PUB. 164

SAILING DIRECTIONS (ENROUTE)

★

NEW GUINEA

★

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TWELFTH EDITION

Preface

Pub. 164, Sailing Directions (Enroute) New Guinea, Twelfth Edition, 2011, is issued for use in conjunction with Pub. 160, Sailing Directions (Planning Guide) Pacific Ocean and Southeast Asia. Companion volumes are Pubs. 161, 162, and 163.

Digital Nautical Charts 4, 5 and 14 provide electronic chart coverage for the area covered by this publication.

This publication has been corrected to 1 October 2011, including Notice to Mariners No. 40 of 2011.

Explanatory Remarks

Sailing Directions are published by the National Geospatial-Intelligence Agency (NGA), under the authority of Department of Defense Directive 5105.40, dated 12 December 1988, and pursuant to the authority contained in U. S. Code Title 10, Sections 2791 and 2792 and Title 44, Section 1336. Sailing Directions, covering the harbors, coasts, and waters of the world, provide information that cannot be shown graphically on nautical charts and is not readily available elsewhere.

Sailing Directions (Enroute) include detailed coastal and port approach information which supplements the largest scale chart produced by the National Geospatial-Intelligence Agency. This publication is divided into geographic areas called "Sectors."

Bearings.—Bearings are true, and are expressed in degrees from 000° (north) to 360°, measured clockwise. General bearings are expressed by initial letters of points of the compass (e.g. N, NNE, NE, etc.). Adjective and adverb endings have been discarded. Wherever precise bearings are intended degrees are used.

Charts.—Reference to charts made throughout this publication refer to both the paper chart and the Digital Nautical Chart (DNC).

Coastal Features.—It is assumed that the majority of ships have radar. Available coastal descriptions and views, useful for radar and visual piloting are included in geographic sequence in each Sector.

Corrective Information.—Users should refer corrections, additions, and comments to NGA's Maritime Operations Desk, as follows:

1.	Toll free:	1-800-362-6289
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3.	DSN:	547-5455
4.	DNC web site:	http://dnc.nga.mil/NGAPortal/DNC.portal
5.	Maritime Domain web site:	http://msi.nga.mil/NGAPortal/MSI.portal
6.	E-mail:	navsafety@nga.mil
7.	Mailing address:	Maritime Safety Office National Geospatial-Intelligence Agency Mail Stop N64-SH 7500 Geoint Drive Springfield VA 22150-7500

New editions of Sailing Directions are corrected through the date of the publication shown above. Important information to amend material in the publication is available as a Publication Data Update (PDU) from the NGA Maritime Domain web site.

NGA Maritime Domain Website
http://msi.nga.mil/NGAPortal/MSI.portal

Courses.—Courses are true, and are expressed in the same manner as bearings. The directives "steer" and "make good" a course mean, without exception, to proceed from a point of origin along a track having the identical meridianal angle as the designated course. Vessels following the directives must allow for every influence tending to cause deviation from such track, and navigate so that the designated course is continuously being made good.

Currents.—Current directions are the true directions toward which currents set.

Dangers.—As a rule outer dangers are fully described, but inner dangers which are well-charted are, for the most part, omitted. Numerous offshore dangers, grouped together, are mentioned only in general terms. Dangers adjacent to a coastal passage or fairway are described.

Distances.—Distances are expressed in nautical miles of 1 minute of latitude. Distances of less than 1 mile are expressed in meters, or tenths of miles.

Geographic Names.—Geographic names are generally those used by the nation having sovereignty. Names in parentheses following another name are alternate names that may appear on some charts. In general, alternate names are quoted only in the principal description of the place. Diacritical marks, such as accents, cedillas, and circumflexes, which are related to specific letters in certain foreign languages, are not used in the interest of typographical simplicity. Geographic names or their spellings do not necessarily reflect recognition of the political status of an area by the United States Government.

Heights.—Heights are referred to the plane of reference used for that purpose on the charts and are expressed in meters.

Index-Gazetteer.—Navigational features and place names are listed alphabetically in the back of the book. The approximate position, along with the Sector and paragraph numbers (e.g. **1.1**), facilitate location in the text.

Internet Links.—This publication provides internet links to web sites concerned with maritime navigational safety, including but not limited to, Federal government sites, foreign Hydrographic Offices, and foreign public/private port facilities. NGA makes no claims, promises, or guarantees concerning the accuracy, completeness, or adequacy of the contents of the web sites and expressly disclaims any liability for errors and omissions of these web sites.

Light and Fog Signals.—Lights and fog signals are not described, and light sectors are not usually defined. The Light Lists should be consulted for complete information.

Ports.—Directions for entering ports are depicted where appropriate by means of chartlets, sketches, and photos, which facilitate positive identification of landmarks and navigational aids. These chartlets and sketches are not always to scale, however, and should be used only as a general informational guide in conjunction with the best scale chart. Specific port facilities

are omitted from the standard format. They are tabulated in Pub. 150, World Port Index.

Radio Navigational Aids.—Radio navigational aids are not described in detail. Publication No. 117 Radio Navigational Aids and NOAA Publication, Selected Worldwide Marine Broadcasts, should be consulted.

Soundings.—Soundings are referred to the datum of the charts and are expressed in meters.

Special Warnings.—A Special Warning may be in force for the geographic area covered by this publication. Special Warnings are printed in the weekly Notice to Mariners upon promulgation and are reprinted annually in Notice to Mariners No. 1. A listing of Special Warnings currently in force is printed in each weekly Notice to Mariners, Section III, Broadcast Warnings, along with the notice number of promulgation. Special Warnings are also available on the Maritime Division web site.

Wind Directions.—Wind directions are the true directions from which winds blow.

Reference List

The principal sources examined in the preparation of this publication were:

British Hydrographic Department Sailing Directions.

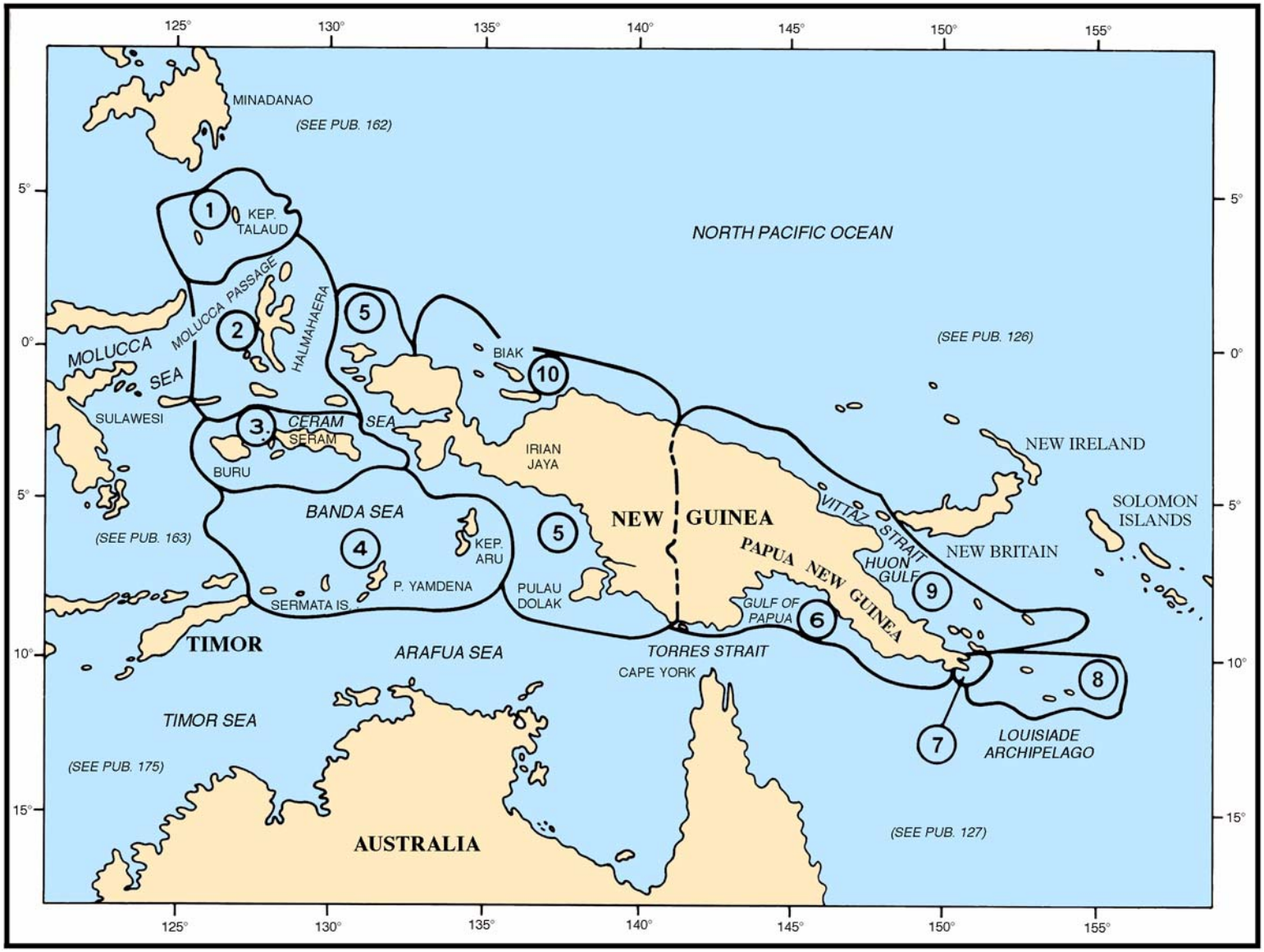
Japanese Sailing Directions.

Various port handbooks.

Reports from United States naval and merchant vessels and various shipping companies.

Other U.S. Government publications, reports, and documents.

Charts, light lists, tide and current tables, and other documents in possession of the Agency.



SECTOR LIMITS—**PUB. 192**

Feet to Meters

Feet	0	1	2	3	4	5	6	7	8	9
0	0.00	0.30	0.61	0.91	1.22	1.52	1.83	2.13	2.44	2.74
10	3.05	3.35	3.66	3.96	4.27	4.57	4.88	5.18	5.49	5.79
20	6.10	6.40	6.71	7.01	7.32	7.62	7.92	8.23	8.53	8.84
30	9.14	9.45	9.75	10.06	10.36	10.67	10.97	11.28	11.58	11.89
40	12.19	12.50	12.80	13.11	13.41	13.72	14.02	14.33	14.63	14.93
50	15.24	15.54	15.85	16.15	16.46	16.76	17.07	17.37	17.68	17.98
60	18.29	18.59	18.90	19.20	19.51	19.81	20.12	20.42	20.73	21.03
70	21.34	21.64	21.95	22.25	22.55	22.86	23.16	23.47	23.77	24.08
80	24.38	24.69	24.99	25.30	25.60	25.91	26.21	26.52	26.82	27.13
90	27.43	27.74	28.04	28.35	28.65	28.96	29.26	29.57	29.87	30.17

Fathoms to Meters

Fathoms	0	1	2	3	4	5	6	7	8	9
0	0.00	1.83	3.66	5.49	7.32	9.14	10.97	12.80	14.63	16.46
10	18.29	20.12	21.95	23.77	25.60	27.43	29.26	31.09	32.92	34.75
20	36.58	38.40	40.23	42.06	43.89	45.72	47.55	49.38	51.21	53.03
30	54.86	56.69	58.52	60.35	62.18	64.01	65.84	67.67	69.49	71.32
40	73.15	74.98	76.81	78.64	80.47	82.30	84.12	85.95	87.78	89.61
50	91.44	93.27	95.10	96.93	98.75	100.58	102.41	104.24	106.07	107.90
60	109.73	111.56	113.39	115.21	117.04	118.87	120.70	122.53	124.36	126.19
70	128.02	129.85	131.67	133.50	135.33	137.16	138.99	140.82	142.65	144.47
80	146.30	148.13	149.96	151.79	153.62	155.45	157.28	159.11	160.93	162.76
90	164.59	166.42	168.25	170.08	171.91	173.74	175.56	177.39	179.22	181.05

Meters to Feet

Meters	0	1	2	3	4	5	6	7	8	9
0	0.00	3.28	6.56	9.84	13.12	16.40	19.68	22.97	26.25	29.53
10	32.81	36.09	39.37	42.65	45.93	49.21	52.49	55.77	59.06	62.34
20	65.62	68.90	72.18	75.46	78.74	82.02	85.30	88.58	91.86	95.14
30	98.42	101.71	104.99	108.27	111.55	114.83	118.11	121.39	124.67	127.95
40	131.23	134.51	137.80	141.08	144.36	147.64	150.92	154.20	157.48	160.76
50	164.04	167.32	170.60	173.88	177.16	180.45	183.73	187.01	190.29	193.57
60	196.85	200.13	203.41	206.69	209.97	213.25	216.54	219.82	223.10	226.38
70	229.66	232.94	236.22	239.50	242.78	246.06	249.34	252.62	255.90	259.19
80	262.47	265.75	269.03	272.31	275.59	278.87	282.15	285.43	288.71	291.99
90	295.28	298.56	301.84	305.12	308.40	311.68	314.96	318.24	321.52	324.80

Meters to Fathoms

Meters	0	1	2	3	4	5	6	7	8	9
0	0.00	0.55	1.09	1.64	2.19	2.73	3.28	3.83	4.37	4.92
10	5.47	6.01	6.56	7.11	7.66	8.20	8.75	9.30	9.84	10.39
20	10.94	11.48	12.03	12.58	13.12	13.67	14.22	14.76	15.31	15.86
30	16.40	16.95	17.50	18.04	18.59	19.14	19.68	20.23	20.78	21.33
40	21.87	22.42	22.97	23.51	24.06	24.61	25.15	25.70	26.25	26.79
50	27.34	27.89	28.43	28.98	29.53	30.07	30.62	31.17	31.71	32.26
60	32.81	33.36	33.90	34.45	35.00	35.54	36.09	36.64	37.18	37.73
70	38.28	38.82	39.37	39.92	40.46	41.01	41.56	42.10	42.65	43.20
80	43.74	44.29	44.84	45.38	45.93	46.48	47.03	47.57	48.12	48.67
90	49.21	49.76	50.31	50.85	51.40	51.95	52.49	53.04	53.59	54.13

The following abbreviations may be used in the text:

Units

°C	degree(s) Centigrade	km	kilometer(s)
cm	centimeter(s)	m	meter(s)
cu.m.	cubic meter(s)	mb	millibars
dwt	deadweight tons	MHz	megahertz
FEU	forty-foot equivalent units	mm	millimeter(s)
grt	gross registered tons	nrt	net registered tons
kHz	kilohertz	TEU	twenty-foot equivalent units

Directions

N	north	S	south
NNE	northnortheast	SSW	southsouthwest
NE	northeast	SW	southwest
ENE	eastnortheast	WSW	westsouthwest
E	east	W	west
ESE	eastsoutheast	WNW	westnorthwest
SE	southeast	NW	northwest
SSE	southsoutheast	NNW	northnorthwest

Vessel types

LASH	Lighter Aboard Ship	ro-ro	Roll-on Roll-off
LNG	Liquified Natural Gas	ULCC	Ultra Large Crude Carrier
LPG	Liquified Petroleum Gas	VLCC	Very Large Crude Carrier
OBO	Ore/Bulk/Oil		

Time

ETA	estimated time of arrival	GMT	Greenwich Mean Time
ETD	estimated time of departure	UTC	Coordinated Universal Time

Water level

MSL	mean sea level	LWS	low water springs
HW	high water	MHWN	mean high water neaps
LW	low water	MHWS	mean high water springs
MHW	mean high water	MLWN	mean low water neaps
MLW	mean low water	MLWS	mean low water springs
HWN	high water neaps	HAT	highest astronomical tide
HWS	high water springs	LAT	lowest astronomical tide
LWN	low water neaps		

Communications

D/F	direction finder	MF	medium frequency
R/T	radiotelephone	HF	high frequency
GMDSS	Global Maritime Distress and Safety System	VHF	very high frequency
LF	low frequency	UHF	ultra high frequency

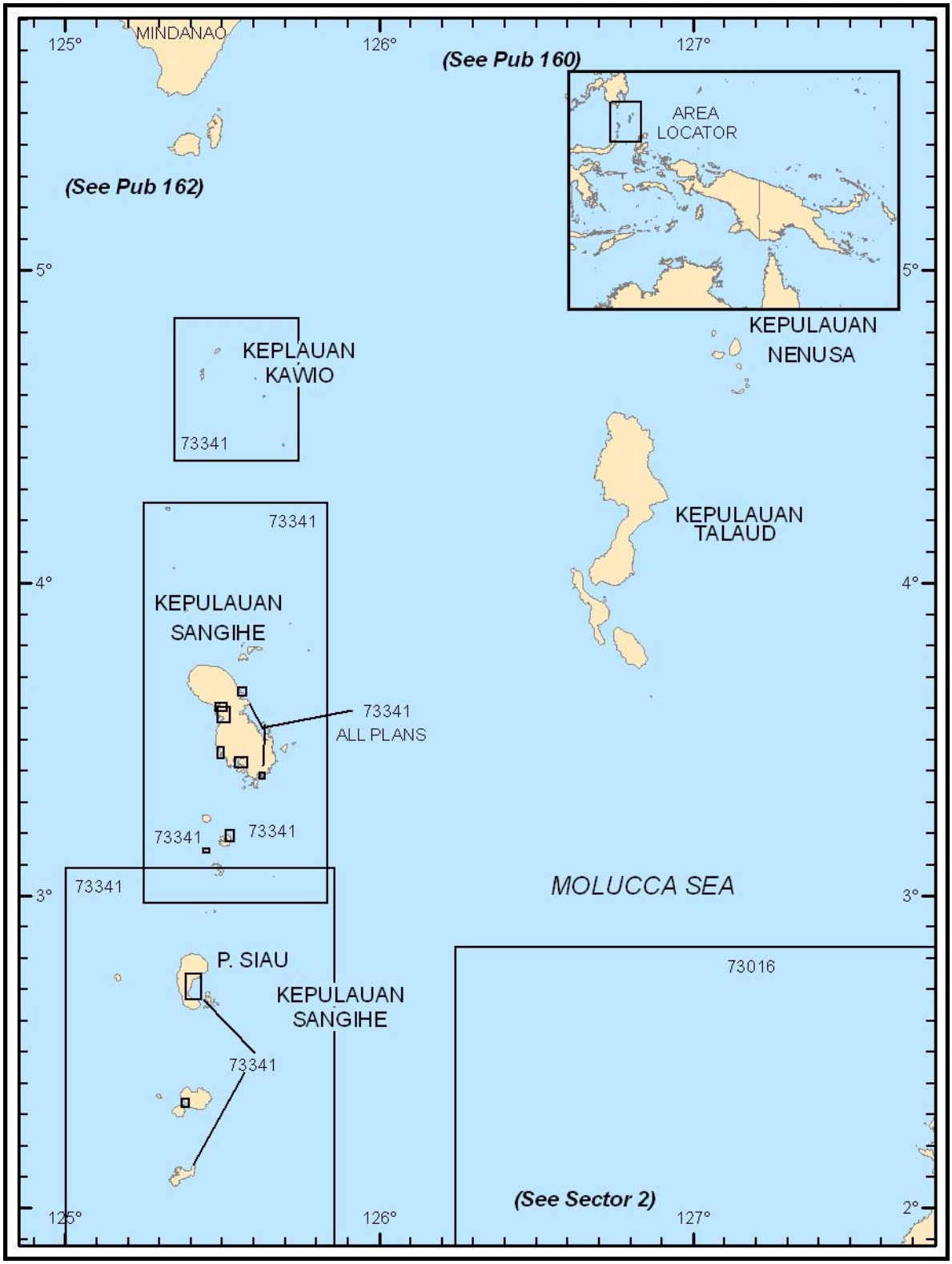
Navigation

LANBY	Large Automatic Navigation Buoy	SPM	Single Point Mooring
NAVSAT	Navigation Satellite	TSS	Traffic Separation Scheme
ODAS	Ocean Data Acquisition System	VTC	Vessel Traffic Center
SBM	Single Buoy Mooring	VTS	Vessel Traffic Service

Miscellaneous

COLREGS	Collision Regulations		
IALA	International Association of Lighthouse Authorities	No./Nos.	Number/Numbers
		PA	Position approximate
IHO	International Hydrographic Office	PD	Position doubtful
IMO	International Maritime Organization	Pub.	Publication
loa	length overall	St./Ste.	Saint/Sainte

Contents



Additional chart coverage may be found in NGA/DLIS Catalog of Maps, Charts, and Related Products (Unlimited Distribution).

SECTOR 1 — CHART INFORMATION

SECTOR 1

ISLANDS BETWEEN MINDANAO AND SULAWESI (CELEBES)

Plan.—This sector describes Pulau Miangas, Kepulauan Nenusa, Kepulauan Talaud, Kepulauan Kawio, and Kepulauan Sangihe, in that order.

General Remarks

1.1 Winds—Weather.—The monsoons blow more steadily and with greater strength in the Molucca Passage than in the Celebes Sea. High winds and squalls are not common. Very rarely a tropical cyclone passes to the N and causes strong winds and swells in the passage.

From December to February, the winds blow from the N, chiefly, but occasionally from the NW. This monsoon is well developed and reaches its greatest strength in February. In March, N winds continue to prevail. In April the winds are lighter, mostly from the N, but veering to the E at times.

Southwest winds set in during May. By June, the East Monsoon has become established, with its prevailing direction from the S and SSE. The East Monsoon blows with somewhat greater strength and steadiness than the West Monsoon in this area. During July, August, and September the prevailing winds are S and SW. The greatest strength of East Monsoon is reached in August.

During October the prevailing winds continue from the S and SW, becoming more variable than in September, with some N breezes.

November is the transition month, during which the winds are light and variable, becoming N by the close of the month. In December the West Monsoon is well established with winds from the NW and NNW.

In general, there is more clear sky and favorable weather during the West Monsoon than in the first part of the East Monsoon season. However, by August the dry season has set in continuing through October, with small cloudiness but a con siderable amount of haze.

Tides—Currents.—Lack of information prevents a detailed discussion of the tidal currents of this area, although know ledge of the vertical movements of the tides is now well estab lished.

Though both the vertical and horizontal movements are due to the same cause, it is useless to attempt to predict the characteristics of one from those of the other.

Attention is called, however, to the fact that the strong tidal currents in the various straits are caused by waters piling up at the entrances to the passages.

Caution.—When navigating through this area, one should bear in mind that it is subject to volcanic eruptions. For instance, in 1922, a submerged volcano was reported 75 miles WNW of **Pulau Sangihe** (3°33'N., 125°33'E.), and in 1892, a tremendous eruption of Awu volcano on Pulau Sangihe occurred. The volcano on **Pulau Ruang** (2°18'N., 125°22'E.), one of the southernmost islands of Kepulauan Sangihe, has often caused great damage.

Numerous fish traps exist W of Kepulauan Sangihe.

Off-lying Islands

1.2 Pulau Miangas (Palmas) (5°34'N., 126°35'E.), an isolated island about 75 miles E of Tinaca Point, the S end of Mindanao, is mostly low and covered with coconut palms, the land being only about 1.5m above high water (See Pub. 162, Sailing Directions (Enroute) Philippine Islands). The NE part rises to a series of hills, the highest of which is 111m high at Gunung Batu. The NE corner is a sheer steep-to cliff 46m high.

The island is surrounded by a wide reef extending up to 0.2 mile from the N and E sides. The edge of the reef is very steep-to, except on the SE side.

A break in the reef in front of the village of Miangas on the SW shore is the best and practically the only landing place for small boats. The beach near the village is sloping and consists of sand and coral; there are numerous rocks near the beach.

The island has been sighted visually from a distance of 25.5 miles and picked up on radar from a distance of 24.5 miles.

Miangas Light is shown from a white framework tower on Mount Gunong; a racon is situated at the light.

Baronto Island, an islet 12.8m high and covered with coconut palms, is on the fringing reef about 183m SE of the S ex tremity of Pulau Miangas. Foul ground extends about 183m S from the islet.

Tides—Currents.—As far as is known Pulau Miangas is in an area where a constant SW to SSW current may be expected, with a last-known maximum velocity of 2.5 knots. A strong S current splits on the bank close N of the island causing danger ous rips and whirlpools in that vicinity, and a considerable eddy to the S. The mean range of tide is reported to be 1.1m.

Anchorage.—A recommended anchorage for moderate-sized vessels is within the N extremity of Baronto Island bearing 248° and the E extremity of Pulau Miangas bearing 023°; this anchorage is clear of strong current, but further out the velocity is about 3 knots; when anchored in depths of less than 29m the vessel is clear of the current, but is subject to eddies and tide rips.

A more difficult anchorage offering protection from NE swell is available off the break in the reef in front of the village of Miangas, about 183m from the boulder line, in 31m. This anchorage is dangerous because the rapidly shoaling bottom forces a vessel to lie very close to the reefs.

Kepulauan Nenusa

1.3 Kepulauan Nenusa (Nanusa) (4°45'N., 127°08'E.), consisting of a group of seven islands, is about 52 miles SSE of Pulau Miangas and 17 miles NE of Kepulauan Talaud. All of the islands are hilly and wooded; the only bare spot is the summit of Pulau Merampit (Marampit), the largest and highest of the group, rising to 165m. The most conspicuous point is the 106m conical peak on Pulau Kakolotan (Kakaroetan).

Pulau Merampit, Pulau Karatung, and Pulau Kakolotan are inhabited. Pulau Intata and Pulau Kakolotan are on the same

reef which dries, at the S end of the group. Ondengbui, a flat bare rocky islet, is on the outer edge of this reef close N of Pulau Intata. There are also some rocks between Pulau Intata and Ondengbui. Pulau Malo, a low island SW of Pulau Kakolotan, is fringed by a wide reef which dries.

Good drinking water is available only at Pulau Merampit.

The water around the islands is very clear; the bottom, consisting mostly of sand and stones, can sometimes be seen at a depth of 29m.

A light is shown on the N side of Pulau Karatung. It was reported that Pulau Malo was a good radar target at a distance of 19 miles.

Anchorage.—Good anchorage may be obtained by vessels with local knowledge during the Northwest Monsoon, S and SE of the village of Karatung on the E side of Pulau Karatung. During the Southeast Monsoon, there is anchorage off the N side of that island.

Vessels with local knowledge may obtain anchorage off the SW extremity of Pulau Merampit, although the depths are great and the bottom steep; the depths are too great off the villages of Merampit and Lalune on the S side of the island.

Good anchorage may also be obtained by vessels with local knowledge, in a depth of 49m, N of the reefs on the W side of Pulau Kakolotan. During the Northwest Monsoon, vessels lie better S of the passage between Pulau Kakolotan and Pulau Malo, or S of Pulau Malo.

Caution.—An 8.8m shoal is about 1 mile N of Pulau Kara tung, and is well marked by discoloration under favorable conditions. Napu Arampua (Napoe Arampoea), a 3m shoal, is 4 miles S of Pulau Karatung. The passage between Pulau Kako lotan and Pulau Malo is encumbered with reefs and should not be used.

A shoal, with a depth of 28m, lies about 2 miles S of Pulau Kakolotan.

Kepulauan Talaud

1.4 Kepulauan Talaud (4°08'N., 126°46'E.) consists of Pulau Karakelong, Pulau Salebabu, and Pulau Kaburuang, all thickly wooded and inhabited islands, about 20 miles SW of Kepulauan Nenusa. The coasts are mostly steep and rocky, interrupted in places by small sandy beaches or marshy flats.

The villages on these islands are almost exclusively on the coast. Agriculture, coconut cultivation, and fishing are the main industries. Copra and lumber are exported.

Tanjung Ambora-besar (4°33'N., 126°45'E.), marked by a light, shown at an elevation of 42m, and on which a conspicuous tree was reported to stand, is the N extremity of Pulau Karakelong, the largest and northernmost of the group. In the N and wider half there is a ridge running in a N-S direction, with Gunung Duata, the summit 680m high, about 15 miles from Tanjung Ambora-besar, and Berawang, 480m high and prominent, about 7 miles from the same point. The island's coasts are generally steep-to, except on the S side, where a bank encumbered by reefs joins it to Pulau Salebabu. The coastal reef is mostly narrow and steep-to; the least swell causes heavy breakers on it.

Teluk Esang (4°28'N., 126°43'E.), about 4.75 miles SSW of Tanjung Ambora-besar, has low shores and a village at its head. Good anchorage may be obtained, in a depth of 46m, with the N entrance point of the bay bearing 002°, at a distance of 0.8 mile.

Batumbalango Bay, about 5 miles SSW of Teluk Esang, affords anchorage on its N side, in a depth of about 31m.

Fair anchorage is also available at Meriri Bay, close S of Teluk Esang, and in Teluk Ambia, close N of Batumbalango Bay.

Nusa Dolong, an islet, is about 0.75 mile offshore close NW of Tanjong Labo, about 6 miles S of Batumbalango Bay, near the middle of the W coast. A prominent white tombstone is on the islet. Nusa Topor, another islet, is about 1 mile SSE of Nusa Dolong. Reefs extend from both of these islets, and a 1.8m shoal is about 0.3 mile WSW of Nusa Topor.

1.5 Beo (4°14'N., 126°47'E.) (World Port Index No. 52480), at the S end of Teluk Beo, about midway along the W coast of Pulau Karakelong, is the principal settlement of the island.

A light is shown from a pole 118m NW of the village flag staff. A conspicuous tree stands on the coast about 0.25 mile SW of Beo and is visible from seaward.

A pier, about 130m long, which is almost dry at HW, extends from the shore at the village. A coral and mud bank is W of the pier and two detached reefs are on the coastal bank, 0.75 mile and 1.5 miles, respectively, NNW of the pier.

Recommended anchorage is about 1 mile NW of the jetty. Anchorage may also be obtained, in 69m, on a line with the prolongation of the pier and the ascending road behind it, but the bottom is very steep. Both of these anchorages are exposed from SW through NW.

On the N coast, a serviceable anchorage is off Kampung Mamahan in a small cove close E of Tanjung Ambora-besar. With local knowledge, vessels can anchor in Bambung Bay, entered close SW of Tanjung Masareh.

On the E coast anchorages can be found at Gemeh and Arangkaa, 5 miles and 6.5 miles, respectively, ESE of Tanjung Ambora-besar. Amat village and Toa Batu village, 3 miles and 6 miles, respectively, S of Arangkaa, also offer anchorage.

1.6 Selat Lirung (3°58'N., 126°41'E.), the strait sepa rating Pulau Karakelong and Pulau Salebabu, is 1.5 miles wide at its narrowest point.

Anchorage.—The only safe year-round anchorage is off Kampung Kiama, close E of Tanjung Dapapat. A 3m shoal is about 1 mile offshore of this anchorage.

Caution.—Several shoals and two islets, Sara-kechil and Sara-besar, are in the S part of Selat Lirung. Napu Mapao, a 7.6m shoal, is about 2 miles NW of Sara-kechil. Several other shoals of 7 to 18m are between Napu Mapao and Sara-kechil. Shoal patches of 2.7 to 7.8m extend about 1.5 miles NE from Sara-besar. A 3m shoal is about 0.5 mile off the S side of Pulau Karakelong and about 2.75 miles NNE of Sara-kechil.

A disturbed sea is usually N of the N entrance to the strait, even when it is calm elsewhere.

1.7 Pulau Salebabu (3°56'N., 126°40'E.) about 15 miles long, is close SW of Pulau Karakelong. A mountain ridge runs through the entire length of the island with several prominent peaks; Ajambanna, which rises to 366m is the highest and is in the middle of the island. This area is readily recognized by its saddle-like formation. It is surrounded by a very narrow shore

reef, which widens out somewhat at the N end and on the S half of the E coast.

The W coast is rocky and steep with projecting rocky points. The villages on the island lie on the E coast.

Kampung Lirung (3°56'N., 126°42'E.) is on the NE coast of Pulau Salebabu. Good anchorage, safe during both mon soons, can be obtained off the town, in a depth of about 29m, with the flagstaff of the village bearing 214°. The best landing, free of rocks, is on the sandy beach near the flagstaff.

Tides—Currents.—At Selat Lirung there is both a diurnal and a semidiurnal tide, but the latter predominates. Neither the spring highs nor the spring lows of the two tides coincide. The highest water level occurs in April or May and in October or November; the lowest water level occurs in January or February and in July or August. The maximum rise and fall that can be expected are, respectively, about 0.9 above and 0.9m below mean sea level.

The currents caused by the semidiurnal tides set NW along the coast around HW and SW around the coast around LW; they can attain a velocity of 2 to 3 knots.

Anchorage.—Salebabu Anchorage is in a small bay about 4.5 miles S of Kampung Lirung. The greater part of the bay is encumbered by a reef that extends from the shores on all sides. Limited anchorage is in a clear space in the middle. Vessels can also anchor off the bay, in 29 to 49m, with Kampung Salebabu, at the NW corner of the bay, bearing about 304°. This is clear of the shoals fronting the shores in the approach to the bay. With E and SE winds some shelter is obtained from Pulau Kaburuang, and complete shelter is obtained during the North Monsoon.

During NE winds. vessels will find anchorage in Teluk Sereh, at the village of Sereh in the middle of the W coast of Pulau Salebabu; however, the depths here are 49 to 101m.

Anchorage is also available off the village of Kampung Kalongan on the W side of Pulau Salebabu, about 1.25 miles SE of Tanjung Salonggan, the N extremity of the island. This anchorage has depths of 40 to 49m, but it is only sheltered from E winds. A 5m shoal is 0.35 mile W of the rocky point N of the village.

1.8 Selat Kaburuang (3°50'N., 126°43'E.), between Pulau Salebabu and Pulau Kabruang, is about 2.25 miles wide at its narrowest part and is clear except for a 4m shoal 1.25 miles WSW of the N end of Pulau Kaburuang.

Tides—Currents.—Strong currents have been experienced in Selat Kaburuang.

Pulau Kaburuang (3°47'N., 126°47'E.), the southernmost island of the group, is 8.5 miles long and has two conspicuous summits, Gunung Padian, 405m high, and Gunung Towoa 481m high. The coast is generally rocky, but broken in places by sandy beaches. The coastal reef is narrow and steep-to. A 4m patch lies 1.25 miles WSW of the N point of the island; a 2.7m shoal is close off Kampung Peret, a village 1.25 miles NW of the S end of the island.

Anchorage.—While there are no recommended anchorages along the coast of this island, vessels can find anchorage in calm weather, but depths of more than 82m will be found more than 91m from the edge of the coastal reef.

Napu Mbalu (Saaru) (Northumberland Reef), 6 miles SSE of Pulau Kaburuang, is a small islet about 1.8m high composed of coral. It is surrounded by a reef with drying rocks. A conspicuous stranded wreck is situated on the islet. A vessel was reported (2004) sunk in position 3°43.0'N, 126°47.0'E, approximately halfway between Napu Mbalu and Pulau Kaburuang.

Kepulauan Kawio

1.9 Kepulauan Kawio (4°35'N., 125°35'E.), consisting of Pulau Marore, Pulau Kawio, Pulau Kemboling, Pulau Memanuk, Pulau Matutuang, Pulau Kawalusu, and Pulau Dumarehe, lies between 4°13'N and 4°45'N, and between 125°19'E and 125°42'E. Pulau Marore, Pulau Kawio, Pulau Kemboling, and Pulau Kawalusu are inhabited; the others are visited from time to time by copra gatherers or fishermen. The inhabitants are engaged mainly in fishing and agriculture.

Tides—Currents.—During October and November, a SSW current will be experienced in the vicinity of the islands. The velocity, but not the direction of the current, is affected by the tides. The velocity varies between 0.5 and 2.5 knots near the islands.

Caution.—Most of the islands are surrounded by fringing reefs. Pulau Marore and Pulau Kawalusu appear to be steep-to in places.

1.10 Pulau Marore (4°44'N., 125°29'E.), the northernmost island of the group, is 140m high at its N end and appears as two islets when approached from E. A light with a racon is shown at an elevation of 180m on the summit of the island. Batu Bawaikang, four rocks, the westernmost of which is 35m high, are close off the N point of the island. Anchorage can be obtained off a small village at the SW end, but tidal currents may be troublesome.

Pulau Kawio and Pulau Kemboling, 5 miles SW of Pulau Marore, are less than 0.25 mile apart and are connected by a drying coral reef. Pulau Kemboling is 108m high.

Tides—Currents.—Strong tidal currents are in the vicinity of the islands.

Anchorage.—Anchorage has been found on the W side of the islands, W of the opening between the two, in 37m, coral, with the SW point of Pulau Kemboling bearing 155° and the W point of Pulau Kawio bearing 004°. Anchorage has also been found, in 27m, coral and coral sand, with the SW point of Pulau Kemboling bearing 164° and the W point of Pulau Kawio 357°. On the E side of the islands there is an anchorage, in 55m, with the N point of Pulau Kemboling bearing 281° and the S point of Pulau Kawio 296°.

1.11 Marie Reef (Ehise), 10 miles E of Pulau Kemboling, is a large coral reef with a sandy patch always above-water. The height and extent of this patch change with prevailing winds and currents. Some rocks are on the NW side of the reef.

Pulau Memanuk (Pulau Memanoek) (4°36'N., 125°38'E.), 62m high and covered with palm trees, is 12 miles ESE of Pulau Kemboling. The depths are very irregular in the vicinity of the island. A shoal with a least depth of 11m is about 1.25 miles E of the island. A 9m shoal and a shoal with a least depth of 4m are 1 mile and 2 miles, respectively, S of the island.

Pulau Matutuang (Pulau Matoetoeng) (4°27'N., 125°42'E.), about 10 miles SSE of Pulau Memanuk, is 67m high, flat-topped, and covered with coconut palms. There is a fringing

reef; two rocks are off the NW end of the island, outside of the reef.

Tides—Currents.—Strong tidal currents are in the vicinity of Pulau Matutuang.

Anchorage may be found, in 46m, off the E side of the is land, staying clear of the coastal reef at the SE point, where shoal water extends for a considerable distance off.

1.12 Pulau Dumarehe (Doembarehe) (4°14'N., 125°42'E.) 12 miles S of Pulau Matutuang, is a 45m high rocky islet cov ered with vegetation.

Anchorage may be found, in a depth of 69m, S of the islet, but currents may be strong. Shoals of 10 to 20m are 6 to 10 miles SSE of the islet. A rock standing high out of the water is SE of the islet. The reef on the S side of the islet appeared to extend about 0.25 mile off. A small tree-covered islet lies close W of Pulau Dumarehe.

Pulau Kawalusu (Pulau Kawaloesoe) (4°14'N., 125°20'E.), 22.5 miles W of Pulau Dumarehe, is 285m high. A light is shown from the island.

Louise Reef (Napo Taroare) (4°03'N., 125°21'E.) is about 11 miles S of Pulau Kawalusu and has a least depth of 11m. A considerable current which gives rise to a violent sea sets across the reef and it should be avoided.

Kepulauan Sangihe

1.13 Kepulauan Sangihe (Kepulauan Sangir), a group of islands lying between 2°N and 4°N, and between 125°E and 126°E, include Pulau Sangihe, the largest island and all the islands S of it to and including Pulau Biaro, about 76 miles S. They are heavily wooded and mountainous, except on places along the coast where they are low and flat; some marshes are on Pulau Sangihe. Tuhana, on Pulau Sangihe, is the principal town. Copra is the main export. There are no roads; communication between villages is by boat.

Islands and Dangers North and Northeast of Sangihe

1.14 Pulau Lipang (3°55'N., 125°23'E.), about 10 miles N of Pulau Sangihe, is 180m high and easily recognized from all sides by its pointed summit which is covered with coconut palms. Except for the N point, the island is reef-fringed for distances of about 0.3 mile offshore. A 12m shoal is about 0.4 mile ENE of the steep N point of the island.

Anchorage may be found N of the island, or off a village near a beach on the W side, where the bottom is steep and the water deep. The currents here are irregular. A better place is N of the island, but anchorage there is further offshore.

Pulau Buang (Pulau Boeang) (3°53'N., 125°43'E.), 20 miles E of Pulau Lipang and covered with coconut palms, is the northernmost of a chain of islands extending 7 miles S; it is 54m high. A light is shown from Boeang. Salehe, an islet, is close N of Pulau Buang. Bowone Reef, with a least depth of 4m, is about 1.5 miles W of Salehe.

Pulau Melihang and Pulau Mekohahe, about 3.25 and 4 miles, respectively, SSE of Pulau Buang, are barren rocks. A 6.9m shoal is about 1.75 miles NW of Pulau Melihang, and a bare rock is about 1 mile N. An extensive reef is close S of Pulau Mekohahe. Pulau Balontohe, 50m high and Inis, 28m high, are steep rocks about 2.25 miles SSE and 3.5 miles S, respectively, of Pulau Mekohahe. This chain of islands is uninhabited. Between and near the chain are several reefs and shoals; therefore, navigation through the group is not advised.

1.15 Pulau-pulau Toade (Kepulauan Toade) (3°46'N., 125°34'E.), consisting of two large inhabited islands and two small islets, lie about 8 miles off the NE side of Pulau Sangihe. The islands are all covered with coconut palms.

Pulau Manipa, the SW island, is 300m high. A coastal reef, which dries, extends about 183m offshore. Anchorage may be obtained off the S side of the island, in a depth of about 80m, with the SE extremity of the island bearing 061°, at a distance of 0.3 mile.

Pulau Boekide, located NE of Pulau Manipa, is 241m high. Anchorage may be obtained 0.3 mile SE of the reef which ex tends from the SE extremity of the island, but the currents are rather strong there. A 4.6m shoal lies about 1.75 miles ESE of the SE extremity of the island.

Tides—Currents.—During November and December, the general current between and E of the islands of Pulau-pulau Toade have been observed to flow at a velocity of 1 to 2.5 knots and to vary in direction by several points.

Pulau Sangihe

1.16 Pulau Sangihe (Pulau Sangir) (3°33'N., 125°33'E.), the largest island of Kepulauan Sangihe, is covered with coco nut palms and is mountainous. Gunung Awu (Gunung Awoe), near its N end, is an active volcano 1,359m high; earthquakes occur frequently. The coast varies greatly; it is steep and rocky in places and low and marshy in others. Fishing with the use of torches at night is carried out in the area, and as a result numerous lights may be seen at night during calm weather.

Tides—Currents.—A 2 knot current has been experienced along the W coast outside of the bays. Tide rips have been observed off the NW end of Pulau Sangihe.

Caution.—A large area of fish havens, lying approximately 20 miles W of Pulau Sangihe and Pulau Siau, extends up to 35 miles W and in a N-S direction for 70 miles.

1.17 North and E coasts of Pulau Sangihe.—The N coast of the island between Tanjung Salimar and Tanjung Peliang, 8 miles SW, slopes gradually toward the interior, except at the stretch near the villages of Kalasuga and Sawang, where it is steep and rocky. The depths along this coast permit anchoring almost anywhere, but there is no shelter.

Anchorage can be obtained, in 49 to 70m, 0.15 mile offshore abreast of Sawang, which is not visible from seaward.

Tabukan (Taboekan), close SE of Tanjung Peliang, affords anchorage, in 26 to 35m, with the flag pole at the village bearing 236°. The depths outside the 50m curve increase rapidly, but within that curve they decrease gradually toward the reefs and the shore. The roads are open from N through E to SE.

Teluk Petaar (3°39'N., 125°34'E.) is entered between Tanjung Buhiase, its SE entrance point, and an unnamed point about 0.5 mile further NW. These entrance points are marked by beacons. A 222° range, consisting of beacons each in the form of a cross, leads into the bay. A light is shown from the

village of Peta at the head of the bay. The bay affords room for one vessel only, up to 119m long. The bay is narrow between the shore reefs, but the depths shoal gradually.

Anchorage.—Vessels can anchor, in 24m, in the inner part of the bay, where they can run a mooring line to an iron ring near a warehouse on the shore. This must be done quickly as strong winds and currents can be expected and there is the danger of drifting onto the shore reef.

Large vessels may anchor, in about 77m, coral, on the range and about 1 mile from the front range beacon mentioned above. The holding ground is not good, however, and the currents, which are semidiurnal, set SE across the entrance at the ebb at a velocity of 3 knots. The flood current sets NW and it is negligible.

1.18 Peta (3°39'N., 125°34'E.), at the head of Teluk Peta, has a postal substation. Cargo is loaded from surf lighters, but the work may be impeded by swell.

Neither fresh water nor stores are available.

Teluk Sensong (3°38'N., 125°35'E.) lies 2.5 miles SSE of Teluk Peta. The shores are fringed by a reef which makes landing difficult.

Tanjung Lehe (3°37'N., 125°35'E.) lies about 1.5 miles SE of Teluk Sensong. Sarahoengoe, an above-water rock, stands on a reef about 1 mile S of the point.

Teluk Talengan (Teluk Mioeloe) (3°35'N., 125°34'E.) is entered about 2 miles S of Tanjung Lehe. Anchorage may be obtained, in depths of 55 to 64m. The sea is usually calm here, although landing is difficult because of the shore reef, mud, and mangroves.

Teluk Kuma (Teluk Koema) (3°34'N., 125°36'E.) affords good anchorage, in 13.7m, with the S entrance point bearing 134° and the center of the village bearing 223°. There is much surf on the beach during the North Monsoon.

Teluk Kulur (Teluk Koeloer), 1 mile further to the SE, affords anchorage, in depths of 20 to 34m, in its outer part. The village of Kulur (Koeloer), at the head of the bay, is difficult to reach because of the broad coastal reef on which a heavy surf may arise.

1.19 Teluk Manalu (Menaloe Bay) (3°32'N., 125°38'E.) (World Port Index No. 52460), the bay formed by Lebessan, Pulau Batuwingkong, and Pulau Tehang, is nearly always calm and is entered between Tanjung Pako, the SE entrance point of Teluk Kulur, and Pulau Batuwingkong. Pulau Batuwingkong is connected to Tanjung Mahema, the N extremity of Lebessan, by a drying reef. The anchorage in the bay is approached on either side of Pulau Tehang. The channel between Pulau Tehang and Pulau Batuwingkong is about 0.5 mile wide between the reefs on either side, with a least known depth of 8.5m in the middle. During the Northwest Monsoon season a heavy swell is in this channel and its use is not recommended. A 7.8m shoal is about 1 mile ESE of Tanjung Pako and a detached rock, 0.7 mile further SE, dries. Batu Malitehang, a reef which dries, is near the middle of the bay.

Tides—Currents.—At Teluk Manalu, there is both a diurnal and a semidiurnal tide, but the latter predominates. The spring highs of the two tides coincide. The highest water level occurs in May and November. The maximum rise and fall that can be expected are, respectively, about 1.3m above and 0.9m below mean sea level.

The coast S of **Lebessan** (3°30'N., 125°40'E.) is very high, rocky, and oddly shaped.

The strait between Pulau Sangihe and Pulau Beng-darat, S of Lebessan, is broad and deep, but a 12.8m shoal, marked by eddies, is in mid-channel. A coral reef with depths of 6m on its outer ends extends out about 0.75 mile S from the S extremity of Pulau Beng-darat. The 129m summit of Pulau Batuwingkong (Batoe Wingkong) and the coastal cliff at Lebessan in range 346° leads through the strait. A deep passage is between Pulau Beng-darat and Pulau Beng-laut; the shore reefs are easily recognized. Many bare rocks are N and E of Pulau Beng-laut (Beng Laoet).

A current with a velocity of 3 knots may be experienced in the strait between Pulau Sangihe and Pulau Beng-darat; it sets N with the flood and S with the ebb.

Anchorage.—A hill, 149m high, and another, 82m high, are 0.7 mile SW and 0.9 mile WSW, respectively, of Batu Malitehang. Anchorage can be taken, in 40 to 49m, mud, with the 149m hill bearing 180° and the 82m hill bearing 260°.

1.20 Dane (3°26'N., 125°41'E.), a steep rocky islet with a very narrow coastal reef, is S of the above strait. A deep passage separates it from Pulau Sangihe.

Anchorage.—Off the village of Salurang (Saloerang), on the coast of S of Lebessan, there is anchorage, in 55m, with the SW point of Pulau Beng-darat bearing 124°, and white rocks N of Pulau Beng-laut bearing 069°, but this location is rather close to the reef. Landing is difficult during the Northwest Monsoon because the coastal reef dries at that time.

1.21 South and W coasts of Pulau Sangihe.—Pulau Lenggis (3°23'N., 125°38'E.), an islet, 110m high, is separated from Pulau Sangihe by a narrow passage, navigable only by native canoes at HW.

Teluk Ngalipaeng, W of Pulau Lenggis, is calm only during the North Monsoon. Anchorage can be obtained, in 86m. The village of Kampung Ngalipaeng is at the head of the bay, off which is a wide shore reef.

Pulau Batunderang (Pulau Batoenderang) (3°22'N., 125°37'E.), an island, 187m high, is W of Teluk Ngalipaeng and is separated from the S extremity of Pulau Sangihe by a passage which dries.

Pulau Bebalang (3°20'N., 125°34'E.), an island about 2 miles W of Pulau Batunderang, is 131m high. A 5.9m shoal is about 1 mile SE of the island. A navigable channel is between the island and Pulau Sangihe. Anchorage can be taken, in 80m, about 0.25 mile off the village of Kampung Bebalang on the N shore of the island, with the flagstaff bearing 146°.

Two islets, Pulau Mendako (Mendakoe), 79m high, and Pulau Dakupang (Dakoepang), are on a reef N of Pulau Bebalang. A rock, awash, is 0.6 mile W of Pulau Dakupang; an 11m shoal is about 1 mile SW of Pulau Mendaku.

The village of Kampung Lapango lies on the coast of Pulau Sangihe E of **Tanjung Boewoe** (3°23'N., 125°34'E.). Anchorage can be obtained, in about 55m, about 91m off the drying reef with the middle of the village of Kampung Lapango bearing 052°. Local knowledge is necessary.

1.22 Teluk Dago (3°26'N., 125°33'E.) is entered between

Tanjung Toade Manandu (Manandoe) and Pulau Mahumu (Mahoemoe). Tandjung Toade Manandu is rocky and has a small island W of it. A light is shown from Toade Manandoe. Pulau Mahuma, with a summit 241m high, is a hilly island separated from Pulau Sangihe by a channel that is navigable only by small native canoes. Inside Teluk Dago, it is always calm E of Sama, a small islet off the shore of the bay.

Anchorage sheltered from all but SW winds may be obtained, in about 49m, with Sama bearing 262°. At Dago, close NE of Sama, a small mole extends out across the drying shore reef. A flagstaff is at the foot of the mole. The reef at the head of the bay and along the N shore of the bay occasionally dries out for a distance of about 0.25 mile.

In the bight at the village of Kalinda, about 2 miles N of Teluk Dago, the depths are too great and the bottom too steep for anchorage.

1.23 Teluk Tamako (3°27'N., 125°30'E.) affords anchorage in front of the village of Tamako. Anchorage should be in 55m or more in about the middle of the bay with the two points on the coast NW, Tanjung Kapehetang and Tanjung Lelapide, in line. the holding ground is poor, however, and the main engines should be kept ready for use.

A light is shown from a beacon in Tamako about 0.15 mile NNW of the pilot station.

Teluk Manganitu (3°34'N., 125°30'E.) is a bay bordered by coconut palm covered hills 198 to 244m high. A shore reef extends about 0.5 mile off the S part of the bay. A 2.3m shoal, often marked by discoloration is 0.75 mile SSE of Tanjung Kalehangeng. Safe anchorage is in the bay, in 53m, with Tanjung Totone bearing N and the small island of Bukide (Boekide) bearing E, but W and S winds can be troublesome.

The coast between Teluk Manganitu and Teluk Tahuna is steep, rocky, and fringed by a drying reef in several places.

Teluk Tahuna (3°36'N., 125°29'E.), is about 0.5 mile wide and extends about 1.5 miles inland. Except for the shore reef on the S side and the shore bank at the NE corner, there are no dangers in the bay, so it can be entered even at night in clear weather. A 520m hill close S of the bay is conspicuous and a small white mosque with a red roof at the head of the bay is prominent.

A light shows at a height from 130m near the S entrance point of the bay.

1.24 Tahuna (3°37'40"N., 125°29'25"E.) (World Port Index No. 52440) is the principal village of Kepulauan Sangihe. A custom house is at the head of the pier. Copra is the chief export. A light is shown from an iron support at the foot of the pier when vessels are expected.

There is a pier, 29m long, with a depth of 3.1m alongside. Large vessels, up to 70m long, remain at anchor and unload into barges.

Tides—Currents.—There is both a diurnal and a semi-diurnal tide in the bay, but the latter predominates. The spring highs of the two tides coincide. The highest water level occurs in May and November. The maximum rise and fall that can be expected are, respectively, about 1.1m above and 0.8m below mean sea level.

Anchorage can be taken off the village, in about 35 to 55m, with the pier light bearing 355°. The holding ground is poor, however, and the main engines should be kept ready for use. It is usually calm, but during the North Monsoon, W winds may spring up and last from 1 to 4 days; they are not dangerous to vessels but cause much surf on the beach. The W winds, which occur at other times of the year, as well as the often strong SW winds, are of shorter duration and lesser intensity, but they may hinder loading or unloading.

From Teluk Tahuna to about 1 miles S of Tanjung Dodah, the land slopes gradually down to the shore with sand and stone beaches, and then to Tanjung Salimar the coast is steep and rocky. No dangers have been seen along this part of the coast.

The Karakitang Islands

1.25 The **Karakitang Islands** (3°10'N., 125°29'E.) is a collective name for the smaller islands and rocks lying between Pulau Sangihe and Pulau Siau. Only Pulau Kalama, Pulau Karakitang and Pulau Para are inhabited. When in this area, the caution note in paragraph 1.1 regarding volcanic activity should be borne in mind. The rocks which are off the W side of Pulau Mahengetang are the result of an eruption in 1919. According to the inhabitants, a column of water periodically spouts high into the air.

The passage between Pulau Sangihe and this group of islands, as well as the passage between Pulau Siau and the group, is clear of dangers. The chart is the best guide for the location of the various islands and the dangers near them.

Pulau Kalama (3°15'N., 125°27'E.), lying about 10 miles SW of Pulau Batunderang, previously described in paragraph 1.21, is 362m high. Anchorage may be obtained S of a village on the SW side of the island, in a depth of about 60m, about 0.15 mile offshore. The coastal reef here extends about 91m offshore. A considerable current has been noticed near the anchorage.

1.26 Pulau Karakitang (3°10'N., 125°31'E.), 249m high, lies about 3.25 miles SE of Pulau Kalama. Teluk Behongang, a bay on the N side of Pulau Karakitang extends halfway into the island. It affords sheltered anchorage, in 80m, in front of the village of Behongang. The extremities of the shore reefs are easily distinguished. A stone mole with wooden superstructure has a depth of 2m alongside and is a good landing place for boats.

Pulau Mehengetang, 139m high, lies about 6 miles S of Pulau Kalama. There is an islet close W, and three low rocks within 0.25 mile WNW of the island. A village, with a flagstaff, is on the SW side of the island. Anchorage may be obtained off the village, in a depth of 37m, with a vegetation covered islet on the reef bearing 339°, distant 0.3 mile.

Caution.—The whole area W and S of the island is reported to be disturbed by eddies and tide rips.

1.27 Pulau Para (3°05'N., 125°30'E.), along with Pulau Siha, Pulau Salangkere, and Pualu Nitoe, lie in a group close together about 9 miles SSE of Pulau Kalama. Anchorage may be obtained, in 60m, 0.2 mile off the village on the SW point of Pulau Para, with vegetation-covered rocks on the W coast N of the inlet in range with the highest point of Pulau Salengkere and the rocky point S of the village bearing about ESE. Local knowledge is necessary. A strong current between Pulau Para

and Pulau Nitu is W of this anchorage.

The channel between the islands of Pulau Para, Pulau Salengkere, and Pulau Siha should be navigated only by small native canoes, but the area between these three islands and Pulau Nitu is apparently deep and clear.

Pulau-pulau Nenoeng (Pulau-pulau Nenong) (3°04'N., 125°40'E.), about 18 miles SE of Pulau Kalama, consists of a 49m high islet, with some above-water rocks lying about 0.25 mile N and S of it. A submerged rock lies about 1 mile SSE of the islet. A coral bank, with a depth of 14.6m, often marked by breakers and tide rips, lies 4 miles SW of the islet.

Pulau-pulau Sanggeluhang (Pulau-pulau Sanggeloehang) (2°57'N., 125°29'E.), 80m high, with an islet 77m high on the same reef close S, is 7 miles SSW of Pulau Para. Pulau Bawondeke (Bowondeke), 56m high, is 1.5 miles W of Pulau Sanggeluhang. A shoal with a least depth of 5m is about 0.5 mile NW of Pulau Sanggeluhang.

Tides—Currents.—An E set at the rate of 1.5 to 2.25 knots has been experienced between Pulau Sanggeluhang and Pulau Tahulandang (2°21'N., 125°22'E.), about 38 miles S.

Pulau Siau and Off-lying Islands

1.28 Pulau Siau (2°43'N., 125°22'E.), locally known as Karang Etang, meaning "highest island," is in general high with steep coasts and no beaches or landing places except in the bight on the E coast. The island is covered with coconut palms, out of which rise several jungle-covered conical peaks. An exception to this is the bare peak of the volcano Gunung Api, last reported active in May 1971. This volcano is 1,827m high and is the highest point on the island.

The island is densely populated. Many of the inhabitants are fishermen who also farm. There are coconut and nutmeg plantations.

1.29 Ulu (2°44'N., 125°25'E.) is at the N part of Ulu Road. There is a pier at the village from which a light is shown on the arrival of vessels.

Anchorage can be obtained 0.15 mile offshore, in 80m, with the charted conspicuous white pillar on the shore bearing N. The bottom is very steep here, however, and it is advisable to lay out a hawser to the shore. During heavy squalls anchorage may also be found, in 48m, with the same white pillar bearing 010° and the flagstaff bearing 296°; a hawser to the shore should not be necessary. From the beginning of January until the middle of April this anchorage is not safe because of NE and E winds. During that time and during the South Monsoon, anchorage off the village of Sawang, 3.5 miles S, is preferred; here the bottom is not so steep.

Elsewhere on Pulau Siau anchorage is off Ondong, at about the middle of the W coast, in 101m, very close but somewhat to the S of the shore reef. Anchorage will also be found, in a depth of 84m, about 0.1 mile offshore with the center of the village bearing 034°.

Pulau Pahepa, Pulau Gunatin, and Pulau Mahoro are E of the S part of Pulau Siau. The channel between Pulau Siau and hilly Pulau Pahepa is clear and has a least depth of 37m, and the shore reefs are well-marked by discoloration. There is anchorage here with good holding ground, but the currents may attain a velocity of 2.5 knots and eddies may be encountered. Off the village on the W side of Pulau Pahepa there is anchorage with shelter during the entire year. A drying reef connects Pulau Pahepa with rocky Pulau Gunatin, the N side of which should be given a wide berth. Pulau Mahoro, steep, rocky, and marked by a light, 80m high, is E of Pulau Pahepa. There are three small islets between the two. Anchorage is not recommended near the islets because of reefs and strong currents, but between the islets and Pulau Pahepa there is a limited area where anchorage is possible. Laweang is 61m high and the southernmost of the islets. A coral reef with a depth of 0.3m extends 0.5 mile S; with a heavy swell the reef may uncover at LW.

1.30 Pulau Makalehi (2°44'N., 125°10'E.), an isolated islet 228m high, is about 11 miles W of Pulau Siau. The islet is covered with vegetation. The village of Makalehi is on a small bay on the SW side of the islet. The bay is obstructed by reefs and dries. The islet was reported to be a good radar target at a distance of 23 miles.

Islands South of Pulau Siau

1.31 Pulau Tahulandang (2°21'N., 125°22'E.), about 15 miles S of Pulau Siau, is mountainous and rises to an elevation of 805m. Its summit is the highest point of a crater which is broken on the NNW side forming Minangan Bay. In the middle of this crater there is an extinct volcano which is steep on all sides. The S and E coasts are very steep-to. The large coastal reef, which is not well marked by discoloration, extends 0.76 mile from the W end of the island. The channel between this reef and the reef at Pulau Pasige is deep and clear. The W point of Pulau Ruang bearing 180° will lead through this channel when it is difficult to identify the reefs. There are coconut plantations on the island. It is well populated and large trading vessels are built here.

A light is shown from a white column near the flag pole at the village of Tahulandang (Boehias), on the SW side of the island. Vessels call at the villages.

Anchorage.—The coast reef is very narrow near the light at Tuhulandang, and vessels may anchor close off it, in 80m. Further to the NW there is anchorage, in 69m, further from the reef. The currents which set through the narrows between Pulau Tahulandang and Pulau Ruang are less troublesome at the latter anchorage. When the sea is rough, anchorage may be taken on the N side of Pulau Ruang, in 49 to 80m, laying out a hawser to the shore.

Off the village of Haas, on the S side of the island, there is anchorage, in 48m, about 0.2 mile offshore. From this anchorage the NE point of Pulau Biaro bears 181°, the road in the village bears 013° and the point to the E bears 083°. Local knowledge is necessary. It is an open roadstead and a fairly strong current is sometimes experienced.

On the N side of the island there is anchorage in Minangan Bay, near the village of Minangan. Local knowledge is necessary. It is very deep here, but the shore reef is very narrow or non-existent so that the shore can be approached closely. It is well-sheltered during the South Monsoon and in the transition periods between monsoons.

1.32 Pulau Ruang (Pulau Roeng) (2°18'N., 125°22'E.), close SW of Pulau Tahulandang, consists entirely of an active

volcano 731m high. The summit is on the E side of the crater and is easily recognized by several sharp rocky points. At a distance, the volcano has the appearance of a table mountain with steep sides. The last eruption occurred in 1904. A coral reef extending from the W end of the island is the only coastal reef. There are few inhabitants.

The passage between Pulau Ruang and Pulau Tahulandang is 0.5 mile wide, but its use is not recommended because of strong tidal currents which set SE with the flood and NW with the ebb. A 1.8m midchannel shoal is at the E entrance.

Pulau Pasige (2°21'N., 125°19'E.), 4.5 miles W of Pulau Tahulandang, is low, covered with mangrove, and uninhabited. It is on the W end of an extensive drying reef which is generally marked by breakers, even at HW. A light is shown from the W side of the island.

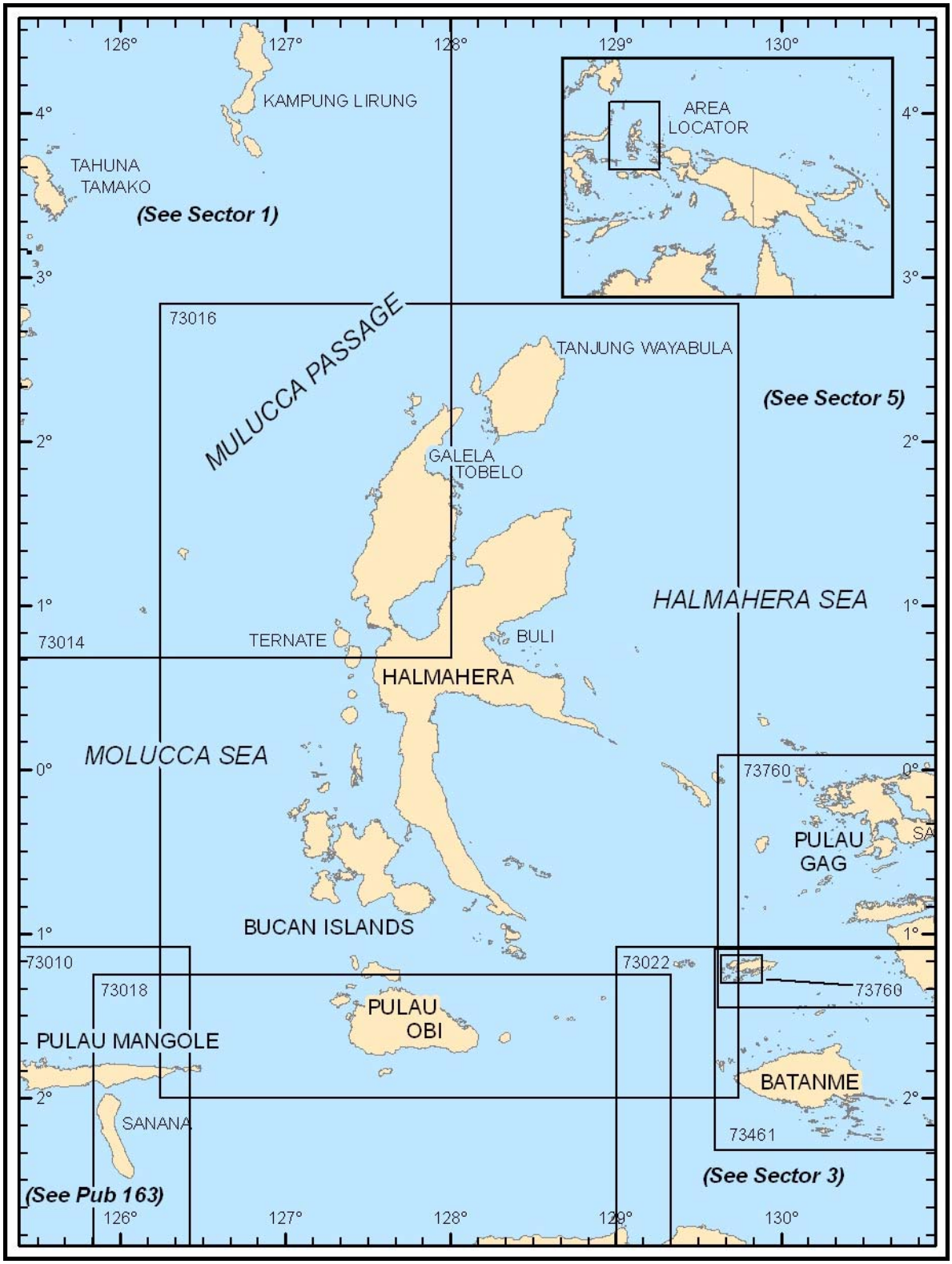
1.33 Pulau Biaro (2°06'N., 125°23'E.), an inhabited island 10 miles S of Pulau Ruang, is the southernmost island of Kepulauan Sangihe. It is hilly and has a very conspicuous peak, Bukide (Boekide), 401m high on its E side. Toendoeng-koehan is a small islet, 54m high, off the SW point of the island. The low NW point, where a 9m rock stands, should be given a berth of 1.5 miles. The outermost shoal, with a depth of 5.8m, is about 1 mile NW of the point; the currents are strong over the shoals in this vicinity. Another pillar-like rock stands near Tanjung Meoh, the NE point of the island. From this point a submerged ridge extends 1.5 miles N with a depth of 35m at its outer end. Currents are strong over this ridge. A berth of at least 0.5 mile should be given the E coast to clear several offshore dangers close to the shore.

Anchorage can only be found on the N and NE sides of the island. The bay on the N side should be approached with caution because the depths decrease suddenly and the shore reef cannot be distinguished at HW when the sea is calm. Except for 4.6m reef about 0.2 mile from the shore reef, there are no detached dangers in the bay, and anchorage is almost anywhere 0.2 mile from the reefs.

In the bight on the NW side there is anchorage, in 70m, off the village of Lamanggo, with Bukide bearing 139°; however cross currents should be expected.

The passage between Pulau Biaro on the N and Pulau Bangka and Pulau Talisei on the S is 18 miles wide and apparently deep and clear. A depth of 88m is about 8 miles SSW of Tanjung Buang the S point of Pulua Biaro and a depth of 46m was reported 5 miles SSW of Tanjung Buang. A depth of 62m was reported 6 miles WSW of Tanjung Buang and depths of 64m were reported 4 and 3.8 miles W and WSW, respectively, of Toendoengkoehan.

Pulau Bangka and Pulau Talisei are heavily wooded and hilly, rising to heights of 348m and 359m, respectively. A light is shown from Tanjung Arus (Tanjung Aroes), the N extremity of Pulau Talisei. Pulau Bangka and Pulau Talisei, lying off the N end of Sulawesi (Celebes) and forming the S side of Selat Bangka, are further described in Pub. 163, Sailing Directions (Enroute) Borneo, Jawa, Sulawesi, and Nusa Tenggara.



Additional chart coverage may be found in NGA/DLIS Catalog of Maps, Charts, and Related Products (Unlimited Distribution).

SECTOR **2** — CHART INFORMATION

SECTOR 2

THE NORTHERN MOLUCCAS—HALMAHERA, KEPULAUAN OBI, AND KEPULAUAN SULA

Plan.—This sector describes the W coast of Halmahera with the islands off it, including the Bacan Islands and Kepulauan Obi, and then the E coast of Halmahera, with the islands on the W side of the Halmahera Sea, including Batanme.

The Northern Moluccas

2.1 The Northern Moluccas include Halmahera and its adjacent islands; the Bacan Islands, Kepulauan Obi, and its adjacent islands; and Pulau Mayu and Pulau Tifore, which are about mid-channel between Halmahera and Sulawesi. These islands are covered with rich tropical forests with many coconut plantations along the coasts.

This group of islands is separated from the N part of Sulawesi by the Molucca Sea and Molucca Passage, which extends to the N. Djailolo Passage separates the group from the islands off the NW end of New Guinea. The Ceram Sea separates the group from the islands to the S.

Pulau Maju (Pulau Mayu) (1°19'N., 126°23'E.) is marked by lights shown from its E and W extremities. The island, which lies about midway between Halmahera and the NE end of Sulawesi, is hilly. At its center it is 413m high and has a smooth rounded appearance. The island is reported to be a good radar target. During the South Monsoon, anchorage may be obtained, in a depth of about 40m, off the N side of the island. Kampung Pasir Putih is on the W extremity of the island; the best landing place is E of it. A sunken wreck is reported to lie about 30 miles NE of Pulau Maju.

Pulau Tifore (1°00'N., 126°00'E.), about 24 miles SW of Pulau Maju, is lower than the latter island, but rises to a 183m hill in its NW part. It has been reported to be a good radar target at a distance of 24 miles. Gureda, an islet 98m high, is off the NW end of Pulau Tifore and is connected to it by a drying reef. A reef, with a depth of 2.4m and marked by discoloration, is close off the middle of the SW side of the island. The village of Kampung Balibi is on the NE coast; fresh water is available.

Tides—Currents.—The currents near the above islands and in the open areas such as the Molucca Sea are dependent on the winds. During the South Monsoon they set to the NNE; as a rule they do not exceed a rate of 0.6 knot but may attain a rate of 2 knots at times. During the North Monsoon they set to the ESE and may also attain a rate of 2 knots, but generally do not exceed 0.75 knot. The currents are stronger W of the islands during the South Monsoon, and stronger E of the islands during the North Monsoon.

Halmahera

2.2 The sparse scattered population of Halmahera are of the Alfuren and Papuan types and to a great extent they dwell on the coast. The N part of the island is the most populated. Coconut culture and forest produce are the principal means of livelihood; fishing is only carried on in the rivers.

The island, although the largest of the Northern Moluccas, is the least important and consists of four long narrow peninsulas with deep intervening gulfs. It is in the N part of the group and is about 190 miles long in a N-S direction.

Mountain chains intersect all four peninsulas. The chain of mountains on the W side is of volcanic character, but Gunung Gamkonora, 1,567m high, is the only active volcano.

Off-lying islands.—Kepulauan Loloda Utara (North Loloda Island) (2°13'N., 127°47'E.), W of Tanjung Bisoa, the N extremity of Halmahera, are moderately high and consist of the four large inhabited islands of Pulau Doi, Pulau Tuakara, Pulau Dagasuli, and Pulau Salangadeke, and several smaller islets in their vicinity. Pulau Doi, the largest, is 330m high, and has been reported to be a good radar target up to a distance of 23 miles. Extensive reefs extend both N and S from Pulau Salangadeke, the S island. The group is separated from the Halmahera coast by a clear channel with a least width of 2.25 miles. Except for reefs extending from the islands and a 5m shoal 0.5 mile N of the W part of Pulau Dagasuli, the channels between the islands are clear. Local knowledge is necessary.

Vessels call at these islands for ebony. They have no definite anchorages, but anchor in the most convenient place for picking up their cargo.

Anchorage is available, in 60m, in a small bay at the village of Kampung Dama on the S side of Pulau Doi. The W shore of this bay has a fringing reef, but the NE shore is clear. Local knowledge is necessary.

Regulations.—For information regarding designated Archipelagic Sea Lanes, as defined by the United Nations Convention on the Law of the Sea (UNCLOS), lying N and W of Halmahera, see Pub. 120, Sailing Directions (Planning Guide) Pacific Ocean and Southeast Asia.

Halmahera—West Coast

2.3 **Tanjung Bisoa** (2°13'N., 127°57'E.), the N extremity of Halmahera, to Pulau Diti the coast trends in a SW direction and is rocky and steep with perpendicular cliffs formed by mountain spurs in places. Occasionally intervening sandy beaches will be found. Tanjung Bisoa has a fringing reef, but may safely be rounded at a distance of 1 mile; otherwise the coast is steep-to.

Tides—Currents.—At **Kampung Asimiro** (1°59'N., 127°45'E.), there is both a diurnal and a semidiurnal tide, but the latter predominates. Neither the spring highs nor the spring lows of the two coincide. The highest water level occurs in May and November; the lowest in June or July and in December or January; the maximum rise and fall that can be expected are, respectively, about 0.75m above and 0.75m below mean sea level.

Pulau Diti (1°57'N., 127°43'E.) is a thickly-wooded coral island near Halmahera coast about 22 miles SW of Tanjung Bisoa. E of the island the coast forms a small bight, where there is anchorage, in 29m Local knowledge is necessary.

From Pulau Diti the coast trends SSW for 18 miles to Teluk

Loloda, and has a wild and inhospitable aspect. It should be given a wide berth by large vessels especially during the monsoons, when rollers are experienced near the coast. Between the various points, which are formed by steep spurs of mountain range, narrow beaches with small villages are found. There is usually anchorage off these villages, but landing is difficult.

The only good shelter for small vessels is in Teluk Barataku, behind a rocky reef extending from the S point. Depth here is 73m. At the villages of Kampung Pumadada and Kampung Gamkahe, 2.3 and 5 miles S respectively, of Pulau Diti, the anchorages are entirely open.

2.4 **Teluk Loloda** (1°41'N., 127°33'E.) is formed by Kepulauan Loloda Selatan (South Loloda Islands) and the mainland of Halmahera. The three main islands of Pulau Kahatola, Nusa Sidanga, and Nusa Adui are 226m, 222m, and 151m high, respectively, and uninhabited. A lighthouse, 30m in height, has been established on **Sidanga** (1°40'N., 127°29'E.). The double top of Nusa Adui, when seen between the other two, appears conical. Of the mountain peaks in the interior of Halmahera Gunung Loloda, 6 miles ESE of the bay, is conspicuous when seen from any direction. It has a rounded summit,1,094m high; close S of it is another lower peak.

Anchorage.—Vessels can anchor S of Doeta Seta, which is off the mainland of Halmahera, in 29 to 66m. A waterfall on the E side of Pulau Kahatola or the summit of that island bearing 273° leads into an anchorage. Vessels should not go too far in, however, as the E part of the bay has many submerged reefs.

In Teluk Loloda there are numerous reefs; an extensive shoal bank is in its E and S parts. Both the N and S entrances are clear except for the reefs skirting the islands. The passage E of Nusa Adui is not recommended because of the numerous rocks and reefs in it. Sungai Loloda flows into the N side of Teluk Loloda, but is navigable only by native canoes. Kampung Loloda is a short distance up the river.

Directions.—Large vessels navigating from S to N keep in mid-channel between Pulau Kahatola and Nusa Adui until the N point of Nusa Adui is passed; then steer N, keeping near the shore of Nusa Kahatola to avoid the shallow water and shore reef of Doeta Seta to the E. This passage is deep and easy. The shore reefs are steep-to and show up well. Current is negligible.

2.5 Between **Tanjung Rongi Mhe** (1°38'N., 127°32'E.), at the S end of Teluk Loloda, and Tanjung Bobo, about 37 miles SSW, the coast is high and too steep to be accessible except in the bights, where it is low and can be identified by the plains extending inland from them. The active volcanoes form the highest peaks of this desolate and mountainous land.

Tanjung Ligua Ma Dehe (1°33'N., 127°30'E.), 6 miles SSW of Tanjung Rongi Mhe, is high and projects some distance to the W. Close to its S side are some conspicuous rocks. The coast immediately N of the point is rocky; then almost to Teluk Loloda it forms a bight with a narrow sandy beach.

2.6 **Gunung Gamkonora** (1°23'N., 127°32'E.), 1,567m high and the highest peak along this stretch of coast, is still an active volcano and emits a constant cloud of smoke. Between this peak and Gunung Loloda is another peak, Ibu, which is 1,383m high. About 3 miles NE of Tanjung Bobo is the cone-shaped peak of Jailolo (Djailolo), 1,036m high and with a lower peak on its W side. Several other peaks are near the coast between this peak and Gunung Gamknora. A lighthouse, 40m in height, has been established (2003) at **Tanjung Bobo** (1°02'N., 127°24'E.).

In the bight between the hills SE of Tanjung Ligua Ma Dehe and Tanjung Duko, abreast of Gunung Gamkonora, the coast is generally low, so that the lone conical hill, Ngidi Matjin, 117m high and midway between the two points, forms a conspicuous mark. South of Tanjung Duko the coast is rocky.

The Ibu River discharges 3.5 miles S of Tanjung Ligua Mahe Dehe. Anchorage may be had, in 12.8m, off the mouth of the river about 0.5 mile from the shore, with Tanjung Ligua Mahe Dehe bearing 348° and the peak of Ibu 092°. It is open to W winds and, in a Northwest Monsoon, a vessel should not go closer in as the swell may rise suddenly. In the Southeast Monsoon, vessels may anchor 0.15 mile closer, in depths of 9.1m. North of the anchorage, the bottom is stony, but to the S it is sandy.

Teluk Sahu (1°09'N., 127°24'E.) is a large bight with a steep beach, on which is the village of Kampung Susupu. When anhoring in front of the village it is advisable to keep in depths of 29 to 40m because rollers come up with the slightest W wind. Small vessels find shelter in the heavily sanded mouth of a small river which enters the sea S of Susupu. The narrow plain with Teluk Sahu is fertile and thickly populated.

Salo Island (1°05'N., 127°24'E.), close W of the high coast between Teluk Sahu and Tanjung Bobo, is very conspicuous.

2.7 **Teluk Jailolo** (Teluk Djailolo) (1°02'N., 127°28'E.), entered between Tanjung Kailupa and Tanjung Guai, a point 3.25 miles SE, is deep. The most conspicuous hills are Jailolo, 1,036m high, and three small hills at Tanjung Guai, 199 to 250m high. Babua, a small coral islet 18m high, is 0.5 mile NW of Tanjung Guai. The village of Kampung Jailolo, on the N side of the bay, cannot be seen from offshore. A light is reported to be shown from a metal framework tower at Jailolo.

The shores of Teluk Jailolo are fringed with drying reefs and shoals which extend, in places 0.6 mile offshore; beacons mark the edge of the reef in places near Kampung Jailolo.

Directions.—A vessel approaching Teluk Jailolo from S should keep Buku Kiematubu (Kie Matubu), the 1,757m peak of Pulau Tidore, bearing 186° astern until near Babua, which can be rounded closely. After passing Babua, continue into the bay with Babua and Buku Kiematubu in range 190°, astern. The current in Teluk Jailolo is negligible.

2.8 **Teluk Tofiri** (0°59'N., 127°30'E.), the next bight S of Teluk Jailolo, has a low shore and is encumbered with dangers. Tofiri, a sandbank above water is 2 miles offshore about 3 miles S of Tanjung Guai. A reef which dries and a 5.8m shoal are 0.7 and 0.9 mile, respectively, NNE of Tofiri. Babua in line with the mountain Jailolo, bearing 338°, leads NE of these dangers.

Several shoals with depths of 1.8m or less are within 0.75 mile of the coast.

Tanjung Sidangoli (0°53'N., 127°30'E.), about 7 miles S of Tanjung Guai is the N limit of Teluk Dodinga. South and E of this point a number of low mangrove-covered islands and reefs front the coast.

Pasir Lamo (0°53'N., 127°27'E.), a shoal with 4m and steep-to, is about 2 miles W of Tanjung Sidangoli.

2.9 **Teluk Dodinga** (0°49'N., 127°33'E.), between Tanjung Sidangoli and Tanjung Oba, is separated from Teluk Kau on the E coast of Halmahera, by a narrow isthmus on which is the village of Kampung Dodinga. A footpath leads from Kampung Dodinga through a long defile across the isthmus to Kampung Bobane Igu, on Teluk Kau.

About 3 miles W of Kampung Dodinga are several detached reefs which extend up to 2 miles offshore. Another 2.7m shoal lies 7.5 miles W of Dodinga. A reef, marked by a beacon is in the S part of Teluk Dodinga about 2.75 miles N of Tanjung Oba. Two shoals, 6.8m and 9m, are 0.35 mile NE and SE, respectively, from the beacon; two other reefs, 8.2m and 10m are 1 mile NW of the beacon; and still another group of reefs is about 1 mile ENE of the beacon. There is good anchorage in the inlet at Kampung Dodinga. It is easily approached by steering 078° for the two hills close S of the village. The current in Teluk Dodinga is negligible.

Pulau Ternate, Pulau Tidore, and their nearby islands are described beginning in paragraph 2.18.

Pulau Pilongan (Pulau Pilongga) (0°44'N., 127°37'E.), a rock 41m high and partially covered with vegetation, lies about 4 miles W of Tanjung Oba and 1 mile off the E coast of Pulau Ternate. The channel is clear on either side of this rock.

South of Teluk Dodinga, from Tanjung Oba to **Tanjung Dobegasi** (0°33'N., 127°31'E.), a distance of about 11 miles, the coast is low, but steep and clean, and can be approached to a distance of 0.5 mile. Tanjung Dobegasi is low and fringed by a narrow coast reef.

2.10 **Pasir Raja** (Pasir Radja) (0°36'N., 127°28'E.), 3.5 miles NW of Tanjung Dobegasi, consists of a small cay covered with sand and broken coral, with a drying atoll close N.

Between Tanjung Dobegasi and **Tanjung Saselata** (0°21'N., 127°39'E.), the N point of Teluk Payahi, the hills follow the coast line. About 2 miles NW of Tanjung Saselata are three hills known as Karambuku, of which the westernmost is 296m high. The N part of this coast is clear and has only a narrow coastal reef extending from it; the S part is fronted by a number of reefs and islands.

Close S of Tanjung Dobegasi is the village of Kampung Akelamo, off which there is anchorage, in 66m, about 0.25 mile from the shore. About 6 and 7 miles farther S are two inlets with the villages of Kampung Jehu and Kampung Lola, off which there is anchorage, in 37m and 27m, respectively.

An uncharted reef, marked in 1944 by a beacon with a flag, and by a beacon on its outer edge, is close offshore near Tanjung Nyarigiro (Tanjung Njarigiro).

Kepulauan Woda (0°23'N., 127°35'E.) is a group of islands about 5 miles NW of Tanjung Saselata. The islands are separated from the coast by a good channel which leads to the village of Kampung Gita. Gita is situated on the E coast of the group. There is good anchorage, in 31m, mud, ENE of Pulau Guratu, the island closest to the mainland. Local knowledge is necessary.

2.11 **Teluk Payahi** (Bay of Pajahi) (0°18'N., 127°42'E.) is an indentation of the coast between Tanjung Saselata and Tanjung Safi, 6 miles to the SE. Anchorage, in 29 to 40m, mud, is available off the village of Kampung Payahi (Pajahi) on the NE shore of the bay. A flag pole with a concrete base is on the beach at the village. South of the village the coast hills are covered with jungle and coconut palms. A waterfall is 3 miles S of the village.

Takat Main Main (0°18'N., 127°37'E.), consisting of two reefs with depths of 3.7m and 5.8m, are 3 miles SW of Tanjung Saselata. A drying patch is about 1.5 miles SE of Tanjung Saselata, and a 0.9m shoal is 1 mile NE of the patch. Two shoals of 1.3m and 1.8m lie within 1.5 miles S of Tanjung Saselata.

From **Tanjung Safi** (0°16'N., 127°43'E.), the coast trends S for 29 miles to Tanjung Tokaka. This stretch has a monotonous appearance with few conspicuous mountains. Lenggiua, E of Tanjung Safi, is 800m high. North of this peak the mountain range ends in a steep drop, making a conspicuous gap between it and the 406m summit close N of it. Lenggiua is also conspicuous because of the gap separating it from Sinopa, a 782m mountain S of it. Tabrain is a 672m summit 4 miles S of Tanjung Safi, which can be seen from all directions. Southeast of this peak is a range of peaks, of which the highest, Dufuk, is 786m high. At the S end of this range is the very conspicuous peak, Dukur, 620m high. The next conspicuous hills are two summits, 475m and 570m high, 5 and 4 miles, respectively, N of Tanjung Tokaka. Then the hills rise to another ridge in a SSE direction.

Nassau Reef (Takat Lem Lem) (0°12'N., 127°35'E.), 9 miles SW of Tanjung Safi, is a small circular reef with a depth of 1.2m and great depths surrounding it. Under moderately-favorable conditions, this reef has been seen at a distance of 0.75 mile and from a height of 16m, when it appeared as a small green spot. A ripple shows on it from time to time. The channel on either side of this reef is deep and clear.

Anchorage.—Vessels can anchor, in 27m, off a small beach at Kampung Maidi, about 8.5 miles S of Tanjung Safi. Local knowledge is necessary. Coconut palms are near the village, but mangroves line the coast N and S of it.

2.12 Between **Tanjung Uwama** (0°06'N., 127°41'E.) and Tanjung Batu Lobang, a conspicuous rocky cliff about 5 miles S, the coast forms a bay in which is the village of Kampung Lifofa. Vessels can anchor, in 29m, but local knowledge is necessary. The drying sand bank 0.5 mile S of Tanjung Uwama and the 1.8m reef further to the E are generally easily seen.

Kampung Batula (0°01'S., 127°42'E.), about 2 miles S of Tanjung Batu Lobang, cannot be seen from seaward, but close to the SW there is a flagstaff, a shed with a metal roof, and a round-topped tree S of a river mouth, all of which are easily identified.

Temporary anchorage may be obtained with local knowledge off Kampung Batula, in 29m. Other temporary anchorages are at Kampung Semo, in 38m, and off Kampung Meloku, in 37m, about 5 and 9.5 miles, respectively, S of Kampung Batula.

Tanjung Tokaka (0°13'S., 127°40'E.), with the village of Kampung Tokaka on it, is low and has a river mouth close N of it. The description of the W coast of Halmahera continues in paragraph 2.14.

Selat Patinti (Patientie Strait)

2.13 **Selat Patinti** (0°30'S., 127°49'E.), separating Pulau Bacan (Batjan) and Halmahera, is 7.5 miles wide at its N entrance between Tanjung Dolit and Pulau Gilalang (Batu Sambo). The channel, which is the usual route for vessels between Ternate and New Guinea, is deep and clear, but very restricted by Kepulauan Kusu, a chain of islands in its N part. In the S entrance is **Middle Sand** (Gosong Tengah) (0°45'S., 127°57'E.), a dangerous 2.1m shoal near the E edge of a bank extending from the SE of Pulau Bacan. The drying reefs in the strait can be recognized by a strong discoloration of the water, but the other shoals show very little or no discoloration.

Tides—Currents.—The vertical tidal movement is not of much importance as the shores and any dangers are steep-to. Tidal information can, however, be obtained under Teluk Gane and Sabatang Road, which is described in paragraph 2.30. The currents in the wider parts of the strait are weak, but they are rather strong in the channels between Kepulauan Kusu. In the tidal currents between Kusa and Pokal velocities of 4.5 knots have been observed at spring tide. At neap tide, velocities up to 3 knots have been observed, but there is no distinct relation between the currents and the vertical tide movements at Sabatang Road.

Directions.—When entering Selat Patinti from N, pass about 2 miles W of Tanjung Dolit and then steer about 160° up to Kepulauan Kusu. Then pass on either side of **Pulau Pokal** (0°26.3'S., 127°43'E.) and set a course for **Tanjung Buobe** (0°40'S., 128°00'E.). Leave this point 1 or 2 miles on the port hand and steer to pass 1 mile W of Nusa Dowora-Lamo. This course will lead clear of Middle Sand.

The E shore of Selat Patinti from Tanjung Tokaka to **Tanjung Tawa** (0°43'S., 128°04'E.), a distance of 39 miles, has nothing conspicuous about it except the mountain peaks a short distance inland. North of Kepulauan Kusa is a group of mountains, of which Buku Uwatcain (Oewat Tjain) is 1,263m high and can be seen in all directions. Pasegal, at the SE end of the group, is 871m high and is especially conspicuous from the W and SW. Near Tanjung Malabuha, 21 miles SE of Tanjung Tokaka, are three conspicuous hills, 245 to 259m high. Near Tanjung Buobe another range of mountains rises rapidly from the hills both at its N and S ends. Gogosoma, the S and most distinctive peak of this range is 950m.

Both N and S of Kepulauan Kusu the coast is clear and steep-to, except for a 4.6m shoal nearly 1 mile S of **Kampung Oha** (0°30'S., 127°55'E.).

Anchorage.—Gurua Boso (0°18'S., 127°44'E.) is a small inlet 7 miles SE of Tanjung Tokaka. It has a least depth of 6.4m in the entrance channel, but deepens to 11 to 13.7m inside. It affords excellent shelter to small vessels. The only other anchorage on this coast is off Kampung Saketa, in a small bight about 15 miles SE of Tanjung Tokaka, in a depth of about 28m. There is a post office in Kampung Saketa. Local knowledge is necessary.

Kepulauan Kusu (0°20'S., 127°44'E.) are a string of hilly and heavily wooded islands lying on a ridge of less than 184m that extends across Selat Patinti. Pulau Saleh Besar, the largest, rises to a height of 330m. Deep channels separate these islands, but the one between the N end of Pulau Saleh Besar and Halmahera has several rocks and shoals in it. The channels used for through navigation, on either side of Pulau Poka, which is marked on its summit by a light, are deep and clear.

Halmahera—West Coast (Continued)

2.14 The W coast of Halmahera trends generally SE from Tanjung Tawa for nearly 26 miles to **Tanjung Libobo** (0°55'S., 128°27'E.), the S extremity of Halmahera. It can be identified by a hill 172m high, standing 2 miles within the point and by Babi, a low wooded islet thickly covered by vegetation, close SE. This stretch of coast is low, with hills rising a short distance inland. Tawaigili, 11 miles NW of Tanjung Libobo, is 273m high and fairly conspicuous.

Tides—Currents.—At Kampung Gane Di Dalam, there is both a diurnal and a semi-diurnal tide, but the latter predominates. Neither the spring highs nor the spring lows of the two tides coincide. The highest water level occurs in June or July and in December or January, the lowest between July and September and between January and March; the maximum rise and fall that can be expected are, respectively, 0.4m above and 0.4m below.

The currents are strong in the vicinity of this end of the island; when opposed by the wind, a rough sea may be raised. This is also true for the passage between the point and Pulau Babi, and also for the wider passage between Halmahera and Pulau Damar.

Anchorage.—Temporary anchorage may be obtained by vessels with local knowledge, in depths of 24 to 29m, close off Kampung Gam Ma Gugu, about 8 miles ESE of Tanjung Tawa.

A small vessel with local knowledge may obtain safe anchorage in Teluk Gane, about 10 miles ESE of Tanjung Tawa and fronted by Kepulauan Dowora. The coast of Halmahera on either side of this bay can be safely approached to a distance of 1 mile. A narrow coastal reef, marked by discoloration, extends from both entrance points. Kampung Gane Di Dalam is just within the W entrance point, and can easily be identified from S by its large mosque. Local knowledge is necessary at both these anchorages.

Teluk Boleh Madjiko, entered about 3 miles S of Teluk Gane, affords sheltered anchorage during the Southeast Monsoon.

2.15 **Kepulauan Dowora** (0°50'S., 128°08'E.) is a group of islands on the E side of the S entrance of Selat Patinti, about 22 miles NW of Tanjung Libobo. **Nusa Doworalamo** (Dowara Lamo) (0°51'N., 128°05'E.), 320m high and the SW island of the group, has a rounded summit with a saddle formation when seen from SW; about 1 mile ESE of this island is a 9m reef. **Sori** (0°53'S., 128°08'E.), about 3 miles ESE of this island, is a wooded rocky island surrounded by rocks. Pasir Bale is on a reef 1 mile N of Nusa Doworalamo. Nusa Mano and Nusa Waringin, about 4 and 5 miles, respectively, NE of Nusa Doworalamo, each have a distinctive tree on them. The channel between this island group and Halmahera is deep and clear, although there may be quite a current.

Pulau Damar (Pulau Salomakie) (1°01'S., 128°23'E.), a tree-covered island, is about 5.25 miles SW of Tanjung Libobo. Kampung Kukupang, standing on piles on the NW extremity of the island, has the only trace of civilization or buildings except for the islets Katinai Besar and Katinai-Ketjil (Kecil), which

are within 1.25 miles of the NE coast. Anchorage can be obtained both E and W of Katinai Besar.

Tapa, an island with low hills close off the SW side of Pulau Damar, is separated from Pulau Damar by a very narrow channel with a least depth of 14.6m and clear of dangers. The channel between Tapa and Pulau Joronga is also deep and clear of dangers.

2.16 Pulau Joronga (Djoronga) (1°06'S., 128°23'E.), nearly 2 miles S of Pulau Damar, is a low thickly-wooded island which rises to heights of 221m and 235m in two hills at its S end. From the S, the S hill appears flat, with a conspicuous crown of trees at the center. At the village of Kampung Waringin, on the S side of the E end of the island, there is a conspicuous plume-shaped tree. The island of Kubi, near the S side of Pulau Joronga, is a hill with a double top 156m high. Small hills are also found on Pulau Orangkaya (Orang Kaja) and on Pulau Gumutu, 2.5 miles W of Kubi; with few exceptions the small islets near Pulau Joronga are low and wooded and for the most part connected to each other by drying reefs.

Batu Anyer (Batu Anjer) (Black Rock), 8m high, is the remains of an old crater and is composed of dark volcanic stone and old coral; part of it extends underwater in the form of a horseshoe. This rock is 4 miles SE of Tanjung Domoro ma doto, the SE extremity of Pulau Joronga. Batu Anyer is on the W end of a bank extending 5.5 miles further E. The depths here are between 29 to 126m. Another bank, located 5 miles N of Batu Anyer contains depths ranging from 35 to 113m.

2.17 Ganone (Little Geelmuiden) (1°05'S., 128°18'E.), an islet with a small hill on which there is a tree with a round top, is 1.75 miles W of the W end of Pulau Joronga. Two shoals, slightly marked by discoloration with depths of 7m and 8.8m, are 1.5 miles SW and NE, respectively, of the islet. Strong currents may be experienced near the islands occasionally.

Pulau Woka (Great Geelmuiden), 4.3 miles NW of Ganone, consists of two islands connected by a coral reef. At the W end of the NE island, a 108m hill gives the group the appearance of a hat with a broad brim. The hill is planted with coconut and banana trees, and has two large conspicuous trees with white trunks. The shores of the low water island are fringed with mangroves. The atoll has a depth of 35m, but a rock with a depth of 1.5m is in the entrance. There is no anchorage near the island.

Loleodjaha (Pulau Loleodjaha) (Five Islands) (1°01'S., 128°09'E.) consists of several small islets on the edges of two drying reefs, 3 miles W of Pulau Woka. Most of the islets are no more than strips of sand with shrubs; on the northernmost are a few coconut palms. The islets are difficult to distinguish at night.

Islands West of Halmahera

2.18 Pulau Hiri (0°54'N., 127°19'E.), N of Pulau Ternate and from which it is separated by a clear channel nearly 1 mile wide, is about 1.75 miles long and rises to a conical peak, 685m high. The island is marked by a lighted beacon, 30m in height. Several rocks above-water are off the NW side. The small bight E of the N end of the island is recommended as an anchorage for vessels with local knowledge.

Pulau Ternate (0°47'N., 127°23'E.), about 1 mile SSE of Pulau Hiri, is composed almost entirely of Gunung Ternate, a conical volcano 1,721m high. Except for the narrow coast reef the shores are steep-to with no off-lying dangers. Vessels can find anchorage almost anywhere under favorable conditions. The lower slopes of the island are planted with coconut palms and fruit trees.

Ternate Roads is an open roadstead on the SE side of Pulau Ternate. Gamme Lamo Channel, between Pulau Ternate and Pulau Tidore and the S approach to Ternate Road, has a least depth of 33m in the fairway.

2.19 Ternate (0°47'N., 127°23'E.) (World Port Index No. 52510) lies about 2 miles NE of the SE extremity of Pulau Ternate. Water is available here but provisions are scarce. Principal exports are copra, shells, cocoa, spices, resins, and dried fish.

There is a coast radio station at Ternate.

Port of Ternate

http://www.portina4.go.id/ternate.htm

Winds—Weather.—From July to October, the winds usually blow from SW to SSW; during the other months of the year the winds blow from W and NW to NE. East winds are very rare. There is a sea breeze near the island but no land breeze. Heavy squalls occur occasionally. Even during the dry monsoon, showers occur from time to time. South winds cause a broken sea when the currents set to the S.

Tides—Currents.—A strong current sets through the roads, at times reaching a rate of 1.5 knots. High water is accompanied by a current setting to the N; LW is accompanied by a current setting to the S.

Aspect.—A light is shown from a white mast near the root of the pier. A minaret stands in the S end of the town.

An oil depot, marked by a light and which has a mooring buoy which can handle vessels up to 10,000 dwt, lies on the S side of Pulau Ternate about 4.5 miles WSW of Ternate.

A 374m long concrete pier can accommodate vessels up to 10,000 dwt, with a maximum length of 100m and a maximum draft of 7m.

The Yani Wharf was reported to have a breadth of 12m and an alongside depth of 7.6m in 1993. A 25-ton mobile crane is available. There is also a wooden jetty for sailing vessels.

Pilotage.—Pilotage is compulsory. A government pilot is available. The vessel's ETA should be given 6 hours in advance through Ternate Coast Radio Station or directly by VHF to the pilot station. Radio frequency information is obtained on VHF channels 12, 13, 14, and 15.

Anchorage.—Good anchorage may be obtained, in a depth of about 65m, about 0.3 mile E of the pier. Vessels should not anchor closer in because the tides may be erratic and the coast reef is difficult to distinguish. From December to April, there may be a heavy swell in the roadstead.

2.20 Pulau Tidore (0°42'N., 127°25'E.), separated from Pulau Ternate by Gamme Lamo Channel, about 1 mile wide, is entirely of volcanic formation. Buku Kiematabu (Kie Matubu), on the S half of the island, is a regular cone 1,757m high. On the N half the mountains are lower and irregularly-shaped.

Along the coasts are several scattered villages with cultivated slopes behind them. The principal village, Kampung Soa Siu, on the SE coast, is easily recognized by its white houses and a mosque. The coast reef fronting the village has been elevated artificially by a barrier, at the end of which is a small pier with a signal mast. A light shows 0.3 mile SW of Soa Siu.

Anchorage.—It is difficult to find anchorage off Kampung Soa Siu; the best method is to approach the pier with anchor cable veered out to 61m then proceed until the anchor catches hold. There is a wooden jetty, about 61m long, about 1.75 miles NNE of Kampung Soa Siu. Better anchorage can be found about 0.5 mile N of Soa Siu, in 18m. Fair anchorage may be obtained anywhere N of the parallel of the Buku Kiematabu summit.

2.21 Gamme Lamo Channel (Selat Gamelamo) is the passage that separates Pulau Ternate and Pulau Tidore. A nasty sea may occur in the W entrance, especially when the wind is from the SW and the current sets SW. A tidal range of about 1.9m in the channel induces currents up to about 6 knots.

Pulau Maitara, about 1 mile in diameter and separated from the NW side of Pulau Tidore by a clear but narrow channel, has a conical peak, 386m high. It is covered with coconut palms on its E side and is fringed by reefs on the N and S shores, extending about 0.25 mile out. These reefs are marked by discoloration. Anchorage may be obtained off the villages on the coast.

Pulau Pilongan (Pulau Pilongga), more than 1 mile off the E coast of Pulau Tidore, is a partly-wooded rock, 42m high. It was reported to be conspicuous even at night. The channel between it and Pulau Tidore can be used at all times. A small saddle-shaped formation on the N slope of Pulau Hiri, in range with the NE point of Pulau Ternate, bearing 317°, will lead NE of the islet.

2.22 **Pulau Mare** (0°35'N., 127°24'E.), 340m high, is 2 miles S of Pulau Tidore and is separated from that island by Selat Mare, a deep channel clear of dangers in its fairway. Tanjung Kovo, the S end of the island, is 113m high, and is connected to the hilly land NE by a low ridge; it is quite conspicuous. In the bight E of this point vessels will find anchorage, in 57m, off the village of Kampung Kovo. There is also anchorage, in 50m, off the village of Kampung Mare, on the NE side of the island, where there is a pier. A 12.8m shoal is 0.5 mile E of the E side of the island.

Pulau Moti (0°27'N., 127°24'E.), about 5 miles S of Pulau Mare, is a hilly island 980m high. Except for a very narrow coast reef and a 1.8m shoal close off the SE side, it is steep-to. Between its highest peak and a lower summit to the NW there is a saddle formation which is quite conspicuous from the W. The only anchorage is in 42m, off the village of Kampung Kotta, on its NE side.

Pulau Makian (0°20'N., 127°24'E.), about 3.5 miles S of Pulau Moti, is steep-to on all sides; a light is situated on the W side of the island. The island has a crater near the center with a pointed peak on one side rising to a height of 1,428m. The saddle between the central heights and the 1,428m summit to the S is very conspicuous when seen from the W or E.

Anchorage.—The only good anchorage is in 29 to 61m, sand, off the village of Kampung Ngofakiaha on the NE side; this anchorage can also be used during the North Monsoon. Cargo is loaded by surf lighters N of the village. Fresh water and stores are not available. There is a small pier for boats. Rollers may occasionally be troublesome at this landing place.

Anchorage can also be obtained farther seaward, in a depth of about 100m, but the bottom is most irregular and uneven.

2.23 The **Kayoa Islands** (0°03'N., 127°26'E.), consisting of Pulau Kayoa (Pulau Kajoa) and Pulau Laluin and nearby smaller islands, are 8 to 24 miles S of Pulau Makian. They have the appearance of one rather flat island with a few elevations. **Tigalalu** (Tigalulu) (0°04'N., 127°25'E.), a peak near the middle of the W side of Pulau Kayoa, 455m high, is the highest peak of the group. With few exceptions, the waters surrounding the islands is deep and clear right up to the drying coastal reef. Pulau Miskin, a small islet off the N point of Pulau Koyoa, is 50m high and very conspicuous. Pulau Djire is a small wooded rock, 7m high, located on the narrow coastal reef near Tanjung Wot Oko, near the NE point of Pulau Kayoa. A 4.6m reef, located 2.7 miles S of Tanjung Wot Oko, extends 0.5 mile off the NE coast. On the S extremity of Pulau Laluin, a spit with a depth of 6.9m extends 1 mile out. Laluin is connected with Tanjung Guruapin, about 2 miles N, by a reef which dries in places. Many coconut plantations are on the island, but the population is small.

Anchorage may be obtained in Guruapin Roads, S of Tanjung Guruapin, but a troublesome swell can develop quickly here. The approach channel is marked by beacons. An inner roadstead anchorage has a depth of 2.4m in the approach.

Kepulauan Goraitji (Guraichi Islands) (0°01'N., 127°11'E.), W of the Kayoa Islands, includes Pulau Taneti and the scattered islands up to 17 miles N of it. They are sparsely populated, but coconut plantations are found on nearly all of them. Although waters in the vicinity are deep, anchorage may be found in several places; the bottom is composed of gray-green clay. There is a fairly strong current dependent on the wind. Local knowledge is necessary.

Pulau Taneti (0°06'S., 127°14'E.) is the largest island of the group. The hills of this island, which rise to a height of 234m, are not very conspicuous, but a tree on a small hill on the SW point is visible. A 9.1m shoal, seldom marked by discoloration, is about 0.75 mile N of the N part of the island.

2.24 **Pulau Tolimao** (0°01'S., 127°10'E.), about 5 miles NNW of Pulau Taneti, is a hilly islet entirely covered by coconut palms. The reefs extend 2 miles E of this islet and are well marked by discoloration. Detached shoals are 2 and 3 miles E of Pulau Tolimao, with depths of 2.8 and 5m, respectively.

Pulau Lilai, about 2.5 miles E of Pulau Tolimau, is 172m high with coconut palms on its summit. Pulau Temomadafa (Temo Ma Dafa), about 1 mile S of Pulau Tolimau, is lower than that island and has a distinctive round-topped tree on its NW end.

Pulau Gumorga (Pulau Gunange) (0°02'N., 127°13'E.), 144m high, is N of Pulau Lilai. On the SE end are the villages of Kampung Tagono and Kampung Akedabo. A 5.5m shoal, slightly marked by discoloration, lies 1.5 miles S of Gumorga.

Anchorage.—Larger vessels anchor, in about 73m, off Kampung Tagono with the E point near Kampung Akedabo bearing 013° and the S point near a shed bearing 337°.

2.25 **Pulau Siko** (0°04'N., 127°09'E.), about 8 miles NW of Pulau Gumorga, slopes gently on the S side but presents a rocky wall, 149 to 250m high to the N and E. Pulau Tamakumafatu (Tomaka Ma Fatu) 1.5 miles to the SE, and Pulau Gafi, 1.75 miles to the NE, have similar formations. Adu, nearly 1 mile E of Pulau Gafi, consists of a group of rocks with a sharp summit and is covered by trees.

Pulau Laigoma (0°08'N., 127°13'E.), about 4.5 miles E of Pulau Siko, is a horseshoe-shaped ridge of hills up to 119m high. Tamo Tamo, about 1 mile W of Pulau Laigoma, is a steep rock with only a few shrubs on it. Between Pulau Laigoma and Tamo Tamo, a rock only slightly above water, is marked by heavy surf with the least sea. Within a radius of 0.5 mile of Tamo Tamo are three shoals with depths of 8.2 and 11m; are marked by rollers.

Caution.—Wolf Rock (Terumba Gora) (0°12'N., 126°54'E.), 12 miles WNW of Pulau Siko, can only be seen at LW, when from close range, it appears as a circular yellow rock about 9.1m in diameter. When the sea is comparatively smooth, this rock may be recognized from a distance of 2 miles, but during a heavy sea it is not so easily recognized. The depths around the rock vary from 20.1 to 50m.

Goweba lies at the outer end of a chain of islets and rocks extending 1 mile W from the NW end of Pulau Siko.

The Bacan Islands

2.26 The Bacan Islands, off the W side of the S end of Halmahera and on the N side of Selat Obi, include Pulau Bacan (Pulau Batjan), Pulau Mandioli, Pulau Kasiruta (Tawali Besar), and the Latalata Islands. The highest point in these islands is a 2,110m summit on the S part of Pulau Bacan. Buku Sibela, the range on which this summit is located, is quite conspicuous because two valleys separate it from the other parts of the island lying to the N and SE. The 765m and 824m peaks of Buku Kabau, on Pulau Kasiruta, are conspicuous because of their distinctive form. The 590m and 641m summits at the NE end of Pulau Bacan are also easily recognized; the former has a small but conspicuous grove of trees on it.

Tides—Currents.—The currents in the Bacan Islands do not usually exceed a rate of more than 2 knots.

Caution.—In the narrow passages between the Bacan Islands, the mariner should never depend on discoloration for the marking of reefs; during strong tidal currents the shoals are sometimes marked by strong ripples and whirlpools on the side opposite to the direction from which the current is setting. Off the more open parts of the coast the water is very clear during the transition periods between the monsoons; the bottom can be plainly seen at depths up to 16m. When the sea is calm the detached reefs are not marked by discoloration. During the strength of the monsoons, both outside the group and within the islands, the water is choppy and discoloration cannot be depended on to identify reefs.

2.27 The **Latalata Islands** (0°16'S., 127°04'E.), at the NW end of the Bacan Islands, are hilly; the highest point, on Pulau Latalata, is 423m high. The only danger in the channel between the Latalata Islands and Pulau Kasiruta is a 2.7m shoal off the NW side of Pulau Kasiruta. Pulau Latalata and Pulau Muari, the two largest of the islands, are separated by a narrow channel, with a least depth of 11m. A light is shown from Pulau Latalata, in position 0°15.5'S, 127°0.8'E. Pao-kecil, S of Pulau Latalata, the southernmost and smallest of the island group, is a very conspicuous cone. In the channel between Pao-kecil and Pao Besar, just to the N, is an 7.8m shoal.

Tolimago (0°09'N., 127°11'E.), a rocky islet with trees on it, is midway between Pulau Muari and Pulau Taneti.

Tuapen (0°12'S., 127°02'E.) is a group of rocks 2.5 miles NW of Pulau Latalata; the three largest are 49m high. An 8.2m shoal is 1 mile S of these rocks.

Anchorage.—The best anchorage is in 49m in a small bay on the E side of the N entrance to the channel between Pulau Latalata and Pulau Muari. Anchorage can also be obtained off the village of Kampung Busua on the E side of Pulau Muari, 2 miles SW of Tanjung Hufau. During the favorable monsoon, anchorage is available in Teluk Gomo, on the NW side of Pulau Muari, and in Teluk Bobo, on the SW side of Pulau Latalata. Local knowledge is necessary for these anchorages.

2.28 The N side of the Bacan Islands is irregular but steep-to. The currents along this side are weak, but some precaution is necessary at the N entrance to Selat Sambaki, which is discussed in paragraph 2.37. There are several anchorages on this side, but the water is fairly deep. Detached dangers include a 4m shoal off of Vuile Point, on the NE side of Pulau Kasiruta, and a 8.2m shoal 1 mile NE of Tanjung Geti, on the NE shore of Loid Bay.

Tawali Kecil (0°14'S., 127°18'E.), about 1.75 miles N of Vuile Point, is 115m high and steep-to, except on the SW side.

Pasir Bale (0°14'S., 127°26'E.), a drying reef which is steep-to, is 7.5 miles E of Tawali Kecil. A small part of it is reported to be above water at all times and some shrubs are on it. A black beacon is situated on this reef.

Teluk Loid, a large bight in the N coast of Pulau Bacan, has high land on both sides. The islands, Nusa Raloid and Nusa Babi, 180m and 158m high, respectively, are on the W side of the bay. A small islet, Nusa Deket, is near the S end of Nusa Raloid. The channels between these islands and the coast is clear.

Anchorage is available, in 28m, off the village of **Kampung Geti** (0°21'S., 127°29'E.) close W of Tanjung Geti.

2.29 **Batu Sombo** (Pulau Gilalang) (0°18'S., 127°33'E.) is located about 1.5 miles E of Tanjung Seki, the N extremity of Pulau Bacan. It is separated from the NE end of Pulau Bacan by Gilalang Strait, a very narrow but deep channel. A large wooded rock is on a drying reef at the E point of Gilalango.

The E side of Pulau Bacan, forming the W side of Selat Patinti (Patientie Strait), is steep-to for the most part. On Tanjung Bilulu, the SE extremity of the island, two hills are conspicuous, especially from the N and NE. Middle Sand (Gosong Tengah), a dangerous 2.1m shoal, is 3.5 miles NE of Tanjung Bilulu. Vessels transiting Selat Patinti should steer well clear of this shoal.

From Tanjung Gilalang, the coast of Pulau Bacan trends SE for 11.5 miles to Tanjung Tuada (Ruige Point). The only detached dangers are those in the small bay 2.5 miles SE of Tanjung Gilalang, the reefs N of Tanjung Goro Goro, and the reefs in Sabatang Roads. Kepulauan Kusu, NE of Tanjung Tuada, has been previously described in paragraph 2.13.

2.30 Sabatang Roads (0°26'S., 127°39'E.), about 2 miles NW of Tanjung Tuada, affords anchorage, in 13.7 to 16.4m, between a drying reef N of a flagstaff and a 5.8m shoal patch outside of the 10m curve. The flagstaff and a large tree in back of the village are conspicuous. Local knowledge is necessary.

Tides—Currents.—At Sabatang Roads, the maximum rise and fall of tide that can be expected are, respectively, about 0.75m above and 0.4m below mean sea level.

The coast between Tanjung Tuada and Teluk Babang, about 10 miles SW, is clear and steep-to. Three off-lying islets, Kairu, Bori-kecil, and Bori, are close to the coast. The coast is lined with coconut palms, jungle, and mangrove. **Bori Island** (0°35'S., 127°36'E.) has a conspicuous flat hill; it is wooded, and its shores are fringed with mangroves.

2.31 Teluk Babang (0°37'S., 127°36'E.) affords anchorage, in a depth of 51m, mud, off the village of Kampung Babang. The only danger in the bay is a rock which dries about 0.1m located 0.5 mile E of the village. A black beacon marks this area. Sindapp, a 536m flat-topped conical hill NW of the bay, and the mouth of Kali Sajung are conspicuous. A road runs from Kampung Babang to Labuha, on the W shore of Pulau Bacan.

A pier, serving an oil depot, is situated 0.25 mile SE of the village; lights are shown from the root of the pier and 0.4 mile NW of the pier.

Teluk Lapan (0°42'S., 127°40'E.) is the next bay SE of Teluk Babang. These two bays form the head of a large indentation on the E coast of Pulau Bacan. Pulau Gamudja, separated from the W shore of the bay by a clear channel, is easily identified. There is a prominent yellow patch on the slope of the land near here caused by hot springs emitting steam and sulphur vapors. Anchorage can be obtained, in 46m, in a small bight close N. Anchorage is also available, in 58m, off the village of Kampung Songa, at the head of the bay and W of a river mouth. A road runs from this village across the island to Kampung Wajaua.

Anchorage, in 46m, can be obtained off the village of Kampung Tutupa, about 11 miles E of Kampung Songa. Rocks extend up to 0.75 mile offshore from a position about 1 mile NW of Kampung Tutupa.

2.32 Between Kampung Tutupa and **Tanjung Bilulu** (0°47'S., 127°54'E.), about 6 miles to the SE, are several dangers, the outermost of which is an 11.9m shoal, 1.75 miles offshore.

Two bays, Teluk Bilulu and Teluk Kapalmaloleo, are SW of Tanjung Bilulu. Anchorage can be obtained, in 44m, mud and sand, off the village of Kampung Kapalmaloloe on the latter bay. A shoal of 5.9m is located close off Tanjung Kapalmaloleo, the point separating the two bays.

The S coast of Pulau Bacan is sparsely inhabited and of no importance except to passing vessels. The charted dangers include a reef 1.8 miles S of Kapalmaloleo, a 10.9m shoal, 2.7 miles further SW off of Tanjung Lemo, and a 2.3m shoal 1 mile W of Tanjung Liaro. Another 10.9m shoal is located 1.25 miles S of Tanjung Silang and the N side of Silang Bay is shoaled. No details of the currents are available, but opposite Selat Patinti and Selat Bacan, a set in or out may be experienced.

Buku Bibinoi (Zoutberg) (0°46'S., 127°43'E.) is a conspicuous peak 11 miles W of Tanjung Bilulu; it has the appearance of a perfectly-shaped cone and is 960m high. Hills are very close to the coast except at the head of Teluk Wajaua where the land is lower. A small but conspicuous rocky island is off Tanjung Maregarango.

Teluk Silang and Teluk Wajaua, in which are villages of the same names, may afford anchorage.

The description of the Bacan Islands continues in paragraph 2.38.

Selat Bacan (Batjan Strait)

2.33 Selat Bacan (0°48'S., 127°23'E.), together with Selat Sambaki, described in paragraph 2.37, to the N, forms a direct route through the Bacan Islands. Selat Bacan is wide and deep at its S entrance between Tanjung Manggo, the SE extremity of Pulau Mandioli, and Tangung Maregarango, the SW extremity of Pulau Bacan (Pulau Batjan), about 9 miles ESE; farther N it is cut up into narrow channels by the Obit Islands.

The inter-island vessels using Selat Bacan follow the Pulau Bacan side of the passage; then they use Selat Udjung Masaran (on the E side of Pulau Obit), then Selat Batu Ampat and Selat Sambaki, leaving the latter passing E of Pulau Toduku.

On a clear day the double-topped summit, 812m high, of Buku Maribenu can be seen from the entrance. Buku Amasing, 1,038m high with a rounded summit, is often hidden by clouds.

Tides—Currents.—As a rule the currents in Selat Bacan and Selat Sambaki seldom exceed 2 knots, although in narrow passages a current of 3 knots is possible during spring tides. Slack water occurs at the time of H and LW at Ternate; a N set is experienced when the tide is rising at that place and a S set when the tide is falling.

Caution.—See paragraph 2.1 regarding lack of dependability upon discoloration to identify reefs.

A W extension of the bank fringing the coast of Pulau Bacan was reported about 1.75 miles NE of the NW extremity of Pulau Obit.

2.34 Teluk Labuha (0°38'S., 127°23'E.) is about 11 miles N of Tanjung Maregarango. A drying reef with a conspicuous tree on its E end is close to the N shore. The best anchorage is in the NE corner, in 15m, soft mud. If there is too much swell, vessels may find shelter in Teluk Belang Belang to the West.

There is a small pier at Kampung Penambuan, a settlement about 3 miles S of Teluk Labuha.

Labuha (0°38'S., 127°28'E.) (World Port Index No. 52523) is at the NE corner of Teluk Labuha. The Customs Pier here is used by vessels up to 40m long and is marked by a light. The Government Pier, 0.3 mile NW, is also marked by a light and a flagstaff is about 91m SE of it. The coastline SE of the government pier was reported to be extending SW. The port is a port of call for vessels trading among these islands and is a center of trade in copra and damar, a resin.

A distinctive tree stands 0.8 mile W of the Customs pier at the E end of Dorapedo, a drying reef close off the N shore.

Two distinctive trees stand near the coast 1 mile S of the customs pier, close N of the mouth of Kali Mendawong.

Winds—Weather.—During the South Monsoon (July and August), the wind can blow with considerable strength and

cause breakers, rendering communication with the shore difficult at times. During the West Monsoon (January and February), a squall of great strength from the SE may occur occasionally but it never lasts more than 20 minutes. Otherwise conditions are more favorable.

Tides—Currents.—At Teluk Labuha, there is both a diurnal and a semidiurnal tide, but the latter predominates. Because the spring highs and the spring lows do not coincide, and their rise is small, they do not affect navigation.

Anchorage.—The best berth is in a depth of about 15m, soft mud, in the NE part of the roadstead. If there is too much swell here, vessels may find shelter in Teluk Belangbelang.

2.35 The **Obit Islands** (0°39'S., 127°21'E.), W of Teluk Labuha, includes Pulau Obit, Pulau Patjitaka, Pulau Parapotang, and some smaller islands. Although these islands are hilly, they are comparatively low, wooded, or covered by coconut palms. The narrow channels between them and the shore of Pulau Mandioli are seldom used. The tin roof and chimney of a copra drying plant at a small village on the SW side of Pulau Parapotang, the westernmost large island of the group, are conspicuous.

Selat Udjung Masaran (0°37'S., 127°24'E.), the E passage, is between Pulau Obit and Pulau Bacan and is the principal channel through the Obit Islands. Although the fairway is deep, it is somewhat restricted by the islets Nusa Deket and Nusa Ra in the S entrance and by the larger island Pulau Mambuat in the N entrance. The main channel used by shipping is N of **Nusa Ra** (0°38'S., 127°25.5'E.). Reefs extend about 0.5 mile of the shore running 2 miles W of Labuha Roads and the edge of a fringing reef on the W side of the strait S of Pulau Mambuat is marked by beacons. There is a 5.8m shoal in the fairway, about 0.25 mile offshore, lying 1.5 to 2.5 miles SE of Tanjung Paisumbaos. The usual route through this part of the strait is between **Tanjung Paisumbaos** (0°36.5'S., 127°22.4'E.) and **Pulau Mambuat** (0°36.0'S., 127°23.0'E.).

There is a stone landing and conspicuous mosque at Kampung Sangkuangklano on the NE shore of Pulau Obit, SE of Tanjung Paisumbaos and Pulau Mambuat.

Teluk Belang Belang (0°37'S., 127°25'E.), N of Nusa Ra, offers anchorage for large vessels, in 40m, off the village of Kampung Belang Belang when anchorage at Labuha is untenable; this anchorage is out of the current.

2.36 **Pulau Mandioli** (0°43'S., 127°15'E.), on the W side of Selat Bacan, is hilly but has a rather flat appearance and is much lower than the larger islands of this group. The highest point, Buku Gaku 331m high is the summit of one of the conspicuous hills. A number of charted dangers surround the island, most of which are close inshore. The farthest off-lying dangers are off the NW part of the island. The islets Ambatin and Samo are about 2 and 3.5 miles NW, respectively, NW of Tanjung Sarawaki the NW point of Pulau Mandioli. Pasir Karo is a white sandbank lying on the S of two reefs about 3 miles W of the same point. A 7.9m shoal is about 0.5 mile SE of Ambatin, and another is the same distance SSE of Pasir Karo. Gamyaha (Gamjaha), 6 miles S of Pasir Karo, has least depth of 14.9m. Two more reefs are located 2.8 and 3 miles S and SE, respectively, of Pasir Karo.

The island is sparsely populated. During good weather anchorage is available with local knowledge almost everywhere off the E coast of Pulau Mandioli, but in considerable depths in some places. Local knowledge is necessary.

Three other passages between Pulau Obit and Pulau Mandioli lead N from Selat Bacan in addition to the principal and recommended passage, Selat Udjung Masaran, which was previously described in paragraph 2.35. It should be remembered that reefs in these passages do not show clearly by discoloration.

All of these passages lead out to the broad clean basin to the N, then several channels lead to Selat Sambaki between Pulau Kasiruta and Pulau Bacan.

2.37 **Selat Sambaki** (Sambak Strait) (0°25'S., 127°17'E.), between Pulau Bacan and Pulau Kasiruta, is used by vessels proceeding N from Selat Bacan, or may be entered by vessels coming from the W and passing between Pulau Mandioli and Pulau Kasiruta. The S entrance to the strait is cut up into narrow channels by the Batu Ampat Islands, which include Pulau Waring, Pulau Batu Ampat, Nusa Uwa, Pulau Tambelik, Pulau Tuada, and a number of smaller islands. All of these islands are wooded except Pulau Tuada, the northernmost, which is covered with coconut palms.

Selat Batu Ampat, the middle of the three channels forming the S entrance to Selat Sambaki is between Pulau Batu Ampat and Pulau Tambelik. It is marked by beacons, and is the recommended channel and is generally taken by vessels using this route. The maximum velocity of current in this strait is 3 knots. Two detached reefs, with depths of 1.5 and 2.7m, are on the W side of the fairway about 0.5 mile N of the SE extremity of Pulau Batu Armpat; the 1.5m reef is marked by a beacon with a white ball. A rock, awash, and reef, which extends SW from the W extremity of Pulau Tambelik, is marked by a beacon with a black ball.

Selat Herberg, the strait E of Selat Batu Ampat, is a less desirable passage and more narrow than Selat Batu Ampat. It should not be used by vessels exceeding 60m. Selat Nanung (Selat Nanoang), the strait W of Selat Batu Ampat, is less advisable because of strong currents.

When the three straits come together, just N of Pulau Tambelik, the conspicuous drying sandbank Pasir Nondang (close off Pulau Bachan shore, 0.75 mile NNE of the N point of Tambelik) serves as a good check for position.

A 7.8m shoal extends NE from Pulau Tuada. Pasir Masarang, with a least depth of 0.3m, is in the middle of the fairway of Selat Sambaki, about 4.5 miles farther N.

North of Selat Batu Ampat, the shore of Pulau Bacan is fairly low and has a couple of drying reefs which extend up to 0.6 mile offshore. A 6.4m shoal is 2 miles N of these reefs and 1 mile offshore.

The shore of Pulau Kasiruta is higher and can be approached more closely. The most conspicuous spot is a bare rocky place N of Tanjung Semo Semo.

The N entrance to Selat Sambaki is divided into two clear channels by **Pulau Toduku** (0°20'S., 127°17'E.). The E of these channels is restricted somewhat by a group of islets extending from the shore of Pulau Bacan. Vessels using the strait should note that a 6m shoal 1.3 miles off the coast of Pulau Bacan, 2.7 miles S of Tanjung Batumangara. Another shoal 4.1m is close off of Vuile Point, the NE point of Pulau Kasiruta.

Directions.—For passage through Selat Sambaki from S,

when the sand bank of Pasir Nondang bears E keep near the coast of Pulau Bacan until past **Tanjung Indari** (0°26'S., 127°18'E.), then bring **Nusa Poko Poko** (0°20.5'S., 127°18.3'E.) in range 004° with the E point of Pulau Tawalikecil, NW of Pulau Kasiruta. This range clears Pasir Masarang.

The N end of Selat Sambaki has two channels, W and E of Pulau Toduku. The E channel is generally used and is clear of dangers in the fairway.

The Bacan Islands (Continued)

2.38 Pulau Kasiruta (0°24'S., 127°12'E.), on the W side of Selat Sambaki, is about 18 miles long, irregular, and hilly. The highest peak, Buku Kabau, on the NE quarter of the island, is 824m high. The coast is also irregular and rocky, and has many small inlets and bays. Several small islets front the coast, especially on the W side. The outermost danger is a 2.7m shoal about 1 mile offshore and 1.75 miles SW of Tanjung Sengga, the NW point of the island.

Anchorage.—The safest anchorage is in Teluk Kasiruta, on the SE side of the island and NW of Pulau Batu Ampat.

Several suitable anchorages are on the W side of the island, although monsoons cause a high sea and surf. Teluk Imbu Imbu has too steep a bottom for anchorage.

A basin, with a depth of 39m, is in Teluk Besori; it is reached through a narrow channel between two islets. The large village of Kampung Tyoba Dahahi is here.

Kampung Palamea, the largest village on the island, is on Teluk Loleo, 4.5 miles farther N; it is somewhat sheltered by the Lata Lata Islands.

Teluk Mamang, the next bay to the N, is easily entered between two rocky islets. It offers sheltered anchorage in all winds, in a depth of 40m.

Kepulauan Obi

2.39 Kepulauan Obi (1°30'S., 127°35'E.), between Selat Obi (Obi Strait) and the Ceram Sea (Seram Sea), consists of the large island of Pulau Obi and several smaller nearby islands. The highest point in the group, near the middle of Pulau Obi, is 1,611m high. Only a few permanent settlements are on these islands. Most of the inhabitants come from neighboring islands; the principal occupations are the gathering of forest products and fishing.

The passages between these islands are deep in the fairway and clear of dangers, except the passages between Pulau Gomumu and the S side of Pulau Obi, and between Pulau Bisa and the N side of Pulau Obi.

From June to September, the E and S coasts of the islands are inaccessible because of high seas; from December to February the same applies to the W and NW coast. Because of this, shipping confines itself principally to the village of Kampung Laiwui, on the N coast of Pulau Obi.

Caution.—Severe tide rips are experienced to a distance of about 30 miles W of a point located about 40 miles NW of Kepulauan Obi.

Pulau Tobalai (1°38'S., 128°20'E.), 7.75 miles E of the E end of Pulau Obi, is a tableland, 240m high, which descends in a step-like formation to the SW. The thick jungle extends close to the rocky shore in many places. The island is steep-to, and Selat Tobalai, the strait separating it from Pulau Obi, is clear throughout.

2.40 South coast of Pulau Obi.—The coast rises steeply from the sea and is covered with jungle except at the small villages along the coast which may be recognized by their coconut plantations. A steep drop at the E end of the interior mountain range is conspicuous. Other conspicuous points are the 965m peak, about 20 miles W of the E end of the island, and a gap near the coast S of it. The higher peaks of the island are usually enveloped by clouds.

The best anchorage is at the village of **Wai Lower** (1°44'S., 127°36'E.) during the favorable seasons. A strong current may be experienced near the points along this coast, except at this anchorage.

At Wai Lower, there is both a diurnal and a semidiurnal tide. Neither the spring highs nor the spring lows of the two tides coincide. The HHW level occurs between June and August and between December and February; the lowest in May and November. The maximum rise and fall that can be expected are, respectively, 0.7m above and 0.8m below mean sea level.

Pulau Gomumu (1°50'S., 127°36'E.), about 5 miles S of Pulau Obi, is hilly but has no conspicuous summits; it rises to a height of 279m. The E and S sides are fronted by a drying coastal reef.

Gomumu Anchorage (1°51'S., 127°36'E.), on the S side of Pulau Gomumu, affords anchorage for a small vessel with local knowledge. The narrow channel leads over a bar with a least depth of 7m. Inside the bar, the bay opens out to a basin with depths of 18.3m to about 29m. Farther in, a narrow channel, with a least depth of 7m between the reefs on either side, leads to an inner basin with depths of 9.1 to 18.3m. The reefs on either side of the narrow channel leading into the inner basin are easily distinguished.

There is a 4.1m shoal, extending 1 mile out, close E of this area.

Pasir Radja (Pasir Raja) (Sophia Reef) (1°47'S., 127°32'E.), a reef 4 miles NW of Pulau Gomumu, has a depth of 8.2m, but can seldom be recognized by discoloration. It is the only danger in the otherwise clear channel between Pulau Gomumu and Pulau Obi.

2.41 West coast of Pulau Obi.—The S half of this stretch of coast is comparatively low and the foothills are farther inland. Abreast of Pulau Malamala, it becomes high and steep. The channel between Pulau Malamala and Pulau Obi is clear. Pasi Turi, reported to be conspicuous, is a rock on a drying reef 1.25 miles WSW of Pulau Malamala.

Vessels coming from S must take care to avoid the 1.2m shoal 2.5 miles S of Pulau Malamala; the shoal is only slightly marked by discoloration. A drying patch is 0.5 mile offshore from Pulau Obi, E of the shoal. A village, visible from seaward is close NE of the drying patch. **Tanjung Kawassi** (1°37'S., 127°24'E.) is conspicuous because of the coconut plantation around it. Reefs, extending 0.75 mile out, run from the drying patch to Tanjung Ake Lamo, 6 miles S.

Pulau Obilatu (1°24'S., 127°20'E.), separated from the NW end of Pulau Obi by a clear channel 1.25 miles wide, is mountainous and has some very conspicuous summits, the easternmost and highest of which is a sharply-pointed cone, 840m

high. The only good anchorages are found in the bays on the N side of the island. The peninsulas between these bays, as well as Pulau Tusa, an islet N of the E end of Pulau Obilatu, are bare and have a reddish color. The reef S of this islet and the 2.5m shoal off the W bay can be located by their discoloration. Squalls off the mountains occur at times, especially in the bays.

Vessels using the passage between Pulau Obi and Pulau Obilatu and coming from the NE should avoid the S side of the passage between Pulau Bisa and Pulau Obi because of the reefs off Pulau Obi. When the S point of Pulau Belang Belang and the NW point of Pulau Obilau come in range, course should be altered to port, then steer between Pulau Obi and Pulau Obilatu on a SW course. There are no off-lying dangers and practically no shore reefs between these last two islands.

2.42 Pulau Belang Belang (1°20'S., 127°24'E.), NE of Pulau Obilatu, is low with a slight elevation at the middle. The N coast is steep and sandy, but the S coast and the coasts of Telor, an islet close off its SW side, are muddy and covered with mangroves. The S and W sides of Pulau Belang Belang are fronted with reefs and shoals and a 2.5m charted shoal is about 2 miles W of it.

Anchorage is available, in 53m, 0.3 mile offshore, with the NE point of Pulau Belang Belang bearing 340°. Vessels approach the anchorage steering 324° with two high trees, near the NE point, ahead.

The passage between Pulau Belang Belang and Pulau Obilatu is easy and clean, except for the 2.5m shoal W of Pulau Belang Belang.

Pulau Tapat (1°10'S., 127°25'E.), 5.5 miles N of Pulau Belang Belang, is the NW island of the group. It is covered with jungle and rises to two fairly-conspicuous summits, 491 and 563m high.

Pulau Bisa (1°14'S., 127°36'E.), N of Pulau Obi and E of Pulau Tapat, from which it is separated by a deep channel, is covered with jungle, except at the few villages, where coconut plantations may be seen. It is composed of a range of hills, of which the highest summit, 467m high is at the NW end. Pulau Jerum (Pulau Djerum), at the NE end of the island, consists of a group of mangrove-covered mud banks on the broad drying shore reef which extends from the E coast; a single conspicuous tree stands out above the others. Pulau Santare, at the SE end of the island, is a low islet on the same shore reef; its high trees make it fairly conspicuous.

Caution.—Kurier Reef (1°13'S., 127°49'E.), with a least depth of 1.8m and steep-to on all sides, is 7.5 miles E of Pulau Bisa. It consists of sand and coral, and is well marked by the discoloration of the water.

2.43 North coast of Pulau Obi.—Nearer the N coast of the island and separated from the principal range is a group of mountains rising to a height of 1,290m; very often these peaks are surrounded by clouds. The westernmost peak, 1,290m high, appears as a perfect cone when seen from the N.

From **Tanjung Leleo Basso** (1°24'S., 127°26'E.) to Kadera, about 4.75 miles E, the shore is sparsely wooded, hilly, and somewhat reddish in color. The two small off-lying wooded islets of **Kerka** (1°26'S., 127°27'E.) and Kadera, 30 to 40m high are quite conspicuous. Then from Kadera to Tanjung Anggai, 15 miles E, the coast is low and covered alternately with jungle and coconut plantations. The inhabited section of the coast begins at Tanjung Tabuedji, and along it are the villages of Kampung Baru, Kampung Laiwui, Kampung Badjo, Kampung Ritja, and Kampung Anggai. Many reefs are in the channel between Pulau Bisa and this stretch of coast. The large drying reef N of Tanjung Tabuedji is marked by two groups of bushes. Pulau Sambiki, near the shore opposite the SE end of Pulau Bisa, is small sandy, and covered with coconut palms.

Aspect.—A 200m peak on the N side of Pulau Obi, about 1.25 miles S of the village of Ritja, is reported to be a conspicuous and useful landmark.

For 9 miles, between Tanjung Anggai and **Tanjung Woka** (1°26'S., 127°53'E.), the hills are close to the coast and limestone rocks show in places. This stretch is fronted by many reefs and shoals. The largest drying reef, with drying and shoal patches NW of it, is about 3.5 miles offshore; on these outer reefs are two small islets. Between the W side of Tanjung Woka and Pulau Woka there is good anchorage. Pulau Woka is partly covered with coconut plantations.

A light is shown 2 miles S of Tanjung Woka.

Between Tanjung Woka and **Tanjung Parigi** (1°34'S., 128°06'E.), a distance of about 15.5 miles, most of the coast is fronted by a barrier reef with islands and shoals within it. Except for the coconut plantations at some of the villages along the coast and on portions of the islands, this entire coast is covered with mangroves. Good anchorage can be found most anywhere in fairly deep water within the barrier reef, through which there are some deep passages. The reefs NW of Marosa are well marked by discoloration.

Southeast of Tanjung Parigi, the low coast is covered with jungle; there is hardly any beach.

2.44 Laiwui Roads (1°20'S., 127°38'E.), on the N coast of Pulau Obi, is somewhat sheltered by Pulau Bisa.

The approaches to Laiwui Roads are encumbered by reefs, some of which are only slightly marked by discoloration. Laiwui Reef, which dries, is about 3 miles WSW of Laiwui. Pulau Sambiki is a small sandy islet covered with coconut palms off the N coast of Pulau Obi about 4.5 miles E of Laiwui.

Vessels approaching the roads from E are advised to pass close along the reef at Pulau Santare and along the SE end of Pulau Bisa until a suitable bearing (between 190° and 170°) on the conspicuous tin roof at Laiwui is obtained. When coming from W, keep outside about the 200m curve surrounding Pulau Obi until Laiwui lies between the above bearings. Anchor, in about 20m, 0.2 mile from the coastal reef, E of the pier at Laiwui.

Laiwui (1°20'S., 127°38'E.) has a small pier.

Tides—Currents.—At Laiwui Roads, there is both a diurnal and semidiurnal tide. Neither the spring highs nor the spring lows of the two tides coincide. The highest water level occurs in June and December, the lowest in April or May and October or November; the maximum rise and fall that can be expected are, respectively, about 0.6m above and 0.45m below mean sea level. There are no tidal currents in the roadstead. The water in the vicinity of the roads is very clear and the bottom can often be seen in depths of 11.9m.

2.45 The **Lawin Islands** (1°31'S., 128°43'E.) and Pulau Kekik, 17 to 23.5 miles ENE of Pulau Tobalai, are a group of

small but heavily-wooded islands. Pulau Kekik (Pulau Kekek), the westernmost, is 211m high and has the appearance of a truncated cone from all directions. Toppershudie (Tema), a small rocky islet 43m high and covered with shrubs, is 2 miles NE of Pulau Kekik and on the S end of a bank of soundings.

Pulau Lawin, the middle islet of the three easternmost of the group, is a circular hill 236m high. Nearby Watinger and Laliola are both mainly flat, except for an 86m hillock at the N point of Watinger. A light is shown on Laliola. Shoal water, well marked by discoloration, extends SE from Laliola. These three islands are on the S part of a bank of soundings. A 14.6m shoal, not marked by discoloration, is 0.6 mile N of Pulau Lawin. The only suitable anchorages, weather permitting, are on the bank N of Toppershudie and in the N part of the channel between Pulau Lawin and Watinger.

The whole group is uninhabited.

Pulau Pisang (1°23'S., 128°55'E.), nearly 13 miles NE of Pulau Lawin, is very steep and has two summits, 430 and 464m high. The island is reported to be a good radar target up to a distance of 18 miles. It is uninhabited and hardly penetrable due to its steepness and dense growth. Two detached rocks surrounded by shoal water are 0.3 mile off the NW side of the island, and another rock with shoal water around it is 0.4 mile SE of the island. Contingent on the monsoons, good anchorage may be found on the N or SE side of the island, although a considerable current may be experienced on the SE side. Local knowledge is necessary.

Kepulauan Boo (1°10'S., 129°22'E.), a group of islands NE of Pulau Pisang, are described in paragraph 2.91.

Kepulauan Sula

2.46 Kepulauan Sula (1°50'S., 125°20'E.), a group of islands W of Kepulauan Obi and E of the central peninsula of Sulawesi (Celebes), consist of three very large islands and several smaller ones. The islands of Pulau Lifoematola, Pulau Mangole (Pulau Mangoli), and Pulau Taliabu (Pulau Taliaboe) form a chain extending in an E-W direction about 130 miles; they are high and bold and are sparsely populated. Pulau Sanana, extending in a S direction from abreast the middle of Pulau Mangoli, has extensive coconut plantations.

The islands of Kepulauan Sula give a good radar return from a distance of 24 miles.

Pulau Taliabu (Pulau Taliaboe) (1°50'S., 124°50'E.), the westernmost and largest island of the group, has a range of mountains rising to a height of 1,380m through its central and W part. There are, however, no conspicuous peaks. This island is described in Pub. 163, Sailing Directions (Enroute) Borneo, Jawa, Sulawesi, and Nusa Tenggara.

Selat Tjapalulu (Selat Tjapaloeloe) (1°50'S., 125°20'E.), the narrow passage separating Pulau Taliabu and Pulau Mangole, is also described in Pub. 163, Sailing Directions (Enroute) Borneo, Jawa, Sulawesi, and Nusa Tenggara.

2.47 Pulau Mangole (Pulau Mangoli) (1°50'S., 125°50'E.) is 62 miles long but comparatively narrow. It is mountainous and has two mountain ranges with a conspicuous depression between them. The highest peak, 1,147m high, is in the Lokoe Mountains range on the E part of the island and is about 16 miles W of the E end of the island.

Vessels navigating along the coasts of Pulau Mangole should expect either E or W currents.

The N coast of Pulau Mangole from Selat Tjapalulu to abreast of the Tabulu Islands (Taboeloe Islands) is low. **Tanjung Wajteta** (1°47'S., 125°22'E.), the NW extremity of the island, is rocky. Except in bays and inlets, sandy beaches will be found E of this point. Liku (Likoe) is a low islet covered with trees. The channel between the Tabulu Islands and the main shore is not recommended, because of the dangers in it. There are also shoals to the E of these islands, and navigation within 2 miles of their E coast is dangerous.

About 9 miles E of the Tabulu Islands is the low and wooded island of Koro, and between them are two off-lying dangers. Between 3 miles WSW and 2.5 miles SW of Koro lies a submerged rock and a 0.3m shoal. East of Koro, to the E end of Pulau Mangoli, the remaining dangers are close to the shore. Two conspicuous masses of rock with reddish-brown sides are on a drying reef, close to the shore at Tabobi and Fatsati, about 9 and 5 miles W of the E end of Pulau Mangoli.

Anchorage.—West of the Tabulu Islands, the only suitable anchorages are in the bights of the coast. There is good anchorage almost anywhere between the Tabulu Islands and Tanjung Lampaoe during the Southeast Monsoon and during the turning periods with due regard for the off-lying dangers mentioned above. Vessels anchoring 0.2 mile off this coast, in 33m, have reported the current sets E and W with a maximum velocity of 2 knots at spring tides during the South Monsoon.

The village of Liku, SW of the islet of the same name, is situated on the W side of the entrance to a large bight. In the inner part of this bight, SE of two small islets, is a small anchorage, with a depth of 6.8m.

2.48 South coast of Pulau Mangoli.—This coast can, in general, be approached to within a short distance, but the sea is quite rough during the Southeast Monsoon and eddies have been observed off the headlands. The points along the coast, as well as the mountains in the W part, are quite conspicuous.

Vesuvius Bay (1°52'S., 125°22'E.) is the NW part of the large bay between Tanjung Sakomata and Tanjung Batu Kapitan, a high rocky point with a very conspicuous pillar-shaped rock on a drying patch near it. In this large bay are the two islets, Pasilpah and Kena; the former is hilly on its W part, and the latter has the appearance of a white sandy beach.

Tides—Currents.—At Vesuvius Bay, there is both a dirunal and a semidiurnal tide. The spring lows of the two tides may coincide. The lowest LW level occurs in June and December; the maximum rise and fall that can be expected are, respectively, 0.7m above and 1.2m below mean sea level.

From Tanjung Batu Kapitan, the coast trends E for 22 miles to **Pulau Sambiki** (1°56'S., 125°47'E.), a steep and high islet. **Tanjung Fargata** (1°57'S., 125°32'E.), 5.5 miles E of Tanjung Batu Kapitan, is high, round, and rocky. A string of shoals and drying reefs extends nearly 3 miles W from Pulau Sambiki. The village of Kaporo with its coconut plantations, 3.5 miles W of Pulau Sambiki, is conspicuous.

Between Pulau Sambiki and the coast is a clear channel, through which vessels can proceed to anchorages in the two small bays NW of the islet. In the large bay E of Pulau Sambiki anchorage can be found almost anywhere, have due regard for the previously-mentioned shoal spots.

2.49 Selat Mangole (Mangoli Strait) (1°57'S., 125°55'E.), separating Pulau Mangole and Pulau Sanana, is nearly 2 miles wide. A 6.8m shoal is in the middle of the strait. A shallower spot was formerly reported, but later surveys failed to locate it. Strong currents of up to 3 to 4 knots, however, prevent very thorough surveys. Strong eddies have been reported in the strait, especially S of the 6.8m shoal. The Pulau Mangoli shore can be approached rather close-to; the Pulau Sanana shore is fringed by a drying reef. The best channel is N of the 6.8m shoal.

Numerous small houses and coconut plantations are scattered along the N shore of Selat Mangole and to the E. A shoal with a depth of 5.5m and possibly less is close offshore abreast of the village of Mangole (1°55'S., 125°57'E.).

Directions.—A vessel proceeding through Selat Mangole from W should keep Pulau Sambiki astern, bearing 270°, which leads N of a 0.4 shoal which is not marked by discoloration and is 2.5 miles ESE of that islet, and pass 0.33 mile S of **Tanjung Botu** (1°56'S., 125°55'E.), then clear the reef extending from the NE side of Pulau Sanana; when Tanjung Wakapara, the NE point of Pulau Sanana is in line with Tanjung Kabau, about 2 miles S, bearing 180°, course may be altered as required.

2.50 The coast of Pulau Mangoli E of Selat Mangoli can be followed at a short distance off, except for the only danger, a 0.4m shoal about 2 miles SW of **Tanjung Gohadjodjara** (1°53'S., 126°14'E.).

Selat Lifumatola (Lifoematola Strait) (1°49'S., 126°21'E.), between Pulau Mangoli and Pulau Lifumatola, is of no importance to navigation and should not be used without local knowledge. It is only 0.3 mile wide and it is further restricted by islets and shoals, so that the widest navigable channel is only 137m at the narrowest part. Navigation is also made hazardous by the strong tidal currents. There are whirlpools and eddies over the banks and shoals and, during the South Monsoon, there is a troublesome sea. The slack water period is short.

Pulau Lifumatola (1°49'S., 126°27'E.), the E island of the Kepulauan Sula group, is uninhabited. It is hilly and rises steeply from the sea; the highest point is 258m high. Limo is a conspicuous little rocky islet lying close to the SE side. The coast back of the islet, as well as Tanjung Dehekolano, the E end of the island, is composed of conspicuous white masses of limestone and is marked by a light; a racon is situated at the light. NW of Tanjung Dehekolano are three narrow inlets; suitable anchorage may be found in the southernmost of these during the North Monsoon and during the turning periods.

Strong E or W currents may be experienced on the N and S sides of the island. Around the S end they set either N or S and cause strong eddies. Because of these eddies, and particularly nasty seas if the wind and currents are opposite, the E point of Pulau Lifumatola should be given a berth of 5 miles.

Tide rips have also been observed about 33 miles ESE and 20 miles ENE of Tanjung Dehekolano.

Pulau Lifumatola serves as a good radar target at a distance of 28 miles, and Tanjung Dehekolano is reported to be a good radar target at a distance of 17 miles.

2.51 Pulau Sanana (2°03'S., 125°59'E.), the southernmost island of the Kepulauan Sula group, extends about 31 miles in a S direction from abreast the middle of Pulau Mangole. From E and W it appears as a single mountain range with a number of conspicuous summits 488 to 678m high. The highest peak is at the S end. In general the coast is low and has sandy beaches with coconut palms, interrupted in places by rocky formations. Except for the N end of the island and the N half of the W coast, vessels can approach the island rather close-to.

The N coast is marshy and covered with mangroves. Large vessels usually stay clear of this coast.

Sanana Bay (2°03'S., 125°59'E.) is a small indentation at the NE end of Pulau Sanana. The entrance is only 91m wide, but has a depth of 14.6m at mid-channel. The depths range from 11.9 to 29m. There is a flagstaff 0.5 mile SW of the village.

Directions.—Vessels should enter the bay keeping a beacon (cone topmark), at the head of the bay, bearing 286°. Because the currents set across the entrance, it is necessary to enter at a fair rate of speed. Because of the space required for maneuvering once inside it is not advisable to enter when another vessel is already in the bay. When about 0.2 mile from the beacon, let go the starboard anchor in a depth of 15m. After the vessel has swung, a hawser should be laid out to a post N of the pier on the shore near the beacon.

2.52 Sanana (2°03'S., 125°59'E.), a small village in which a government official is stationed, lies at the head of the bay.

There is a large mosque in the village and a small pier, with a depth of 0.6m at its head.

Water can be supplied from the stream on the S side of the village.

Tides—Currents.—At Sanana Bay, there is both a dirunal and semidiurnal tide. The spring lows of the tide coincide. The lowest water occurs in April or May and October or November. The maximum rise and fall that can be expected are, respectively, about 0.5m above and 0.9m below mean sea level. The currents usually set across the entrance.

South of the village of Sanana, there are no suitable anchorages; the same is true for the S half of the W coast. On both coasts are a number of villages in the midst of coconut plantations. A coast road connects the villages. Tanjung Patahoj, at the middle of the W coast, is low and marshy. Tanjung Fatparoma, 7.5 miles further N is rocky. Between these points is a ridge of shoals and reefs extending up to 2 miles offshore. Several other charted dangers front the coast N of the latter point.

At the village of Kabauw (Kaban), 1.5 miles N of Tanjung Patahoj, a shallow lagoon indents the coast; a bridge crosses the narrow entrance. North of here, anchorage can be found almost anywhere clear of the reefs and shoals.

At the village of Kampung Molboefa, on the NW side of the island, there is a deep basin within a drying reef. Vessels may find temporary anchorage, in 10.9 or 11.9m, about 0.5 mile offshore, SW of the entrance to the basin. Care is necessary to avoid the 5m shoal WSW of the village, the 0.5m shoal 1 mile N, and the reefs off the entrance.

2.53 Morotai (2°20'N., 128°28'E.), an island about 10.5 miles E of the N end of Halmahera, is about 40 miles long and is high over its greater part. The highest point (2°13.5'N., 128°25'E.) is 1,250m high and is one of the summits of the Sabatai Mountains (Sabalai Mountains), which stretches across

the island in a NE-SW direction. On the river banks and on the flat SW part of the island are forests of sago trees; in the interior are dammar forests. The island is frequented by people who collect dammar gum and also fish among the islands off the W coast. A number of villages are along the coast. It was reported that the NE coast of the island lies 4 to 5 miles farther NE than charted.

The NW coast of Morotai between **Tanjung Wayabula** (Tanjung Wajabula) (2°17'N., 128°12'E.) and Tanjung Padangi, about 24.5 miles to the NE, is steep and vessels can navigate rather close inshore bearing in mind that a narrow coastal reef exists in places. Along this coast are many mountain tops, but because they have no distinctive features they are not much use as landmarks.

Anchorage can be found almost anywhere along this coast, but the depths are great. Anchorage can be obtained off the village of **Kampung Tijo** (2°25'N., 128°18'E.), in 21m; off **Kampung Libano** (2°29'N., 128°21'E.), in 27m; off **Kampung Hapo** (2°31'N., 128°24'E.), in about 28m; and off **Kampung Berriberri** (2°34'N., 128°26'E.), in 14m.

Teluk Sopi (2°35'N., 128°30'E.), the bay between Tanjung Padangi and Tanjung Sopi, about 7.5 miles ENE, offers good anchorage during favorable winds. Stay clear of the charted 6m shoal in the outer part of the bay, 1.25 miles NE of Tanjung Padangi. The village of Kampung Sopi is at the head of the bay.

Tanjung Sopi (2°38.5'N., 128°34'E.), the N end of Morotai, is marked by a light; it is a low but gradually sloping point with a broader reef than that found on either side of it. Several boulders are on the edge of the reef.

2.54 East coast of Morotai.—Between Tanjung Sopi and Tanjung Selepia, 15 miles S, the shore reef is steep-to. From there to **Tanjung Posiposi** (2°06.5'N., 128°34'E.), about 21 miles further SSW, the coast is foul. A barrier reef, which may be distinguished by the heavy surf on it, extends up to 0.5 mile offshore.

Winds—Weather.—High seas and rollers from the SE and NE have been experienced. Heavy showers from the SSE, called "Angin Lelei" by the natives, occur at the middle of the South Monsoon. They come up about 1000 or 1100 without any warning and are accompanied by a heavy sea.

Tides—Currents.—Strong currents may be experienced off the NE end of the island. At **Tanjung Gorango** (2°30'N., 128°41'E.), a rate of 3 knots has been observed on a rising tide.

2.55 Berebere (Berri Berri) (2°23'N., 128°40'E.), an anchorage, is in a bight of the E coast about 16 miles S of the N point of the island. It is sheltered by a large drying reef on which is the mangrove-covered island of Tabailengo. The entrance between this reef and another drying reef to the N is not safe because of several shoals which do not show by discoloration. Shoals of 7.8m and 2.3m are located 0.6 mile NW and N respectively, of Tabailengo. Vessels can anchor, in 40m, sand and coral, NW of Tabailengo, but care must be taken to avoid the reefs and shoals on the W side of the bight and off the S entrance. The village of Kampung Berebere, at the head of the anchorage, is the center of the native trade in dammar gum and copra.

Tanjung Boboro (2°19'N., 128°39'E.) and Kampung Busu Busu, 7.5 miles S, the coast is fronted by a barrier reef. At Tanjung Lefau, where a conspicuous small rock is on the coast reef, there is a wide break in the barrier reef. A wide sandy beach extends N from this point. Dangers are found near the coast N and S of the barrier reef. The bight at Kampung Busu Busu affords anchorage, but it is not very safe from October to March, when heavy rollers come in.

2.56 South coast of Morotai.—Between **Tanjung Posiposi** (2°06'N., 128°34'E.) and Tanjung Gila, about 20 miles WSW, the narrow coast reef is steep-to. Two reefs, extending 0.75 mile offshore, are 4.5 and 6.5 miles SW of Tanjung Posiposi.

A small basin for small vessels only is off **Kampung Samgowo** (2°06'N., 128°33'E.) (World Port Index No. 52640) close W of Tanjung Posiposi. Anchorage can be found outside, but rollers are usually experienced. Vessels call here occasionally.

Kampung Sabati (Kampung Sabatai), 8.5 miles W of Kampung Sangowo, is at the mouth of the river of the same name, which can only be navigated by small craft. During favorable weather ,anchorage may be found off the village, in 48m, sand.

2.57 West coast of Morotai.—The coast between Tanjung Gila and Tanjung Wayabula, 18 miles N, is fronted by numerus shoals, reefs, and islets which lie up to 5 miles offshore. The reefs are well marked by discoloration, and the passages within them are available to vessels of considerable draft. There is nothing particularly conspicuous about the mountains, with the exception of **Bandera** (2°07'N., 128°16'E.), a 201m coastal hill 8 miles N of Tanjung Gila.

Tanjung Gila (Tanjung Dehegila) (1°59'N., 128°15'E.) is a low wooded tongue of land. A couple of palms on the W side are conspicuous. Pulau Mitita is a thickly-wooded coral island 1.75 miles WSW of Tanjung Gila. Two detached 4m shoals are 0.75 mile and 1.5 miles, respectively, WSW of Tanjung Gila, and a 4.8m shoal is between these two shoals.

The outermost danger in this vicinity is Pono Ponata, a 7.3m shoal about 1.75 miles W of Pulau Mitita. Midway between Pona Ponata and Goja Uku, a drying reef about 2 miles NNE, is Lutu Lutu, a shoal with a depth of 5.8m. Midway between Pona Ponata and Pulau Mitita is Dododahohe, a reef that dries 0.3m and is marked by a light.

2.58 Islets off the W coast of Morotai.—Kokoyo (Kokoja), Kolorai, Dodola-kecil, and Dodola-besar are on a drying reef which is 2.75 to 9 miles NNE of Pulau Matita. The two N of these islets are not inhabited, but are covered with coconut plantations; they can be reached from Kolorai by foot at LW. A conspicuous tree is on the reef about 183m N of the NW end of Dodola-besar. Between these islets and the shore to the E is another group of islets, including Sumusuma, Ruke Rukete, Bobogono, Rube, and Lungulungu.

On the next large drying reef to the N are the islets Loleba-besar, Loleba-kecil, Pulau Galogalo Besar, and Pulau Galogalo-kecil, on which there are some houses and coconut plantations. Close W of Pulau Galogalo Besar is the small islet of Pelo. It is reported that shoal water extends S from Pelo. The large village of Dowongi Kokotu is on the coast abreast of this group and at the foot of Bandera hill.

Pulau Ngelengele-kecil (2°10'N., 128°13'E.) and Pulau Ngelengele-besar, about 1.5 miles NW, on the larger reefs, have large villages and coconut plantations. On the coast abreast of the latter is the village of Kampung Tilei, with the inhabited islet of Katjuwawa close off it.

The W coast of Morotai is fronted with numerous shoals and reefs and there are also many shoals and reefs laying off the off-lying islands and islets.

Anchorage.—A pontoon in ruins was reported about 2.75 miles NE of Tanjung Gila. A pier in ruins is about 4.5 miles NNE of the same point, with a green copra shed and a mosque about 0.5 mile and 1 mile NNW of the pier. Anchorage for two 122m long vessels may be obtained, in 10.9m, about 0.6 mile W of the green shed.

Directions.—Vessels approaching from W should steer for Tanjung Gila on a course of 100°. When the right tangents of Kokoyo and Kolorai are in range, change course to 060°, steering for the ruined pontoon. When the W edge of the ruined pier is in range with the green shed and mosque, bearing 027°, they should be steered for. When about 0.6 mile from the ruined wharf, course should be altered to 000° for the anchorage, passing midway between the Morotai shore and the two small islets about 0.7 mile SW of the ruined pier.

2.59 Wayabula Roads (2°17'N., 128°12'E.), S and SW of the point of the same name, can be approached from the W by passing S of Saminjamau and keeping the S side of that islet on a 282° bearing astern. Vessels then steer in mid-channel, in 20m, with a conspicuous tree on Tanjung Wayabula bearing 038° and the head of the pier at the village E of the pier bearing 073°. A more sheltered anchorage is close N of the two drying reefs S of the village. To reach this anchorage pass between the W reef and the 0.9m shoal S of it, then haul N between the two reefs. Vessels call here regularly. A mosque and a flagstaff are in the village.

Pulau Rao (Pulau Rau) (2°21'N., 128°09'E.), off the W side of Morotai, has a mountain range along its E side. Its highest summit, 475m high, is conical in appearance when seen from SW. Close S of the summit is a lower and less conspicuous top which terminates in a 281m hill near the SW side of the island. The E side of the island rises rather steeply; the W side slopes more gradually and ends in a wide plain covered with jungle and coconut plantations in places. Saminjamau, at the S end of the island, is a heavily-wooded islet with a rocky W side. Tunane, at the N end, and Tjapali, near the E side, are two small, rocky, and heavily-wooded islets. There are three caves in the steep cliff in the vicinity of Kampung Aru, on the E coast about 2.5 miles S of the N end of the island, which are visible from seaward.

Selat Rau (Rao Strait) (2°20'N., 128°12'E.), the strait between Pulau Rau and Morotai, has a least depth of 6m in the fairway. A bank with a least depth of 7.9m extends about 0.8 mile from the W side of the strait. The channels each side of the shoal are indicated by strong tide rips.

Selat Morotai (2°17'N., 128°06'E.), the deep strait between the N end of Halmahera and the islets and reefs off the W coast of Morotai, is 6.5 miles wide, clear, and easily navigated. In its S approach, however, a few charted dangers are found. Of these, the 7.3m spots 1.75 miles W of Pulau Mitita have already been mentioned. A 31m bank is in the N part of Selat Morotai, about 3.75 miles WNW of the N end of Pulau Ngelengele-besar. A 18.3m shoal is 2.5 miles SW of Pulau Mitita. The Momow Reefs, two reefs with depthsof 6.7m and 7.8m, lie 9.5 and 11.75 miles, respectively, SW of the same islet.

Halmahera (Continued)

2.60 Supu Bay (2°11'N., 127°59'E.), at the N end of Halmahera, is entered between Tanjung Bisoa and Tanjung Djodefa (Tanjung Jojefa), about 7 miles E. Both points have a narrow fringing reef but may be rounded safely at a comparatively short distance. The bay is clear and affords suitable anchorage, in 27m, off the village at the head. The shore reef is widest near the village extending over 183m offshore; the rocks visible at high water are within the edge of the reef.

In general, the E coast of Halmahera is densely overgrown, hilly, mountainous, and inhospitable. At many points the coast is a great wall of rock rising precipitously out of the sea. The shoals and reefs off this coast are also steep-to. The islands near the E coast are nearly all low. Morotai (described beginning in paragraph 2.53) and Pulau Sayafi (described in paragraph 2.71), being steep and high, are exceptions, as are Pulau Pakal and Pulau Gei in Teluk Buli (described beginning in paragraph 2.69).

From **Tanjung Djodjefa** (Tanjung Jojefa) (2°12'N., 128°04'E.) to Tanjung Salimuli, a distance of about 14 miles, the coast may be approached close-to, however, the 1.8m shoal off Lapi and the 4.1m shoal NE of Tanjung Salimuli must be avoided. Anchorage may be found during favorable weather conditions at the villages of **Saluta** (2°04'N., 127°58'E.), Lapi, and Tufa Ma Lole, but the water is deep and the bottom is steep. Local knowledge is necessary.

Teluk Galela (1°53'N., 127°55'E.) is entered between Tanjung Salimuli and Tanjung Luwari (Tanjung Luari), about 10.75 miles S. Both of these points are low, but Tanjung Luwari may be identified by Gunung Mamuya (Gunung Mamuja), a 930m conical mountain 2 miles S of it. The N shore of the bay is close to the foothills of a mountain range. The W shore is backed by a broad plain on the S part of which are the two detached hills, Tarakan Itji and Tarakan Lamo, 280m and 380m, high, respectively. Temporary anchorage can be found almost anywhere along the shore, in a depth of about 50m.

There are several shallow areas along the shores of the bay. Off the coast E of Possi Possi, 0.5 mile and 1 mile ENE of Limau, are 1.8m shoals. Another reef reaching 2.6 miles N of Galela Roads extends 1 mile offshore with a depth of 4.1m. East and SE of Tanjung Bongo are shallow reefs. Another 2.8m shoal is located 0.7 miles WNW of Tanjung Luari.

2.61 Galela Roads (1°50'N., 127°51'E.), at the SW corner of the bay, affords anchorage, in 29 to 50m, fine sand, between the pier and the islet W of Tanjung Bongo. It is sheltered during the Southeast Monsoon, but it is not safe during the Northwest Monsoon because of rollers. Landing is possible, however, even with the heaviest surf, S of the above-mentioned islet.

Kampung Galela (1°50'N., 127°51'E.) is at the SW corner of Teluk Galela. There is a boat pier S of the village. Some buildings with zinc roofs in the N part of the village can be seen for a considerable distance. Vessels call at Kampung

Galela regularly and at villages to the N to load wood.

Tides—Currents.—At Galela Roads, there is both a diurnal and a semidiurnal tide, but the latter predominates. Neither the spring highs nor the spring lows of the two tides coincide. The maximum rise and fall that can be expected are about 0.6m above and 0.6m below mean sea level. Currents in the vicinity of the roads are negligible until about 6 or 8 miles off, when the monsoon drifts become noticeable.

2.62 Kepulauan Tobelo (1°49'N., 127°56'E.) is a small group of islands located offshore between Tanjung Luwari and Pulau Miti, about 17 miles to the SE. The largest of these are Pulau Tolonuu (Tonuu), Pulau Kokara-besar (Kakara Lamo), Pulau Tagalaya (Tagaja), Pulau Kolorai, and Pulau Miti. They are low coral islands, but are excellent landmarks because they are covered with high trees. They are rocky to the E and NE. Patola, a 3.2m reef, 1 mile E of Pulau Tagalaya, is the only detached danger outside of the islands; it is usually marked by discoloration and occasionally by breakers.

A clear channel runs between the foul ground that fronts the Halmahera shore and the group of islands between Pulau Tolonuu and Pulau Kolorai. Clear passages are also found between the islands.

Currents may be encountered outside the islands and along the coast S of Pulau Miti, but among the islands and between them and the shore there is no current of any consequence.

The high mountains of Halmahera are also conspicuous. Gunung Mamuya has already been described in paragraph 2.60. Valsche Dukono, 4 miles SW of Gunung Mamuya (Mamuja), is a 930m mountain that looks very much like Gunung Dukono, the 1,275m active volcano 5.5 miles S of Gunung Mamuya. Between these two is a double peak called Mede, about 1,097m high. East of Gunung Dukono is a lower chain with a serrated appearance. Togohi, a 1,279m peak, is the most conspicuous and southernmost summit of the higher chain. South of it the land drops to a broad plain, on which are the fairly conspicuous mountains of Tokito, Tami, and Ah, from about 518 to 579m high.

Tami (1°31'N., 127°52'E.) has been reported to be a good radar target up to a distance of 9 miles.

Anchorage.—Along the coast are several anchorages, all of which require local knowledge. South of Tanjung Ruku, about 3 miles SE of Tanjung Luwari, there is anchorage, in 29m. At Kampung Popilo, about 1 mile farther E, there is anchorage between the off-lying islets of Mede and Popilo. Anchorage can also be found, in 29m, outside the shoal patches at Kampung Wari, about 6 miles SE of Tanjung Luwari.

2.63 Tobelo Roads (1°44'N., 128°01'E.) is formed and sheltered by Pulau Kumu and the reef which connects it to Halmahera. The most conspicuous mark is a tin roof at the S end of the village and abreast the S pier.

An oil depot at **Kapakupa** (1°37'N., 127°59'E.), on the N side of a small bay 4 miles NW of the N point of Miti, is served by a pier; a light is shown near the root of the pier.

About 0.3 mile SW of the SW extremity of Kumu is the small islet of Pulau Ubu Ubu. This islet is on a detached drying reef on the SE side of the roadstead. A detached reef, marked by a green conical beacon at its S end is close SE of Pulau Ubu Ubu; a 1.8m shoal marked by a red conical beacon is midway between Pulau Ubu Ubu and the shore; a 0.3m shoal is about 0.1 mile N of the N end of the reef on which Pulau Ubu Ubu lies.

A detached reef, which dries, marked by a red conical beacon on its N edge, is about 0.4 mile SE of Pulau Kumu. The reef fringing the S side of Pulau Kumu is marked at its W end by a beacon. Tanjung Pilawana is about 0.6 mile NW of Kumu.

The limit of the roadstead is the arc of a circle, with a radius of 2,100m and the head of the S pier as center.

Anchorage.—Large vessels anchor S of Pulau Ubu Ubu, where there are depths of 14.6 to 18.3m. This anchorage should be approached from seaward by way of the channel between Kumu and the detached drying reef SE of it. The anchorage is suitable for one vessel up to 122m long.

Small vessels should approach the roadstead by passing between the SE side of Kumu and the detached reef, marked by a daybeacon, SE of it, then NE of Pulau Ubu Ubu, then N of the beacon marking the N edge of the reef extending from Pulau Ubu Ubu and steer for the S pier, passing S of several light brown shoal patches which can be easily seen; when clear of the S shoal patch, vessels should haul sharply N, with Pulau Tolonuu just open E of Tanjung Pilawana, and anchor before the S end of Pulau Tagalaya closes behind Kumu.

2.64 Tobelo (1°44'N., 128°01'E.) has a small pier suitable for boats at the S end of the village; another pier, with a depth of 2.4m alongside, is N of the village. Copra is exported.

Pulau Miti (1°34'N., 128°03'E.), about 9 miles S of Tobelo, has the village of Kampung Miti on its W side and the village of Kampung Mawea on the shore opposite. There is suitable anchorage between the two villages. The best approach is around the N end of Pulau Miti, between that island and the drying reefs to the N. The shoals are well-marked by discoloration. Local knowledge is necessary for these anchorages. The channels between Pulau Miti and the mainland are suitable for small vessels only.

Vessels can also anchor close to the shore in the bight at Kampung Gotana, a village SW of Pulau Miti.

Teluk Kau

2.65 Teluk Kau (1°03'N., 128°53'E.), a large bay, separates the N part of Halmahera from its NE peninsula. Nusa Bubale (Nusa Bobale), a low island covered with high trees, lies on the W side of the fairway in the entrance to the bay, about 15.5 miles Sof Pulau Miti, and is easily recognized.

The bay, 4.5 miles wide at its entrance, extends 33 miles to the SW to its head which is separated from Teluk Dodinga, on the W coast of Halmahera, by a narrow isthmus. Generally speaking, the W shore of the bay is rather low, while the E shore is fairly high and steep. The inner part of the bay has a greatest depth of more than 494m. The inner bay is open to both monsoons and the sea rises quickly.

The plain on the W side of the bay S of the mountains of Tokido, Tami, and Ah, continues S to Pegunungan Mata Mata, of which the most prominent peaks are Gunung Tabobo, 929m high, and Oosttop, 534m high, 9.5 miles E. The most conspicuous point on the E side is the 1,159m summit 19 miles E of Nusa Bubale. Tilegan, 5.5 miles farther SW, is a 1,012m summit at the W end of a long range. Papudo, 3.5 miles farther W,

is a detached 417m hill. Near the E shore of the bay is a group of mountains, of which Subaim, a sharply-pointed 1,143m peak, is the highest; SE of it is the more gently-sloping Wato Wato, 1,474m high.

Batu Kubu (1°28'N., 128°01'E.), a white patch at Tanjung Domake, 10 miles N of Nusa Bubale, is conspicuous when approaching the entrance to the bay. At Tunjang Tunowe, a small bank extends offshore and causes tide rips.

Tides—Currents.—The lowest water levels occur between January and March and between July and October. The maximum rise and fall of the tides that can be expected are, respectively, about 0.75m above and 1.2m below mean sea level.

The maximum rate of current on either side of Nusa Bubale is 1.5 knots. When the wind blows in the opposite direction toward that which the current sets, a difficult sea is experienced.

Anchorage.—There is anchorage, in 18.3m, sand, about 0.2 mile off the village of Kampung Bubale on the S side of Nusa Bubale. This anchorage is protected even during the South Monsoon.

The main channel leading into Teluk Kau is close E of Nusa Bubale. It is deep in the fairway but has a 10m shoal on its W side and its E side is formed by a shoal bank with a least depth of 6.4m; this bank has not been closely examined and may be shallower than charted. This shoal bank is separated from the reefs along the shore of the entrance by another deep but narrow channel. The channel W of Nusa Bubale cannot be recommended because of the several shoals and the currents.

Coconut plantations border the W shore of the bay and its entrance to **Tanjung Boleu** (Tanjung Bolu) (1°09'N., 127°54'E.), about 12 miles SSW.

2.66 **Kampung Kau** (1°10'N., 127°54'E.), about 1 mile N of Tanjung Boleu, is a low village with a small pier. Several stranded wrecks lie about 1.5 miles E of the pier.

The shore between Tanjung Boleu and Kampung Akelama, about 18 miles WSW, is low, but is backed by Pegunungan Mata Mata mountain range. At the W end of the bay spurs of the mountains approach the shore, but there are no conspicuous points. The isthmus between Teluk Kau and Teluk Dodinga on the W coast of Halmahera is composed of low hills. At the SE corner of Teluk Kau and on the E side opposite Kampung Kau, mountain spurs also approach the shore; these latter have already been mentioned with the general description of the bay. The small islet of **Roni** (0°59'N., 127°56'E.), close to the E shore, is 167m high and very conspicuous.

Loleo Lamo (1°13'N., 127°50'E.) is the bight W of Tanjung Boleu. A large bank in its E part extends 2 miles offshore. In the vicinity of this bank vessels should stay outside about the 20m curve. The bight affords sheltered anchorage during the North Monsoon. A stranded wreck lies in the bight about 3.5 miles W of Tanjung Boleu.

Teluk Bobane (0°53'N., 127°40'E.) at the head of Teluk Kau affords excellent anchorage, in 11.9m, in its E part with the pier at Kampung Bobane Igu bearing 169°. A trail leads to Dodingo, on the opposite side of the isthmus.

Anchorage can be found almost anywhere along the S shore of Teluk Kau. The villages of Kampung Pintatu, Kampung Ekor, Kampung Menamin, Kampung Saolat, and Kampung Wadjoi are along this shore. Between the first two is a low plain. Vessels can anchor off **Kampung Ekor** (0°49'N., 127°50'E.), with the center of the village bearing 180° and a white spot bearing 105°. Landing can be effected at high water in the small river which flows out here.

2.67 **Ake Selaka Roads** (1°02'N., 127°57'E.), about 2 miles N of Roni, can easily be recognized by the small off-lying islet of the same name. Southwest of this islet there is anchorage, in 40m, mud and sand. A reef is 1 mile N of this islet and about 0.4 mile offshore. The reef is not marked by discoloration. In steering for the anchorage, the coast can be approached until Roni is shut in by the point N of it. This point may be recognized by the 214m hill on it and the small rocky islet close off it.

Kampung Ake Selaka (1°02'N., 127°57'E.) is a storage place for the jungle products gathered by the people of the coastal villages. Vessels call here regularly.

Teluk Waisile (1°12'N., 128°06'E.) is on the E side of Teluk Kau immediately inside the entrance. The bay is clear of shoals in its central part, but it is very seldom used. In it are the villages of Kampung Subaim, Kampung Dodaga, and Kampung Lolobata.

Anchorage.—Anchorage may be obtained anywhere in Teluk Waisile, in the NE part of Teluk Kau, in a depth of about 30m, mud and sand.

In the bend close E of **Kampung Njaulaku** (1°17'N., 128°05'E.), at the entrance to Teluk Kau, there is anchorage, in 32m. At the village of Kampung Iga, 15 miles to the NE, good anchorage can also be found.

In Teluk Bobolo, 11.5 miles W of Tanjung Lelai, anchorage can be obtained on a small ridge, with a depth of 37m. This anchorage should be approached with 55m of chain veered out. By steering 169° for the 518m summit close E of Gunung Bobolo, the anchor will catch hold about 0.5 mile offshore.

Caution.—See Pub. 120, Sailing Directions (Planning Guide) Pacific Ocean and Southeast Asia, for information on the mine danger area in Teluk Kau, including Teluk Waisile and the approach channel to Lolobata.

2.68 From the entrance to Teluk Kau, the coast trends NE for 43 miles to **Tanjung Lelai** (1°34'N., 128°43'E.), the low NE extremity of the peninsula separating Teluk Kau and Teluk Buli. At Tanjung Lelai, the coast reef extends more than 1.5 miles offshore. Gunung Bobolo, a 538m coastal hill at the bay of the same name and Tatem, a 953m summit 6 miles farther to the SW, are quite conspicuous.

At Tanjung Lelai, the coast turns to the S for about 31 miles to Tanjung Wayamli. Tanjung Petak, 11 miles S of Tanjung Lelai, may be identified by a flat hill with two summits, 148m high, which have the appearance of an islet. Watida, W of Tanjung Petak is a double-topped mountain, 908m high which appears sharply pointed from E. East of Watida is a group of sharp but smaller peaks. Near the coast 5 miles SSW of Tanjung Petak is a conspicuous 242m hill. South of this bay a chain of hills follows the coast as far as Teluk Buli. The Watam Mountains, 1,100m high, may be seen over these hills.

The monsoon drifts are the principal currents along this coast. These currents are rather strong around the most salient points.

Anchorage.—Dabo Bay, 2.5 miles S of Tanjung Lelai, affords anchorage, in 26 to 29m. There are no inhabitants here.

Karang Patilang, a reef lying in front of the bay, has a least depth of 3.6m and can always be recognized by discoloration or breakers. A rock with 2.2m, is in the channel W of this reef and a drying rock is 0.25 mile W of the reef. Teluk Akelamo, the next bay to the S, affords better anchorage than Dabo Bay. The anchorage at these bays offer shelter only during the Northwest Monsoon.

At Kampung Tifonis, 2.5 miles S of Tanjung Petak, vessels can anchor NW of a small drying sandbank. Local knowledge is necessary.

Teluk Buli

2.69 Teluk Buli (0°48'N., 128°28'E.), between Tanjung Wayamli and Tanjung Inggeland, 31 miles S, is surrounded by mountains and highlands and is encumbered with numerous reefs and shoals inside the 200m curve line. Because of these dangers, the bay is navigated mainly by vessels enroute to Buli Roads.

Tanjung Wayamli (Tanjung Wajamli) (1°04'N., 128°42'E.), the low N entrance point ,can be identified by the coast hills in its vicinity, especially by Onat, the 422m hill lying 2.5 miles NW of the point.

The peninsula separating Teluk Buli and Teluk Weda is hilly and mountainous. The most conspicuous summits seen from Teluk Buli are Tadjam, a 723m conical peak; Damoli, 711m high; Bial, 661m high; and the Waleh Mountains, a range farther to the W, whose highest peak is 653m high.

Winds—Weather.—The weather is better during the Southeast Monsoon than during the Northwest Monsoon. During the Southeast Monsoon the S part of the bay is sheltered, but troublesome rollers may be encountered along the N coast. Whirlwinds may be experienced inside the bay, but they are not dangerous. Rain may be expected throughout the year.

Tides—Currents.—The lowest water level occurs in June or July and in December or January. The maximum rise and fall that can be expected are, respectively, about 0.6m above and 0.9 below mean sea level. In the open sea fronting Teluk Buli the currents consist of monsoon drifts. Between a line joining the entrance points and about the 200m curve of the bay, the currents are affected by tidal movements, and a current of as much as 2 knots may be encountered. In the inner part of the bay the tidal currents are noticeable, but they do not exceed 1 knot, except between the islands at the SE end, where they may attain a velocity of 1.5 knots.

Directions.—When coming from N, round Tanjung Wayamli at a short distance so as to pass between that point and Sailal, a 10.9m shoal 1 mile off it. Then follow the coast at a distance of about 2 miles which will lead midway between Semer and Metonga, two 4.5m shoals off Tanjung Mokali. A 0.9m shoal is E of Metonga. This course also leads N of the shoals S of a line joining Metonga and Pulau Gei (Pulau Gee), but farther into the bay alter course to pass S of Litin, a drying patch. Then steer for the anchorage, in 22m, to the W of a 8.8m shoal about 0.75 mile SSE of a large conspicuous shed near the boat pier at Buli Roads. The channel, leading to the pier between drying reefs, is marked by beacons. A 0.9m shoal is about 1.25 miles E of Buli Roads.

When coming from E, steer to pass N of Pulau Leleve and Sain, which are about 13.5 and 17 miles, respectively, NW of Tanjung Inggeland, then pass S of Ronde Reef, an atoll-shaped reef which dries and is marked by discoloration, then steer for the anchorage in Buli Roads.

When coming from the S, give Tanjung Inggelang a wide berth, then steer to pass between Pulau Inggelang and Pulau Woto. Pass S of Pulau Wor, taking care to clear a dangerous wreck about 0.7 miles SE and the 2.4m shoal about 0.75 mile SW, respectively, of that islet; then steer to pass E and N of Pulau Mia. Pinit and Toppo, drying reefs N of Pulau Mia, are marked by discoloration. There is a clear channel to Buli Roads passing W of Woi, a reef which dries and is marked by discoloration, and W of Ronde Reef.

The N shore of Teluk Buli is fronted in places by reefs and shoals, but suitable anchorage can be found almost anywhere. Two villages, Kampung Watam and Kampung Wayamli, lie 3 and 12.75 miles, respectively, SW of Tanjung Wayamli.

Buli Roads (0°52'N., 128°17'E.) is in the NW corner of the bay and N of Pulau Pakal and Pulau Gei. The shore is fronted by patches of drying reefs. The channel leading between the reefs to the boat pier is marked by private beacons. Kampung Buli is the shipping place for copra and other jungle products.

Teluk Sololo (0°47'N., 128°14'E.), SW of Buli Roads and at the head of Teluk Buli, is deep and has few dangers. It is uninhabited. In it and fronting it are several islands, of which Pulau Pakal is the outermost and largest.

2.70 South shore of Teluk Buli.—There are more villages on this side of the bay than on the N side. At Kampung Maba, on the S side of the entrance of Teluk Sololo, there is safe anchorage N of Maba Islet. Off Kampung Bicoli (Kampung Bitjoli) opposite Pulau Wor there is anchorage in 18m. During the Northwest Monsono, better anchorage may be found in the lee of Pulau Wor, in a depth of 28m. The best landing place is close E or W of Kampung Bicoli. Well-sheltered anchorage may be found off Kampung Inggelang in the narrow channel along the S side of Pulau Inggelang; however, the W end of this channel is dangerous and unmarked. The channels S of Seal Islet, and Tjef Islet, S and W of Pulau Inggelang, can only be navigated by native canoes. There is a boat pier at Kampung Inggelang. During the Southeast Monsoon, suitable anchorage may be found W of **Tjef** (0°34'N., 128°37'E.), in 9.1m. The other villages along this shore are of little or no importance.

A 9.1m rocky shoal was reported about 4.25 miles ENE of Pulau Inggelang.

2.71 The **Sayafi Islands** (Sajafi Islands) (0°31'N., 128°50'E.), 7.25 miles E of Tanjung Inggelang, are separated by clear and deep passages from the Halmahera coast and from the bank described below. The only dangers in addition to the reported rocky shoal mentioned above are an 11.9m shoal W of the N end of Pulau Sayafi, and a shore reef which extends farthest from the E side and S end of Pulau Luwo. Pulau Sayafi, the N and largest island, is 124m high, and Pulau Luwo, the S island is much lower.

About 8 miles NE of Pulau Sayafi and fronting Teluk Buli is an extensive bank of soundings with irregular depths. Near the edges of this bank are shoal spots of 11.9 to 24m. These shoal spots are well marked by discoloration. Close off the SW side of the bank is a smaller bank, with a least depth of 8.7m.

Pulau Yiew (Pulau Jiew) (Katherine Islet) (0°44'N.,

129°07'E.), on the E part of the larger bank, is a heavily-wooded island, 58m high. Near its E end is a small but high, wooded, and rocky islet; near its NW end is a lower barren islet.

Togoplun (Recovery Islet) (0°40'N., 129°02'E.), a rock 7.5 miles SW of Pulau Yiew, is 24m high and practically bare. From a distance it looks like a ship.

Canton Packet (0°39'N., 128°50'E.), 6.25 miles W of Togoplun, is a small drying rock near the SW edge of the bank. It is often marked by breakers.

A submerged reef, about 0.7 mile in diameter and whose existence is doubtful, has been reported about 13.5 to 15 miles NE of Pulau Yiew; a depth of 18.3m has been reported about 7.5 miles ENE of the island.

Caution.—Volcanic disturbances have been reported in an area 15 miles wide between position 0°18'N, 129°54'E, and position 1°00'N, 129°00'E. A great disturbance was observed in an area, with a radius of about 1 mile, centered about 12 miles E of Pulau Yiew. Vessels are warned to give these areas a wide berth.

Aurora Bank and Winchester Bank, located E of Pulau Yiew, are described in paragraph 2.85.

2.72 From Tanjung Inggelang, the coast of Halmahera extends S for 12.5 miles and then ESE for 16 miles to Tanjung Ngolopopo. The latter stretch is the N side of a narrow tongue of land extending in that direction from the SE end of the peninsula between Teluk Buli and Teluk Weda. The most conspicuous points are near Tanjung Ngolopopo.

This coast can be approached rather closely as it is steep-to and the coastal reef is very narrow wherever it exists. About the only anchorages are in 23m in a small bend, 3.5 miles S of Tanjung Inggelang; in the same depth off Kampung Paniti, 9.5 miles S of that point; and, in 29m, off the villages off Kampung Telepeu and Kampung Gemia, 6 and 6.5 miles farther SE. Anchorages off this coast require local knowledge.

Tides—Currents.—The maximum rise and fall of tide that can be expected at Kampung Telepeu are, respectively, 0.5m above and 0.5m below mean sea level.

2.73 Tanjung Ngolopopo (0°13'N., 128°54'E.) is steep and rocky. About 1.25 miles W of the point is a fairly conspicuous hill, 163m high. About 2 miles farther NW is Guba, a very conspicuous 297m hill. Pulau Muor, 86m high, is 2.3 miles ESE of Tanjung Ngolopopo with Witimdi, two flat rocks midway between. On the reef at the SE end of Pulau Muor is Weilon, a small rocky islet.

Guba (0°16'N., 128°53'E.) has the appearance of a table mountain when seen from E and W, but when seen from the S, both Guba and Pulau Muormay be mistaken for Pulau Muor from a distance, and at closer range Guba may be taken for Tanjung Ngolopopo, and the hill on the point for Pulau Muor.

In the passage between Tanjung Ngolopopo and Pulau Muor, the currents are sometimes very strong and cause heavy tide rips. During the transition periods of the monsoons, regular and moderate tidal currents, setting NW and SE, have been observed to the N of Tanjung Ngolopopo.

A shoal, with a depth of 12.8m, has been reported about 7 miles E of the SE end of Pulau Muor.

Teluk Weda

2.74 Teluk Weda (0°10'N., 128°20'E.) lies between the SE and S peninsulas of Halmahera, within a line joining Tanjung Ngolopopo and Tanjung Libobo, about 72 miles SW. With the exception of Veldman Rock, N of Kepulauan Widi, no dangers are found more than 6 miles offshore, and there are few within that distance.

Winds—Weather.—During the entire Northwest Monsoon, the wind is light and the sea calm, except in the NW part, where the wind which blows through the low valley W of the Liember Mountains strikes. In February and March, when the Northwest Monsoon is strongest, sudden strong winds are experienced E of Tanjung Remdi, about 22 miles W of Tanjung Ngolopopo, where they blow across the narrow tongue of land starting at that point. At such times heavy rollers will be encountered just beyond the lee of Tanjung Ngolopopo. The turning period of the monsoons begins at the end of March, and only to the N of the latter point will gentle N winds still be experienced. In the beginning of the Southeast Monsoon heavy showers from the SW occur occasionally. They last from 1 to 4 hours and are accompanied by a peculiarly thick and heavy atmosphere. After the middle of June this monsoon is quite strong and blows from the S and SSE. Most of the rain on the shore of Teluk Weda falls during this monsoon, in contrast to Teluk Buli, where most of the rain falls during the Northwest Monsoon.

Tides—Currents.—In the bay, tidal currents are only noticeable close to the shore, and the monsoon drifts are not encountered until outside the line joining the entrance points.

2.75 North shore of Teluk Weda.—The principal peaks of the peninsula between Teluk Buli and Teluk Weda have already been described in paragraph 2.69. The highest of the Waleh Mountains and Bial, a 661m mountain about 28 miles NW of Tanjung Ngolopopo, are rather conspicuous because of their steep W slopes. West of the former group of mountains, Sagea and Liember, 843 and 1,262m high, respectively, may be seen over the low coastal hills. Close to the shore S of Sagea is a very dark conspicuous 210m hill which stands out well against the background and has the appearance of an island from a distance. West of the Liember Mountains is the valley through which the winds of the Northwest Monsoon find their way into the bay.

Navigation along this shore is not too difficult, because with favorable conditions the reefs are well marked by discoloration and the water is always clear. The easternmost dangers off this shore are **Karang Legli** (0°14'N., 128°49'E.), two 1.8m shoals, about 5 miles WNW of Tanjung Ngolopopo and 1.75 miles offshore.

Tides—Currents.—Tidal currents set along the coast but are not strong; the flood current sets W and the ebb E. During the Southeast Monsoon the sea along this shore is rather troublesome.

2.76 Patani Roads (0°16'N., 128°45'E.), about 9 miles NW of Tanjung Ngolopopo, affords anchorage with local knowledge, in a depth of about 55m, with the small landing pier bearing about 315° and the SW end of Pulau Muor in line with the coast NW of Tanjung Ngolopopo bearing about 117°.

The village is not easily identified at a distance, but closer in, a mosque with a white roof, behind a sandy beach, will be seen. A 1.8m shoal is 1.5 miles offshore SE of the mosque. About 1.75 miles farther W and 0.4 mile offshore there is a drying reef. Communication with the shore is difficult during the South Monsoon, and the landing pier should not be used because of two rocks close off it.

2.77 Kampung Patani (0°17'N., 128°45'E.) (World Port Index No. 52560) is the center of the native trade for this section of the coast and the neighboring islands. Vessels call here regularly. A small pier extends out on the drying reef abreast the village.

Tides—Currents.—The maximum rise and fall of tide that can be expected are, respectively, 0.6m above and 0.3m below mean sea level.

Between Kampung Patani and Kampung Mesa, nearly 30 miles to the W, the coast is wild and sparsely populated, and has a deserted appearance. Suitable anchorage, however, can be found off the villages of Kampung Banemo, Kampung Moreala, and Kampung Dote, 11.5 miles, 15 miles, and 25 miles, respectively, W of Kampung Patani. Local knowledge is necessary in each case. Near the coast of Kampung Mesa are three hills, which may be found useful landmarks when navigating along this shore. The westernmost and highest hill is 283m high.

Caution.—A 1.8m shoal is close to the shore 0.6 mile SE of Kampung Moreala. At Kampung Sebonpopo, 1.5 miles NW of Kampung Moreala, a drying reef extends 0.5 mile W from the shore. **Karang Matalel** (0°22'N., 128°29'E.), another drying reef, is 1 mile farther off. Near the edge of the 200m curve and 2.5 miles W of Karang Matalel is Karang Samlowos, an extensive drying reef with a 0.9m shoal 0.5 mile SE of its eastern end. Karang Mie is a similar drying patch lying farther S. Karang Mela, still another drying patch with a 1.4m shoal close NE of it, is about 1 mile SE of Kampung Dote.

2.78 Mesa Roads (0°24'N., 128°17'E.) can be recognized by the small islets of Mesa and Mtu, which are low with high conspicuous trees. Drying reefs are S and W of Mesa and S and E of Mtu. East of the last mentioned reef are other detached reefs. These reefs are not always marked by discoloration when covered and not easily located. The anchorage is N of **Mtu** (0°23.8'N., 128°18.0'E.), in 26m, sand. The best approach is on a 330° bearing on the 283m hill mentioned above, until Mtu and the middle of Mesa are in range bearing 280°, when the shore can be followed. When the reefs are visible the anchorage can also be approached from the S between the reefs extending from Mtu and Mesa. Kampung Mesa is located NW of Mesa. A boat basin leads N of this islet to a basin S of the village. It was reported that Mesa is connected to the mainland N of it.

Kokka Bay (0°27'N., 128°10'E.), 8 miles W of Mesa, has two small basins in its E part formed by **Tete** (0°27'N., 128°10'E.), a mangrove-covered islet, and the reefs extending from it. The N basin affords anchorage, in 29 to 40m, but a 4.5m shoal N of Tete constitutes a danger which should be avoided. Another good anchorage spot is in 31 to 33m, mud, with the E side of Tete in range with Tanjung Waleh. In the N part of the bay are two drying reefs with a 0.9m shoal E of them. These are separated from the shore by a clear but narrow channel. In this vicinity, anchorage can also be found in 29 to 40m. Karang Mela, another drying reef, is near the 200m curve in front of the bay. A little over 1 mile W of Karang Mela is a 2.3m shoal.

The village of Kampung Sepa, with a conspicuous house at its E end, is on the N shore of the bay. The village of Kampung Waleh is E of Tanjung Waleh, the SE extremity of the bay.

At **Kampung Sagea** (0°28'N., 128°06'E.), about 2.5 miles W of Kokka Bay, there is a slight bend in the coast where anchorage can be obtained, in 33m, during the North Monsoon and transition periods. Local knowledge is necessary. There are five small wooden piers at the village. A dark hill near the coast S of Sagea Mountain is a useful mark for approaching vessels.

2.79 West shore of Teluk Weda.—This shore, formed by the S peninsula of Halmahera, trends in a general S and SSE direction. The mountains of this peninsula begin S of the valley W of the Liember Mountains. Immediately W of the village of Kampung Weda, there is a conspicuous row of five hills, 209 to 382m high. Above these, the coastal mountains of the W side of Halmahera may be seen. The highest and most conspicuous of these latter mountains were described earlier with the W coast of Halmahera in paragraph 2.9.

Abreast of the S range of mountains and nearer the E coast of the peninsula are two conspicuous round hills, 341m high and 29 miles NW of Tanjung Libobo. The bank of soundings along this side of the bay is wider than that on the N side, but there are more shoal dangers that must be avoided; these shoal dangers are not always marked by discoloration.

Communication with the shore on this side of the bay is difficult during the Southeast Monsoon.

Tides—Currents.—The currents setting along the shore in the N part of the bay are weak; farther S and near Kepulauan Widi they become stronger. The currents set N with a rising tide and S with a falling tide.

2.80 Between **Tanjung Uli** (Tanjung Oeli) (0°28'N., 127°58'E.) and Tanjung Foya (Tanjung Foja), 22 miles to the S, the 200m curve extends further offshore than any other part of Teluk Weda. The only danger outside this curve is the reef Karang Pasir Tidore, described in paragraph 2.81, off Weda Roads. The N side of Tanjung Silota, 12 miles S of Tanjung Uli, is quite rocky. Some rocks and the small islet of Silota, close S, make the point quite conspicuous. Between Tanjung Silota and Tanjung Foya, about 10.5 miles S, there are a number of shoals and reefs with a navigable channel between them and the shore reef. The shoals have 3.2m or less of water over them and several of the reefs dry at LW. The outermost reef, Karang Elmoos, is 5.5 miles offshore.

The principal village along this part of the coast is Kampung Weda. To the N are the villages of Kampung Kobe and Kampung Lelilef, and to the S the village of Kampung Sosowomo.

Weda Roads (0°20'N., 127°53'E.) is entirely open and affords no shelter during the Southeast Monsoon. Kampung Weda is a storage depot for copra and jungle products from this part of Halmahera. The shore reef here is marked by two beacons with ball topmarks. A flagstaff stands at the S end of Weda.

The Kolo Islands, the most important of which are **Yef** (0°21'N., 127°54'E.) and Kulefu, close SW, are close offshore NE of Kampung Weda. The E side of Yef, which is saddle-shaped, is fringed by a drying reef. A rock is on the SE side of this reef and two islets are on the NE side. The S edge of the reef is marked by beacons.

Kulefu (0°20'N., 127°53'E.) 52m high, about 0.5 mile SW of Yef, is covered with coconut palms and is fringed with a drying reef whose edges are marked by a number of beacons. A 0.9m reef, marked by discoloration is about 0.6 mile SE of Kulefu and two reefs, marked by beacons, are 0.3 mile S of the islet. A drying reef, marked by a beacon with a square topmark, is about 0.8 mile SSW of Kulefu.

2.81 Karang Pasir Tidore (0°19'N., 127°59'E.), the outermost danger in this vicinity, is a drying reef 7 miles E of Kampung Weda. A 1.8m shoal is 1.25 miles W of the N end of this danger.

The outer anchorage off Kampung Weda has a depth of 34m, coral. From here a wooded rock on the drying reef at the head of Teluk Maidi can easily be seen just open W of Kulefo; this berth is exposed to the South Monsoon. Small vessels will find well-sheltered anchorage, in about 13.7m, between Kulefu and the shore. This anchorage may be approached from N or S of Kulefu.

Directions.—To pass N of Karang Pasir Tidore, steer 270° for the conspicuous steep slope of the 646m mountains in position 0°21'N, 127°45'E, about 5 miles N of Lenggiua, until Tanjung Foya bears 191°, then alter course SW and steer for the southernmost and highest of the five hills W of Kampung Weda bearing 244°. When the warehouse on the beach N of Kampung Weda is open SW of Kulefu bearing about 313°, steer for the anchorage, passing SW of the 0.9m shoal SE of Kulefu.

To pass S of Karang Pasir Tidore, steer 287° for the conspicuous steep slope of the 646m mountain in position 0°21'N, 127°45'E; when abeam of Karang Pasir Tidore, steer for the anchorage.

2.82 Between **Tanjung Foya** (0°07'N., 127°55'E.) and Tanjung Libobo, the coast is fronted by dangerous shoals and reefs and there are few conspicuous points. This area is sparsely populated; the few villages are Kampung Foya, Kampung Mafa, Kampung Latubi, Kampung Ake Lamo, Kampung Wosi, Kampung Besui, and Kampung Gane di Luar. Coconut plantations are N of Kampung Wosi, 17 miles S of Tanjung Foya, but S of that place are mostly jungles with the greater part of the shore lined with sandy beaches.

Of the islets that are on or near the shore bank, Pulau Sunam, the outermost, is 35 miles SE of Tanjung Foya. This is a rocky islet with high trees. Pulau Djodji, near the shore SW of Pulau Sunam, is conspicuous because of the coconut palms on it. Pulau Wamlonga, close to the shore 11 miles NW of Pulau Sunam, is almost joined to the shore and is not conspicuous. **Tanjung Libobo** (0°55'S., 128°27'E.) was discussed earlier with the W coast of Halmahera in paragraph 2.14.

Anchorage.—Anchorage can be found almost anywhere between Tanjung Foya and the village of Kampung Gane di luar.

A good anchorage is off the village of Kampung Foya in the bight S of Tanjung Foya. When approaching, it is advisable to keep Tanjung Foya bearing 278° to clear the dangers off that point. Off the village are several drying reefs and shoals, inside of which is a more or less sheltered anchorage for small vessels. Communication with the shore is frequently cut off during the Southeast Monsoon. A 0.9m shoal is located 2.2 miles offshore.

2.83 Kepulauan Widi (0°35'S., 128°27'E.), about 16 miles N of Tanjung Libobo, consists of several wooded islands and numerous small islets and rocks, most of which are in two compact groups on a couple of drying reefs. A detached island is S of the W end of the W group, and another detached islet is S of the E group. The channels between the two groups, and between them and the detached islands, are deep and clear. There are no permanent settlements but native fishermen come here occasionally.

Dadawe Lagoon is located within Pulau Dadawe (Druvig Island), the small detached atoll S of the W end of the W group of islands. The lagoon is navigable by launches only.

Muiliyk Lagoon (Muilijk Lagoon) is located within Pulau Muiliyk, the largest W island of the group. The lagoon is navigable by launches only. The entrance is through a drying reef on the SW side of the island. It is reported that a heavy current may occur in the entrance, especially when the reefs are uncovered. When the current is outgoing and there is a S wind, there is much surf in the entrance.

Veldman Rock (0°27'S., 128°31'E.), about 8.5 miles N of the E group of Kepulauan Widi, is a small coral reef with a least depth of 0.5m. It is always marked by discoloration.

There are no convenient anchorages in Kepulauan Widi. The islands should be given a wide berth because of the possibility of strong currents in the area.

The Halmahera Sea

2.84 The **Halmahera Sea** (1°00'S., 129°00'E.) is the name applied to the waters off the E side of Halmahera. The N part, N of Pulau Gebe, is open to the Pacific Ocean, but the part S of that island is more of an enclosed basin with deep channels connecting it to the waters S of it. The deep and clear passage between Pulau Gebe and Pulau Muor connecting the N and S parts of the Halmahera Sea is known as Selat Jailolo (Djailolo Passage).

Tides—Currents.—At Selat Jailolo, the Northwest Monsoon reaches its greatest strength in February and March. A heavy swell will be experienced at any time during the year, even during the South Monsoon. The monsoon drifts are felt in the deep and open section of Selat Jailolo; they are quite strong around the bank of soundings near Pulau Muor.

Directions.—Vessels coming from N and heading for Selat Jailolo should identify Pulau Yiew, which has a high rock on its E side and a lower small island on its W side. The bank extending from Pulau Yiew can be safely crossed and even anchored upon. Shoal patches less than 20.1m show up by discoloration, but none of them are dangerous on this part of the bank.

When past Pulau Yiew, steer straight for the middle of Selat Jailolo, with consideration for prevailing monsoon and currents. Pulau Muor and Weilon, off Tanjung Ngolopopo, and the summit of Pulau Gebe are good points to check position.

Leaving Selat Jailolo steer nothing W of SSW. When Pulau Vrooliyk, the E island of Kepulauan Widi, is passed, and Libo-

bo Hill, close W of Tanjung Libobo comes in view, course may be set for **Batu Anyer** (Batu Anjer) (1°10.5'S., 128°29.5'E.) which can be passed fairly close, then use any of the broad channels between the islands to the S.

Caution.—Shoal depths have been reported in the passages E of Halmahera. Mariners are advised to exercise caution when navigating in this area. A rock, with a depth of 12.8m, was reported in Selat Jailolo in position 0°09.0'N, 129°05.5'E. Volcanic disturbances have been reported across the N part of the Halmahera Sea in an area 15 miles wide between position 0°18'N, 129°54'E and position 1°00'N, 129°00'E. A great disturbance was observed in an area with a radius of about 1 mile, centered about 12 miles E of Pulau Yiew. Vessels are advised to give these areas a wide berth.

Kepulauan Widi should be given a berth of at least 5 miles because of strong tidal currents around these islands.

The Halmahera Sea—East Side

2.85 Aurora Bank (0°43'N., 129°32'E.) and Ormsbee Bank, with Winchester Bank between them, are the northernmost banks NW of New Guinea and on the E side of the Halmahera Sea. Aurora Bank, the westernmost, is 24 miles E of Pulau Yiew, which has been described in paragraph 2.71. The least depths are 12.m on Aurora Bank, 23.8m on Winchester Bank, and 16.5m on Ormsbee Bank. The bottom is sand, rocks, and coral. These banks are not marked by discoloration, but breakers may be seen at times. The water on them is very clear, so that the rocks on the bottom may be seen at the shallowest places. A 26m shoal, was reported to be located about 3 miles SE of Winchester Bank.

Pulau Sayang (0°18'N., 129°53'E.) and Ai, the northernmost island on this side of the Halmahera Sea, are low and flat, but they are visible for quite a distance because of the thick and high forests that cover them. Pulau Sayang has been reported to be a good radar target up to a distance of 23 miles. About 4 miles W of Pulau Sayang the depths decrease from 18.3m to less than 10.9m shoreward. The shoal places are marked by discoloration because of the white sandy bottom. Hunter Bank, 5 miles E of Pulau Sayang, has a depth of 14.6m and is not marked by discoloration. Pulau Wayag, lying SE of Pulau Sayang, is described in paragraph 5.4.

Caution.—Two 18.3m shoals are about 7.75 and 10 miles NNE, respectively, from the NW end of Pulau Sayang. A 20m shoal, and a 21.9m shoal lie about 11 miles NE of the same point.

The channel between Pulau Sayang and Pulau Wajag is wide and deep. A vessel approaching from the W should steer on an E course and pass about 1 mile N of Pulau Wajag which is steep-to. In this area the water is very clear and the bottom can be seen for a depth of 20.1m. Large schools of porpoises are sometimes seen in this passage and may be mistaken for dry rocks when motionless.

2.86 Pulau Gebe (0°05'S., 129°28'E.), about 19.5 miles ESE of Pulau Muor, is a narrow and hilly island, 23 miles long in NW-SE direction. The highest summit is 396m high at the SE end. It is lower at the middle, then rises to **El Fanum** (0°03'S., 129°24'E.), a double-peaked hill 285m high, then lowers again to the NW. There is safe passage both E and W of this island.

A light is shown from Tanjung Sofa, the NW extremity of Pulau Gebe.

The NE coast of Pulau Gebe is subject to rollers and surf during the North Monsoon and to surf during the turning periods and the South Monsoon. This makes landing on this coast practically impossible. Provided there is not much surf a landing place may be found at the adjoining villages of Kampung Sanafi and **Kampung Katjepi** (Kampung Kacepi) (0°07'S., 129°31'E.), which are mostly hidden by coconut plantations. There are openings in the coastal reef E and W of the villages. Anchorage may be found, in 40m, about 91m off the villages.

Pulau Gebe—Agent Contacts	
Jakarta—General Agents	
Telex: Telephone:	73-42854 62-21-676547 and 672613
Jakarta—Local Agents	
Facsimile: Telephone:	62-21-7891224 62-21-7891234
Gebe—Local Agents	
Facsimile: Telephone:	62-21-7804589 62-21-7891234 ext. 3703
Ternate—Local Agents	
Facsimile: Telephone: Telex:	62-921-22819 62-921-21686 73-73153 ATKTTE IA
Note.—Vessels should send confirmed ETA to local agents in Gebe by fax or telephone.	

The SW coast of Pulau Gebe is covered with mangroves and is almost uninhabited. Between **Tanjung Oebulie** (0°04'S., 129°22'E.) and Tanjung Tuli Kalio, about 6.5 miles SE, is Pulau Fau. A reddish conical hill 128m high is on this island.

There is an open pit nickel mine on the W face of El Fanum, about 2 miles NE of Tanjung Oebulie. A small ore loading jetty is close NE of the same point. The jetty has a depth of 3m alongside. Ships load ore from lighters of 120 to 900 dwt at a rate of about 2,000 tons per day, using ship's gear. Tugs are available. Fuel and fresh water are reported not available. Ore vessels anchor about 0.4 mile NW of the jetty, in a depth of about 66m.

Pilotage.—Pilotage is not compulsory. There is no pilot at Pulau Gebe. Vessels should advise their ETA to their general agent and local agent at least 48 hours prior to arrival, confirming at least 24 hours prior to arrival.

Anchorage.—An anchorage N of Tanjung Tuli Kalio has a depth of 29m. The best-sheltered anchorage is in the channel N of Pulau Fau. The entrance is about 0.25 mile wide and there are depths of 12.8 to 21.9m in the channel. Reefs are near both entrances to the channel, but the W entrance is the best. The E entrance can only be navigated when conditions are favorable for identifying the reefs.

Fairly strong currents may be experienced at spring tides in the vicinity of Pulau Fau, especially in the channel between it

and Pulau Gebe.

Anchorage may be found in the two bights at the SE end of the island, but the depths are over 61m and a sea sets in during SE winds.

2.87 Pulau Ju (Pulau Joe) (Pulau Yu) (0°03'S., 129°37'E.) and Pulau Oeta (Pulau Uta), about 1.75 miles NNE, are islands on separate banks E of Pulau Gebe. Pulau Ju is 55m high and Pulau Oeta is comparatively low; both are covered with fairly high trees. A wide and deep passage separates these islands from Pulau Gebe. The village of Kampung Omnial is on the rocky SW coast of Pulau Ju. Vessels anchoring here should select a place W of the village because the bottom is too steep in front of it. Local knowledge is necessary. Boats can enter the lagoon at the SE end of the island. Pulau Oeta is not inhabited; the coconut plantations on this island are maintained by inhabitants of other islands. Vessels can anchor in favorable weather off the SW end of Pulau Oeta, in 64m, about 183m from shore, with the W point of the island bearing 005° and the S point bearing 083°. An extensive shoal, having a depth of 7.9m on its outer edge, is usually marked by discoloration and extends from the SE side of Pulau Oeta. This shoal narrows the channel width to about 0.5 mile. Both islands are infested with swarms of mosquitoes.

The passage between Pulau Ju and Pulau Oeta is deep and clear, as is the passage between Pulau Ju and Pulau Gebe. The shores of Pulau Gebe and Pulau Ju are steep-to. South of Pulau Oeta the shoal water extending from that island can be avoided by favoring the Pulau Ju shore when using that passage. In both passages the current may be strong, especially near the SE point of Pulau Gebe.

2.88 Pulau Gag (0°30'S., 129°52'E.), about 21.5 miles SE of Pulau Gebe, is about 6 miles long and is very hilly; the highest hills are 340m and 349m high. The island has been reported to be a good radar target up to a distance of 30 miles. The rocky W coast can be passed at a safe distance, but the N and E coasts should be given a wider berth. An 11.9m shoal is off the N coast, 10m and 7.8m shoals are off the NE part of the island, and a number of shoals from 1.8 to 11.9m, known as Fishing Bank, are SE of the S end of the island.

The island is most heavily wooded at the N part. It is practically uninhabitable because of swarms of stinging gnats.

Anchorage.—Anchorage, open to the SE, may be obtained on a muddy bottom, with depths of about 30m, to within 183m of the shore.

Madjet, a small islet on the coast reef at the N entrance point of the inlet on the E side, is conspicuous because of tall trees. A shoal of about 3.6m is about 0.5 mile W of Madjet in the entrance of the inlet.

The **Jef Doif Islands** (Yef Doif Islands) (Pulau Bambu) (0°46'N., 129°47'E.) are on and near the middle of the S side of an extensive bank of soundings S of Pulau Gag. This bank has very irregular depths; shoals of 6.9 to 20.1m are found near its S and NW edges. Two 11m shoals have been reported 11 miles E and ENE of Pulau Klaarbeek.

Pulau Klaarbeek, the northernmost island, is rocky and 112m high, and its coast is exceptionally steep. A 5.2m shoal is close S of Pulau Klaarbeek. Pulau Kommerrust, the easternmost, is a low wooded coral island outside of the bank of soundings.

Pulau Schoteroog and Pulau Vlaming are two small heavily-wooded coral islets close within the S edge of the bank; they are surrounded by sandy beaches. The water on the bank is very clear and the bottom can often be seen at a depth of 29m. The islands are uninhabited.

2.89 Pulau Kofiau (1°11'S., 129°50'E.), 39 miles S of Pulau Gag, is about 15 miles long in a E-W direction. The greater part of it is low, but at the W end it rises in a group of hills which attain an elevation of 255m. There are no conspicuous summits among these, however. Near the middle of the N coast is a conspicuous 288m hill named Mata, with a 201m hill close E of it. These two are dome-shaped when seen from the N and S, but they appear conical when seen from the E. This island as well as the smaller islands of this group, is heavily wooded. With the exception of the inner bays on the S side, the water around these islands is clear enough to see the bottom at a depth of 18.3m. The sides of the group can be followed at a distance of 0.5 mile, except for the NW side, which should be given a berth of at least 1 mile.

The tidal currents in the passages attain maximum velocities of 2.5 to 3 knots. When the wind and current are in opposite directions, a choppy sea arises outside the archipelago.

The E part of Pulau Kofiau is totally uninhabited. A few inhabitants live in several small scattered settlements on the smaller islands such as Pulau Jailolo and Pulau Deer. The principal occupation is fishing. Trading schooners call occasionally.

Anchorage.—Wambong-besar, on the S side of the E end of Pulau Kofiau, offers good shelter against all but SW winds. The anchorage, however, is rather narrow and suitable for only a small vessel. It should be approached on a mid-channel course through the bay. At the head of the bay is a small sandy beach, on the W side mangrove trees grow out into the water, and on the E side is a narrow coral strip with mangroves behind it.

2.90 Tanjung Soos forms the E extremity of Kofiau; a light is shown on Tanjung Soos.

Pulau Deer (1°09'S., 129°50'E.), with the village of Kampung Deer, is separated from the N coast of Kofiau by a clear channel. Vessels will find a sheltered anchorage off the village, in 10.9 to 18.9m. A vessel may lie quietly here in all conditions of weather. Local knowledge is necessary. The W entrance to the channel is narrowed by the shore reefs; the E entrance is wider.

Anchorage.—Anchorage can be for almost anywhere along the N coast of Pulau Kofiau during the South Monsoon.

During the North Monsoon the clear channel between Pulau Kofiau and Pulau Torobi offers excellent anchorage, in 14.6 to 26m. A 10m shoal is in the N entrance of this channel. A bank with a depth of 31m is about 1.25 miles N of the N end of Toribi. A deeper approach to this anchorage is through a channel along the N side of Pulau Kofiau and S of Pulau Jailolo and the three islands E of it.

Many good anchorages are found among the smaller islands SW of Pulau Kofiau. The islands facilitate navigation because of the ease of taking bearings. The following are considered safe entrances to the waters within the archipelago:

1. Between Pulau Toribi and Pulau Gebe-Besar, by fa-

voring the Pulau Toribi shore. Steer with the W point of Pulau Tabek bearing 150°. There is a 7.3m shoal, 0.7 mile offshore N of Gebe Besar, restricting this entrance.

2. Between the Walo Group and Keeim by favoring the Walo Group.

3. Between the Walo Group and Pulau Tabek.

4. Between Ayuan (Ajoean) and Ayuan (Ajoean) Mangi mangi. Keep to the Ayuan side.

Smaller vessels may also find anchorage in the inner bays of Pulau Kofiau.

It is not advisable to anchor close to low mangrove shores because these areas, especially in the S parts of the island, abound in small flies whose bites can cause severe irritation usually lasting about 3 days.

2.91 Kepulauan Boo (1°10'S., 129°22'E.), a group of islands on a bank of soundings W of the Kofiau Group, is separated from that group by a deep and wide channel. Pulau Boo-besar, at the W end of the group, consists of two islands separated by a very narrow opening filled with reefs. These islands are about 100m high and are flat on top. On the N coast there are some rocky spots, but otherwise, only sandy beaches and woods are seen. The S coast is mostly covered with mangrove trees. The shoals off the W end are marked by discoloration. A deep channel leads between Pulau Boo-besar and the next island to the E. Strong currents may be encountered in this channel.

A rocky 12.8m shoal was reported to lie about 4.5 miles WNW of Pulau Boo-besar in position 1°09'S, 129°14'E.

Pulan Boo-kecil (Pulan Ketjill), the E island, and the smaller islands between it and Pulau Boo-besar are low. The smaller islands have more of an atoll shape and are thickly wooded. The lagoons are shallow and suitable only for native canoes. Off the W side of Pulau Boo-kecil is a clear basin with good entrances leading in from N. Vessels can anchor in this basin, sheltered in the N and partially-sheltered in the South Monsoon, in 29 to 73m.

Along the S edge of the bank is a long string of sand and coral reefs with depths of 0.3 to 5m over them. They are marked by discoloration. Passing vessels are advised to give the S side of the islands a berth of 3 miles.

Strong currents with velocities up to 2.5 knots have been observed near and among Kepulauan Boo. A difficult sea may be experienced near the shallower places when the wind and currents oppose each other.

There are no permanent settlements on these islands, but they are sometimes visited by people from other islands. Water is not available.

Dona Carmalita (1°18'S., 129°27'E.), about 5.5 miles S of Pulau Boo-kecil, is an atoll-shaped bank with a least depth of 6.1m. Its edges are well marked by discoloration, and sometimes by breakers. Breakers occur with even a slight breeze blowing in the opposite direction to the tidal currents, which may attain a velocity of 2 knots in a N or S direction. It has been reported that large schools of porpoises lying on the surface sometimes appear as rocks above water in this area.

Takat Sapa (1°10'S., 129°06'E.), with a least depth of 8.8m, lies about 16 miles W of Kepulauan Boo, and is usually well marked by discoloration, current rips, or breakers.

Pulau Pisang, S of Takat Sapa, was previously described in paragraph 2.45.

Batanme

2.92 Batanme (Misool) (1°50'S., 130°10'E.), a large island, is about 32 miles SSE of Pulau Kofiau. It is on the outer end of an extensive bank of soundings extending W from New Guinea. The part of the island and its off-lying islands are low, but the S part of the island and the off-lying islands to the S and SE are high. Because the water over the bank on which these islands lie is discolored by river water, discoloration is not a sign of reefs and shoals.

In the open sea and in the channel between Batanme and New Guinea, the monsoon drifts prevail, but near Batanme and its surrounding islands tidal currents are encountered.

The N coast of Batanme is fronted by many dangers and by wooded islands. The outermost danger, 13 miles N of the W end of Batanme, is Mas Mas Oelit (Fitz Maurice Shoal), a 5.2m shoal; it is seldom marked by discoloration. A 29m bank was reported to be about 6 miles WNW of Mas Mas Oelit; a 14.1m depth has been reported to lie about 6.5 miles N of Mas Mas Oelit. Except at the W part of the island, the summits of the range near the S side of Batanme are not of much use to navigation, but the small islands are good marks for bearings. It is reported that the long range of hills near the S coast are obscured by haze during the Southeast Monsoon.

Caution.—Dangers in addition to those charted may exist off the N side of Batanme. Vessels are warned to keep to the recommended tracks through this area. False discoloration is often seen.

2.93 Misool Marine Terminal (1°33'S., 130°31'E.) consists of the 200m-long FPSO vessel Brotojoyo. The terminal can accommodate vessels up to 85,000 dwt, but will not accept vessels less than 20,000 dwt. Operations are handled jointly by Pertamina and Petrochina Salawati.

Petrochina

http://www.petrochina.co.id

Pilotage.—Pilotage is compulsory unless proceeding to the anchorage. The pilot normally boards in the anchorage. Tugs are available.

Regulations.—Berthing is available during daylight hours only, but unberthing is available 24 hours. The terminal operates continuously throughout the year and has ability to simultaneously receive and discharge cargo.

The vessel's main engines must be maintained ready to allow for immediate departure in the event of an emergency.

Vessels more than 20 years in age are not accepted unless, during a previous transfer, the vessel loaded without incident.

An ETA should be sent on departure from last port of call and 72 hours, 48 hours, and 24 hours prior to arrival.

There is a restricted area established within 1.1 miles of the terminal.

Anchorage.—An anchorage, with a radius of 1 mile and an average depth of 38m, lies centered in position 1°33.5'S, 134°3'E.

2.94 Waigama (1°50'S., 129°49'E.), the most important village on the N coast of Batanme, is the station of a government official. A mosque and a flagstaff are at the village. The village is about 7 miles ENE of the W end of the island.

The best anchorage is in a depth of 18m N of Wagajel, the small peninsula E of Waigama. The N points of Pial and Kaptjan Kecil should be in line bearing 252°. Pial lies on the coastal reef 0.5 mile WNW of Waigama and Kaptjan Kecil, an islet, lies 3.25 miles WSW of Pial.

Tides—Currents.—At Waigama, the maximum rise and fall of tide that can be expected are, respectively, 0.5m above and 0.5m below mean sea level. The flood current sets in a W direction. The maximum velocity recorded was 2 knots in the more open parts and 3 knots in the narrow passages.

Directions.—Approaching from W, pass between Tanjung Fet Dom, the W extremity of Batanme, and Pulau Kanari, an island about 4.5 miles to the NW; then pass about 0.3 mile N of Pial, or pass more than 1 mile N of Pial, and approach the anchorage with the W tangent of Pian, an islet about 5 miles N of Waigama, in line bearing 002°, astern, with the W tangent of the islet of Moeslat, about 2 miles further N. There is a 6.9m shoal 0.8 mile N of the Wagajel peninsula, with a 11m shoal close W of it. Another shoal of 4.2m is located 0.8 mile NE of this peninsula.

Approaching from N, steer to pass about 1.75 miles W of **Jef Lie** (1°36'S., 129°59'E.), then keep the E peak of Adola (Adoea), 427m high, in line with the W side of Jef Kanjin, about 8 miles SW of Jef Lie, bearing 198°; then pass W of Jef Kanjin and proceed as given below.

Approaching from E proceed through the channel between Kepulauan Kalies and Batanme to a position 1 mile N of the detached reef, with a low white sand dune, 1.5 miles N of Tanjung Haokep; then set course to pass S of Laitot and Haowat, after which take passage between Pulau Bellis Darat and Pulau Mut Mafela. The alignment of the N side of Pulau Mut Mefela and the E side of Haitlal bearing 068° astern can be followed until the rocky point W of Sungi Bano is in range with the mountain Liem, bearing 192°. Steer for Liem on a 192° bearing until the N sides of Pial and Kaptjan-kecil are in range, which will then lead to the anchorage. This course passes S of a 4.2m shoal about 1.2 miles NE of Waigama in position 1°49.0'S, 129°49.8'E.

2.95 Off-lying islands and dangers NE of Batanme.—Kepulauan Penyu (Schildpad Islands), 16 miles NNE of the NE point of Batanme, are a group of eight low islands covered with high trees. They are in the N part of the channel between Batanme and New Guinea and they divide the channel into two parts.

Pentako Ef (1°25'S., 130°29'E.), the easternmost of Kepulauan Penyu, has a reef with depths of 1.8 to 2.7m extending about 0.8 mile SE from it. A 1.8m shoal is about 0.75 mile ENE and an 11.9m shoal is about 1.5 miles E of Pentako Ef. A 10m shoal was reported about 5.25 miles SW of Pentako Ef.

Hesketh Shoal (1°27'S., 130°22'E.), between Kepulauan Penyu and Kepulauan Nusela (Noesela), is a mid-channel danger with a depth of 4.9m, rock.

Zeemeeuw Reefs (Karang Elang) (1°20'S., 130°31'E.), between Kepulauan Penyu and New Guinea, are two patches that dry at LW and are at that time marked by heavy breakers. Tidal currents in this vicinity are irregular.

Kepulauan Dua (Kepulauan Doea) (1°32'S., 130°31'E.), a group of small islands 5 miles SSE of Kepulauan Penyu, are two low islands thickly covered by high trees. Madgal Reefs are two dangerous reefs with 1.8 and 2.8m over them; they are 4 miles NE of Kepulauan Dua and SE of Kepulauan Penyu. A depth of 16.1m, the position of which is approximate, was reported about 0.75 mile WNW of the 1.8m shoal spot of Madgal Reef.

A wreck with a depth of 13.7m is about 7.3 miles ESE of Kepulauan Dua.

A 7.3m shoal is about 2 miles W of theNW extremity of Mesloe Besar, the N island of Kepulauan Dua. Depths of 5.2m, position approximate, were reported about 2.25 miles N and 2.25 miles W, respectively, from the same point.

A 0.3m shoal is about 9 miles SW of Kepulauan Dua.

2.96 The E coast of Batanme between **Tanjung Yamtu** (Jamtoe) (1°40'S., 130°20'E.) and Tanjung Openta, about 12 miles to the SE, is low and flat, but S of the latter point it rises sharply. A depth of 4.5m is about 8 miles ESE of Tanjung Yamtu.

Teluk Tamulol (Teluk Tamoelol) (1°55'S., 130°25'E.), on the S part of this coast, is virtually unnavigable because of the numerous reefs in it. Vessels can, however, reach an anchorage SW of Pulau Mustika (Moestika) in 31m. From E pass 1 mile S of Ef Kasya (Kasja), then steer for the conspicuous Bayampop hill on Mesemta Island bearing 272° until the E side of Pulau Wagmab is abeam to port. Then steer for the S point of Pulau Mustika. When Bayampop hill bears 235° steer W until the conspicuous rocky islet of the N shore of the bay about 1.25 miles NW of Pulau Mustika bears 331°, then alter course for the anchorage SW of Pulau Mustika.

There are many shoals in this area. When heading for the anchorage these dangers, as marked on the chart, should be noted. Off the SE side of Mustika are rocks awash and reefs with depths ranging from 0.5 to 4.1m located as far as 1.6 miles offshore. Two shoals, N of the center of the island of Lenkafal, with depths of 5.9m and 11.9m, are 2.4 and 3.0 miles away, respectively.

West of Tanjung Openta are two conspicuous hills, **Gunung Pelana** (Zadel Berg) (1°49'S., 130°22'E.) and Gunung Pencut (Koepel Berg), 327m and 294m high, respectively. Bayampop, a very conspicuous hill, 244m high is on Mesemta, an island separated from the SE end of the main island by Panapana Strait. This hill is sharp when seen from seaward, but appears flatter when seen from N or S.

2.97 Off-lying islands and dangers off the E coast of Batanme.—Among the islands which extend ESE from Mesemta, there are many deep channels, but they are not recommended because of the strong and irregular currents and the very slight discoloration of the reefs. There is safe passage, however, between **Ef Pian** (2°02'S., 130°45'E.) and the Sagof group of islands about 2 miles W.

Ef Kasya (Seven Islands) (1°58'S., 130°47'E.), about 4 miles NNE of Ef Pian are steep-to with a highest elevation of 53m.

Kepulauan Daram (Valsche Pisang Islands) (2°07'S., 130°53'E.) are the easternmost of the chain of islands and scattered rock extending from the SE end of Batanme. The principal and easternmost island of this group is **Pulau Daram** (2°09'S., 130°55'E.), 132m high and covered with forest. An is-

let, 88m high, connected to the S side of the E end of Pulau Daram, is also wooded, and when seen from S is striking because of some steep yellow rocks. Bijenkorf Rots, a detached rock in the shape of a beehive, is on the coastal reef off the E end of Pulau Daram. The passage immediately N of Pulau Daram is clear of dangers. The remaining islets of the group are high masses of rock; the northwesternmost, Batu Karang Hitam (Zwarte Rocks), are black rocks 4.2m high and 6.25 miles NW of the W end of Pulau Daram. The rocks about 0.75 mile ESE of Batu Karang Hitam and between them and a 25m high islet are only just above water.

Anchorage may be obtained during the Southeast Monsoon off the N side of Pulau Daram.

A 2.7m shoal is about 3.25 miles SE of Batu Karang Hitam. A 3m shoal and another with a depth of 2.7m are about 2.75 miles W and 1.25 miles SE, respectively, of the W end of Pulau Daram. There is a 6m shoal 2 milesW of the W end of Daram. A depth of 15.8m was reported 4 miles ESE of Pulau Daram.

Pulau Len Kafal (2°00'S., 130°35'E.), the largest of the islands of the string extending from Mesemta Island, is 336m high and can be seen from a distance of 35 miles.

2.98 **Tanjung Forongketo** (2°01'S., 130°28'E.), the SE extremity of Batanme, is fringed by a reef which extends about 0.5 mile to the E and upon which there are several small islets. An 8.2m shoal is about 1 mile SE and a 6.8m shoal is 0.8 mile E of Tanjung Forongketo.

The archipeligo extending S from Tanjung Forongketo is mainly small but high rocky islands, all uninhabited. Kepulauan Jal (Djal), about 9 miles SW of Tanjung Forongketo, are low; the rock WNW of these islands are always above water. Kepulauan Jam, 2 miles SW of Kepulauan Jal (Djal) are also low; 1 mile NW of them is a drying reef. A 4.9m shoal and a 6.7m shoal are about 1.25 and 1.75 miles SSE, respectively.

A very useful channel is between Ef Mo and Olobie Pale, a conspicuous conical island about 9 miles S of Tanjung Forongketo, but a 4.9m shoal well marked by discoloration is between Olobie Pale and Wajaban Lenalos.

Boo (2°13'S., 130°35'E.), a narrow island, 142m high, is about 7.5 miles SE of Olobie Pale. This island rises vertically from the sea. Several above-water rocks are close off the E end of the island. A 6.7m shoal is 1.5 miles E of Pulau Warakaraket, the next island S of Boo and a 4.9m shoal is almost 2 miles NE of Boo.

Teluk Lelintah (Lilinta Bay) (2°02'S., 130°18'E.), at the SE end of Batanme, is encumbered with dangers. It is sheltered during the Northwest Monsoon, but it is difficult to approach during the Southeast Monsoon because of high seas. Kampung Lelintah, the principal village, is in the SW part of the bay close NW of **Tanjung Wafani** (2°03'S., 130°15'E.). Anchorage can be found abreast of the village during the Northwest Monsoon. The highest pointon the islet **Tapalo** (2°01.5'S., 130°19.2'E.), in line with **Ketjitot** (2°03.0'S., 130°17.1'E.) on a 052° bearing, serves to indicate the close proximity of the shoals and reefs extending from the shore near the anchorage. Only a few houses are visible from seaward; the zinc roof of a storehouse is the most conspicuous object.

Directions.—Vessels will encounter little difficulty approaching Teluk Lelintah from W. Discoloration should not be depended upon to distinguish reefs with the exception of the reef surrounding Fagom Genan. If **Pulau Yaan** (Pulau Jaan) (2°08'S., 130°07'E.) is recognized and passed to the N, Lelintah Road may be reached on a straight course of 067° with Pulau Yaan bearing 247° astern. The short reef near Kampung Lelintah is hardly visible.

A 10.1m shoal was reported about 15 miles WSW of Pulau Yaan.

From S, the best channel is E of **Yef Pelee** (2°12'S., 130°15'E.), an island about 7.5 miles S of Tanjung Wafani, then E of **Kaoenoet Sollon** (2°10'S., 130°20'E.), a rock 62m high and about 2.5 miles NE of the E end of Yef Pelee, then between Batu and Mate, about 2.75 miles farther NNE. A 6.7m shoal, slightly marked by discoloration is on the W side of the part of the passage, and a rock is close off the W end of Mate. Pass about 0.2 mile W of this latter rock, leading through a least depth of 10.9m, then steer for the entrance of Lelintah Bay, avoiding a shoal with a depth of 7.6m about 3 miles SE of Tanjung Wafani.

The easiest approach from E is N of Boo, then N of the chain of islands of which Boo is the easternmost. Then the route for the S approach, given above, should be followed.

The channels between **Jaganan** (2°03'S., 130°24'E.) and Japale, NW of it, between Japaleand the coast of Batanme, and between Gag and Ginjamato, SE of it, should not be used because of their bends and the strong tidal currents which run in them.

2.99 The S coast of Batanme has some conspicuous summits in the range of hills close to the S coast. Those most easily distinguished are Wieng, Liem, Adola (Adoea), and Foel, which are 408m, 486m, 427m, and 531m high, respectively, and lie near the W end of the island. Elban and Jadata, 407m high, are near the middle of the S coast. Liem has the appearance of a cone when seen from W. Although these are the first objects sighted by vessels coming from W, the high islands of the archipelago S and SE of Batanme are soon picked up. Native fishermen report that during the Southeast Monsoon this coast is almost unapproachable because of the heavy seas.

Tides—Currents.—The tidal currents off the S coast of Batanme sets E and W at a maximum velocity of 2 knots, which is generally less than that off the N coast. In the narrow channels, however, the currents are sometimes stronger and very irregular.

This stretch of coast is almost deserted. Four large houses used as temporary residences are at the village of **Kampung Adola** (Adoea) (1°59'S., 129°54'E.). Telok Wagom lies about 9 miles further E. Water can be obtained from a stream near its head.

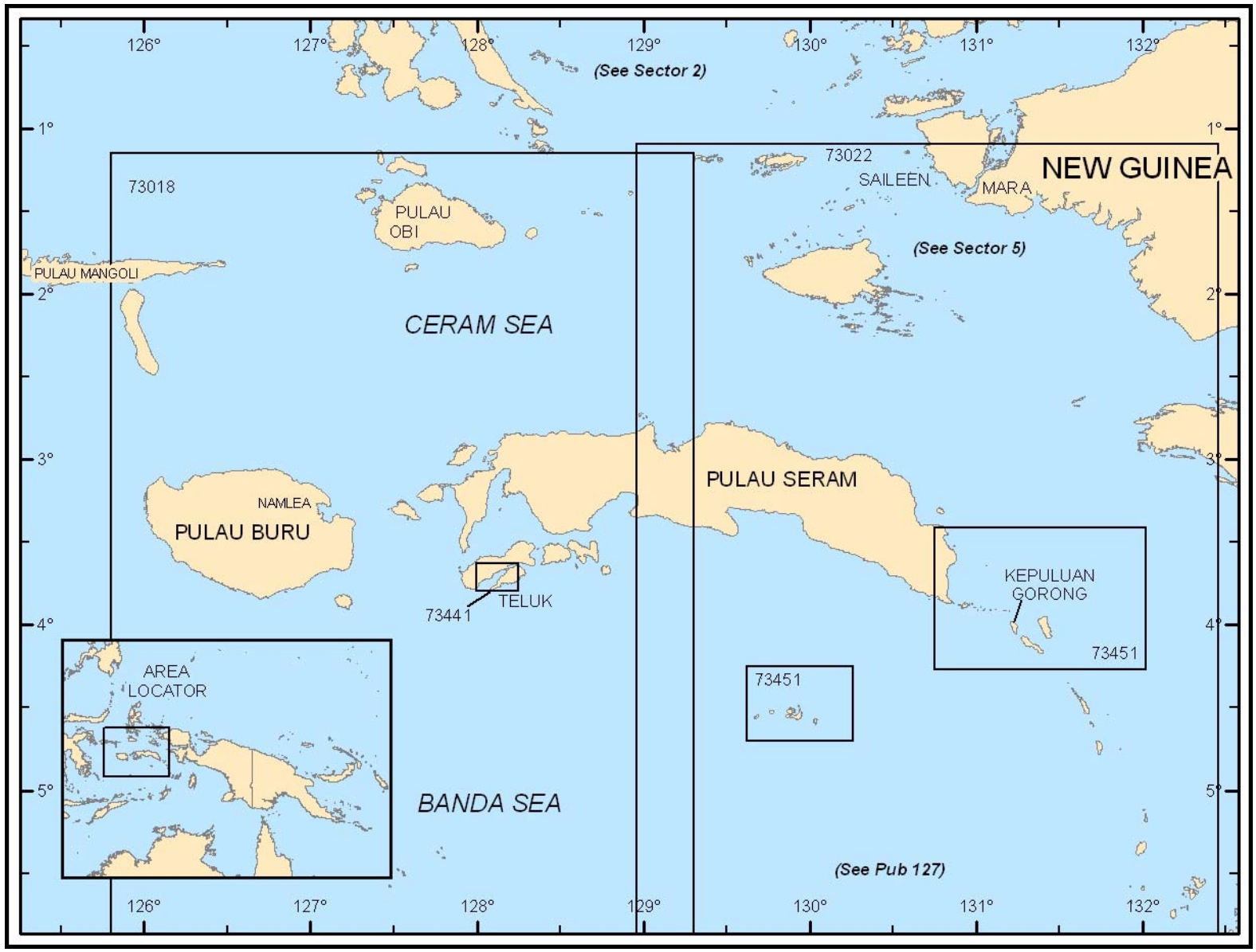
2.100 **Pulau Tiga** (2°02'S., 130°00'E.), lying W of Teluk Wagom, is separated from the coast by a safe channel; the coast reef here is not very well marked by discoloration.

Suitable anchorage may be found behind Joe, a small islet SE of Teluk Wagom. The reef with a drying rock which extends from the E end of the islet is conspicuous because of the breakers on it. The islet was reported to be a good radar target up to a distance of 20 miles.

In the bay behind **Jef Bie** (2°04'S., 130°09'E.), the shallow places are not marked by discoloration, but the E entrances are easily navigated because in that area the reefs are indicated by discoloration.

Caution.—Several charted reported depths of less than 183m are located S of Batanme. A depth of 10.1m was reported in position 2°12'S, 129°59'E. A depth of 11m is located in position

2°06'S, 129°41'E.



Additional chart coverage may be found in NGA/DLIS Catalog of Maps, Charts, and Related Products (Unlimited Distribution).

SECTOR **3** — CHART INFORMATION

SECTOR 3

THE SOUTHERN MOLUCCAS—BURU, SERAM, AND KEPULAUAN BANDA

Plan.—This sector describes Buru, Seram, their off-lying islands, and Kepulauan Banda, in that order.

General Remarks

3.1 The Seram Sea (Ceram Sea) is the broad and deep passage bounded on the N by Kepulauan Sula and Pulau Obi, and the islands stretching then to Pulau Kofiau; on the S it is bounded by Buru and Seram. With the exception of Karang Bais (Leeuwarden Reef), off the NE point of Seram, there are no dangers outside the 200m curve. Tidal currents will be encountered close to the shores of the surrounding islands, but in the more open sections of the passage, monsoon drifts prevail. In the vicinity of Karang Bais, a constant E current has been observed.

Winds—Weather.—The monsoons in the Seram Sea are not quite so well developed here as in the seas to the W and S. The East Monsoon especially is of relatively short duration, and only moderately well developed.

In January, the prevailing winds are NW. They blow with fair regularity, with an average velocity of about 6 knots. There is little change in February. The West Monsoon weakens in March. In April, the winds become variable, and in May the East Monsoon sets in with winds most often from the SE, but with little constancy.

The East Monsoon continues to be rather poorly developed through June, but in July, August, and September it is fairly well established with SE winds a half to two-thirds of the time. The average velocity then is about 9 to 10 knots. It becomes weaker in October and ceases by November, when the winds are quite variable again, more often SE than any other direction.

During December, the West Monsoon becomes established with NW winds of fair regularity and moderate force.

Locally the direction of the wind is much affected by islands, in some places the land and sea breezes dominate. This is especially true in the vicinity of Seram.

In the open sea, showery weather occurs frequently during most of the year, but less often from August to November.

Haze is observed at all seasons, but is most pronounced in August and October.

The character of the weather on the islands depends largely upon the exposure to the monsoons; the S coast has its best weather during the West Monsoon.

Buru

3.2 **Buru** (3°25'S., 126°40'E.) is the third largest of the Molucca Islands and has the appearance of one large irregular-shaped mass of mountains when seen from a considerable distance in any direction. Namlea Plain is a large valley in the E part of the island. The summits of the mountains are not easily distinguished from a distance; the higher peaks are often hidden by clouds. The mountains are further described with the coasts. The island is fringed by a reef in many places, but there are depths of 183m close to the coast nearly everywhere.

Winds—Weather.—The weather conditions on the N and S sides of Buru Island differ widely. On the N coast, the Northwest Monsoon brings rain while the Southeast Monsoon is accompanied by a dry spell. On the S coast the reverse is true. During the latter part of the turning period in the fall and during December and January strong W or S winds and rain storms may spring up suddenly, but they last only a few hours; they cause a heavy sea.

Buru—North Coast

3.3 Coastwise navigation along this coast is safe because there are no detached dangers outside the 20m curve, which is close inshore.

Tanjung Karbau (Tanjung Karbou) (3°17'S., 127°07'E.), the N entrance point of Teluk Kayeli, is marked by a light, and is further described in paragraph 3.11.

Djikoe Merasa (Jikumerasa) (3°10'S., 127°02'E.) lies about 8.5 miles NE of Tanjung Karbau. Good anchorage, out of the tidal current, may be obtained here; local knowledge is necessary. This anchorage is unsafe during the Southeast Monsoon. **Terwissie** (3°13'S., 127°02'E.), a 355m high treeless mountain, stands 2.5 miles SSE of Djikoe Merasa, with a commanding hill, 194m high and with a tree on it, 2.25 miles SE. All other hills in this vicinity are sparsely covered with trees.

Good anchorage, out of the tidal current, may also be obtained in Teluk Waeplau, about 9 miles ENE of Djikoe Merasa. Local knowledge is necessary; this anchorage is unsafe during the Southeast Monsoon.

From Teluk Waepluto **Tanjung Hatawanu** (3°04'S., 126°47'E.), 7 miles ENE, the coast is a stretch of sandy beach in back of which a plain rises gradually to the foothills of the higher interior mountains. The foothills are covered with light-green vegetation.

Between Tanjung Hatawanu and **Tanjung Wapot**i (3°04'S., 126°41'E.), 6 miles W, the coast is in great contrast to the above stretch. It is rather high, steep, and rocky, and a spur of the mountains approaches it. The highest point is a 621m summit about 3 miles ESE of Tanjung Wapoti. East of this spur, and separated from its steep E side by a gap, is a rather high plain.

Between Tanjung Wapoti and **Tanjung Bebek** (3°06'S., 126°18'E.), 24 miles to the W, the coast is sandy beaches backed by plains which rise to light-green foothills. Wai Nibe, the only river of any importance on this coast is 5 miles W of Tanjung Wapoti. The very dark 911m peak E of the river is easily distinguished from the other summits. The 1,458m peak 11 miles SE of Tanjung Bebek has the appearance of a large block when seen from the N and the NE and as the summit of the ridge from farther W. South of Tanjung Bebek a spur of the mountains extends in a N direction and has two sets of steep triple summits, each on a N-S line.

At **Teluk Bara** (3°10'S., 126°13'E.), entered between Tanjung Bebek and Tanjung Palpetu (Tangjung Palpetoe), about 12 miles E, the mountains come close to the coast, so the coastal plain is considerably narrower. When seen from the N, the range S of the bay has a number of conspicuous points.

Kapalatmada (3°16'S., 126°12'E.), the highest peak, 2,429m high and about 12 miles SSW of Tanjung Bebek, is fairly sharp and is the highest peak on the island. The next peak to the W is 2,215m high and flat-topped. The 2,059m peak W of the latter has a rounded summit. Gunung Tomahu (Tomahoe), the westernmost of the higher peaks, has a double top, 2,161m and 2,109m high; the E summit resembles a horn with the point to the W. The 731m peak W of Gunung Tomahu is a sharp well-wooded cone. A high spur with three conspicuous summits, 702m, 352m, and 255m high, extends from Gunung Tamahu to Tanjung Palpetu.

Tides—Currents.—The tidal currents set either E or W along the coast. The greatest velocity on record is 2.5 knots. The W current draws inward somewhat at Teluk Bara. Nothing is known as to the relationship between the turning periods of the vertical and horizontal tidal movements.

The lowest LW level occurs in June and December. The maximum rise and fall that can be expected are, respectively, about 0.5m above and about 1.0m below mean sea level.

Anchorage.—A number of villages are scattered along the N coast but, with the exception of Teluk Bara, the bottom is too steep for suitable anchorage during the Southeast Monsoon.

Teluk Bara affords anchorage during the Southeast Monsoon, but during the Northwest Monsoon high seas and a surf will be experienced. In the E part of the bay is the small village of Kampung Bara inhabited by people from Halmahera and Kepulauan Sula.

Buru—West Coast

3.4 A wide berth should be given to the N part of this coast, which is foul up to 1.25 miles offshore. Between Tanjung Waeken and Tanjung Waflia, about 4 and 6 miles, respectively, SW of Tanjung Palpetu, three small but conspicuous hills stand near the coast. The N one is partly bare and the middle one entirely bare. Tanjung Waflia is low and covered with coconut trees. Near the Tomahu Islands, where the mountains come close to the coast, the coast is especially high. The conspicuous peak of Gunung Tomahu resembles a cone. The hilly peninsula of Fogi, from which is a light is shown from the summit, is located farther to the S. It is an excellent place for landfall.

South of Fogi peninsula the rocky coast gives way to sandy beaches. There are no conspicuous summits among the mountains, but in back of **Tanjung Sarmana** (3°25'S., 126°02'E.) and **Tanjung Walimen** (3°29'S., 126°05'E.) the heavily-wooded terrain rises rapidly. **Tanjung Walwawat** (3°37'S., 126°11'E.) is the S point of a wide stretch of lowland, through which the Wai Koema flows. The muddy waters of this river discolor the sea water for a long distance offshore.

Strong currents set in a N or S direction along this coast. With continuous winds in the Southeast Monsoon there is usually a high running sea and rollers from the S.

Anchorage.—The channel between Buru and **Pulau Tengah** (3°14'S., 126°00'E.) offers excellent anchorage, in depths of 24 to 39m, over mud and sand. Outside the 10m curve, which is close to the shores, the depth in most places is more than 20m. A 3m patch lies 1.2 miles from the S point of Tengah in the middle of the fairway and a 9.1m shoal lies 0.4 mile E of the same point. There are also several rocks in this approach. In the middle of the broader section N of the latter spot is a 16.4m shoal. The only settlement of any importance is situated at the N end of Pulau Tengah; near it is a small and steep beach. The anchorage near the village is in a depth of 29m. Local knowledge is essential.

The channel N of Pulau Tomahu can only be used by small vessels.

The channel between Pulau Tengah and Pulau Tomahu is the preferred entrance for large vessels. The drying reefs are clearly marked here, while the S entrance is encumbered with several submerged rocks with a depth of 0.9m. The tidal currents inside the Tomahu Islands are weak. In the N entrance to the channel between Pulau Tomahu and the coast and between Pulau Tomahu and Pulau Tengah, a vessel approaching from the outside is soon clear of the tidal current which sets across the entrances.

Off the village of Kampung Fogi, about 2 miles S of the Fogi Peninsula there is suitable anchorage for a small vessel when the reefs can be made out.

Close off a coconut plantation at **Kampung Wamsasi** (3°33'S., 126°10'E.), anchorage may found in the open roadstead, 0.3 mile offshore, in a depth of about 15m, fine black sand, good holding ground; this is the only anchorage free from rollers during the Southeast Monsoon.

Buru—South Coast

3.5 Southeast of **Tanjung Walwawat** (3°38'S., 126°12'E.) there are many detached dangers. A shoal of 9m is located 3 miles ESE of Tanjung Walwawat. Shoals with least depths of 7.8 and 11.9m are 1.5 miles and 3 miles SSW and SE, respectively of Tanjung Fatufat (Fatoefat). Off the coast of Bobo, just NW of **Tanjung Fatufat** (3°40'S., 126°17'E.), is a rock awash and a 5.9m shoal. A 3.9m shoal and a long drying reef are off the coast between Teluk Tifu (Tifoe) and Teluk Leksula (Leksoela). The most conspicuous section of this coast is the Plain of Mala, which extends into the interior of the island. Here the sea is discolored for miles offshore by the muddy waters of the river Wai Mala. The hills and mountains lie close to the coast on either side of this plain. Sanane, the 296m hill on the W side of the entrance to Teluk Tifu, is especially conspicuous. With favorable weather anchorage is available almost anywhere between Tanjung Walwawat and Teluk Leksula, over a sandy bottom.

Tidal currents can be fairly strong along this coast.

Teluk Tifu (Tifoe) (3°43'S., 126°24'E.), 13 miles SE of Tanjung Walwawat affords anchorage free from rollers, heavy seas, and currents but it is only large enough for one vessel. Because of the narrow entrance and the rollers and currents in front of it during the Southeast Monsoon, it is sometimes impossible to enter. During this monsoon, however, it is advisable, when possible, to enter early in the morning and depart as early as possible, because the wind increases as the day advances.

Pulau Ketjil is on the N side of the E end of the bay. Kam-

pung Tifu, with a pier, lies on the S side.

Signals.—A flag is displayed at the flagstaff on the E entrance point when it is inadvisable to enter; a red flag is displayed when there is already a vessel in the bay.

Directions.—A vessel should approach the entrance at a low speed and enter with only sufficient speed for steerage way. When Pulau Ketjil bears 060°, it should be steered for on that bearing, then let go the starboard anchor when the point on the NW shore, about 0.3 mile W of the head of the pier at Kampung Tifu bears not less than 270°, or when the pierhead bears about 094°, veering out about 49m of cable; after swinging, a hawser should be laid out to a tree on Pulau Ketjil.

3.6 Kampung Tifu (3°43'S., 126°24'E.) is on a sloping beach on the E side of Teluk Tifu. There is a pier for boats. Vessels call here occasionally.

Tides—Currents.—At Teluk Tifu the highest HW level occurs in March and September and the lowest in June and December. The maximum rise and fall of tide that can be expected are, respectively, 0.6m above and 0.7m below mean sea level.

A shoal, depth not known and position approximate, and another shoal, depth not known and existence doubtful, are 19 and 36 miles, respectively, S of Teluk Tifu.

A shoal with a depth of 3.9m is 3 miles SE of Teluk Tifu about 0.3 mile offshore. About 2 miles SE of this shoal and 0.5 mile offshore there is a drying reef marked by discoloration.

Teluk Leksula (Leksoela) (3°47'S., 126°31'E.), 8 miles SE of Teluk Tifu, is easily recognized by its two entrance points, Tanjung Kabat Roit and Tanjung Kabat Ha, with the small rocky islets in the channel between them. Midden Islet, at the middle of the entrance, has the appearance of a flat cylinder. Of the coast mountains, Mefa, 565m high, Miten, and Tef Dula are fairly conspicuous. Batu Kapal (Batoe Kapal), lying 2.5 miles ESE of Tanjung Kabat Roit, is a rock that forms a good mark for making the entrance to Leksula Bay. This rock is at the S end of a reef extending about 1 mile offshore.

A light, shown only when vessels are expected, is shown from the NE side of the bay.

3.7 Kampung Leksula (Leksoela) (3°47'S., 126°31'E.) (World Port Index No. 52740) is at the foot of hills, near a small bight in the drying reef at the head of the bay. There is a landing pier, with a depth of 1.8m alongside.

Anchorage can be found, in 35m, mud, in the middle of the bay. During the Southeast Monsoon anchorage should be somewhat farther to the E, in 20.1m. During the Northwest Monsoon, anchorage should be more to the NW, in 28m. There are no currents in the bay.

Anchorage.—Near the village of Kampung Nalbesi, about 3 miles E of Teluk Leksula, and near the village of Kampung Wanala, 6.5 miles farther ESE, anchorage can be found during favorable weather conditions This is outside the strength of the tidal currents and local knowledge is necessary.

Directions.—With the bay well open steer for Midden Islet on a NNE course until the light bears 038°, which will lead through the channel between Midden Islet and the detached reef, 0.2 mile SE of this islet.

Between Teluk Leksula and **Tanjung Batupekat** (Batoe-pekat) (3°51'S., 126°44'E.), the S extremity of Buru, about 14 miles to the E the coast is very similar in character to the coast NW of the bay. The high rocky point **Tanjung Batutulis** (3°50'S., 126°37'E.) is the most conspicuous point E of Batu Kapal. Between Teluk Leksula and Tanjung Batutulis are shoals ranging from depths of 0.9 to 7.8m and coral reefs extending as far as 2 miles offshore. The vicinity of Teluk Namrole is especially conspicuous because of the valley of the Wai Tina, the 49m high rocky walls of Tanjung Batupekat, and the small rocky islet of Klasi. Close inland of Teluk Namrole are the Wa Leli Mountains, a range of hills with an elevation up to 553m.

3.8 Teluk Namrole (3°51'S., 126°43'E.) has a white coral reef, Loktonal, at the middle of its entrance; the reef dries at LW. A rather strong current has been observed in the deep channel between Klasi and the shore. There is no shore reef in front of the village of Kampung Namrole, on the NW side of the bay. A small hill, round and flat, is near the shore E of the village and is conspicuous because of its lighter color. To enter the bay, steer N for the 553m summit of the Wa Leli Mountains. If the summit is obscured by clouds, a useful alternate mark, on the same bearing, is a large round-topped tree, which, on nearer approach, will be seen between two native houses in the village. Anchorage will be found, in 29m, sand and coral, in Teluk Namrole.

Directions.—Approach the bay with the summit of Wai Leli bearing 000° and in line with Namrole village; if the summit is obscured, a useful alternative mark on the same bearing is a large round-topped tree which, on near approach, is seen between two houses in the village. Pass W of Loktonal on this leading line then steer for a white patch about 0.5 mile SW of Wai Leli summit in line with a prominent knob on the ridge behind it bearing 340°; this leads to the anchorage.

Between Tanjung Batupekat and **Tanjung Liboli** (3°41'S., 127°11'E.), the SE extremity of Buru, about 30 miles NE, the coast is backed by a mountain range parallel to the coast. The highest point of the range is Kaku Batakbual (Batak Boeal), a 1,731m peak 10 miles N of Tanjung Liboli. The summits of this range are almost always hidden by the clouds.

Between Tanjung Batupekat and Tanjung Salia, 14 miles to the ENE, the coast is fronted by a barrier reef with a number of deep openings through it. Shoals, with least depths of 4.1 to 7.7m, are located as far as 3 miles offshore. Behind this barrier reef, anchorage can be found almost anywhere, over a sandy bottom.

Labuan Kabuti, on the NE side of Tanjung Salia, affords suitable anchorage during the Northwest Monsoon, in a depth of 42m. At Tanjung Polisini, 9.5 miles farther NE, there is anchorage, in 50 to 61m, close W of the mouth of Wai Lumara.

Pulau Oki (3°49'S., 126°51'E.), an islet, 149m high and covered with vegetation, is about 1 mile offshore, about 7 miles ENE of Tanjung Batupekat. Some rocks are close S of the islet. Wayo (Wajio) Reefs with a least depth of 4m lie with the shallowest part 2 miles ESE of Pulau Oki. The islet is reported to be a good radar target up to a distance of 22 miles.

The 617m and 670m summits N of Tanjung Salia are good marks. On both sides of Tanjung Salia there is an almost continuous line of sandy beaches with plains between them and the hills. At Tanjung Liboli, the coast becomes rocky again.

Tides—Currents.—The tidal currents set parallel with the coast. Eddies are experienced off Tanjung Salia, and between

Tanjung Liboli and Pulau Ambelau, an island described in paragraph 3.9. These whirlpools are created by the E current through the passage meeting the S current in Selat Manipa. During the West Monsoon, there is sometimes a strong drift setting E in this passage; during the East Monsoon, there is sometimes a strong drift setting W in this passage.

3.9 **Oki Roads** (3°48'S., 126°51'E.), N of the islet of the same name, is best entered by passing close E of that islet. If bound to the W from the roads pass between the islet and the 4.9m coral patch N of it. Vessels proceeding E through the inner channel should favor the coast N of Wayo Reef (Wajio Reef) and Belobo Reef; the latter has a drying spot on the N side. Kampung Oki, on Buru, N of Pulau Oki, is the most important settlement on this coast.

Pulau Ambelau (3°51'S., 127°12'E.) is 8.5 miles S of Tanjung Liboli and is separated from Buru by a deep and clear passage. It rises almost vertically from the sea, and may be approached close-to as far as depths are concerned. The entire island is wooded and very hilly. The highest summits, Nona, 559m high, and Baula, 608m high, are on the W part of the islet. At Waloa, on the S coast, and at Nigeri Baru and Ulima (Uilima) on the N coast, sandy beaches and the only flat land on the island is found. Native canoes may find suitable anchorage in the small bay at Waloa; otherwise no anchorage has been found anywhere.

Pulau Ambelau is a good radar target up to a distance of 22 miles. A lighthouse, 40m in height, has been established on **Tanjung Bartutui** (3°54'S., 127°13'E.).

Buru—East Coast

3.10 Between Tanjung Liboli and **Teluk Kayeli** (3°19'S., 127°07'E.), Buru is composed of high and wild mountainous land with mountain spurs extending close up to the coast and forming rocky points in places. Between these points are sandy beaches and the coast slopes more gently. At Tanjung Pohonrea, 8 miles NNE of Tanjung Liboli, there is a small round coastal hill, 157m high which is very conspicuous. Teluk Kayeli, described in paragraph 3.11, can easily be identified by approaching vessels, because this bay, together with the Plain of Namlea to the W, appear as a large break in the mountainous country.

Tides—Currents.—Tidal currents are strong along this coast; the maximum velocity of the N and NW current was observed to be 3 knots five days after new moon; the maximum velocity of the SE and S current was about 1 knot.

Anchorage.—During the Southeast Monsoon, the E coast S of Teluk Kayeli is absolutely not approachable. During the Northwest Monsoon, fairly suitable anchorage may be found in the following places:

3.11 In the bight at **Kampung Ilat** (3°35'S., 127°15'E.), 7 miles NNE of Tanjung Liboli, small vessels can anchor, in 50 to 70m, out of the strength of the current, but it is attended with some difficulty. When approaching steer 270° for a small isolated house close N of the village and in the middle of the shore of the bay. A stream is a little S of this house. When at anchorage Pulau Ambelau is out of sight behind the land S of the anchorage. In calm weather anchorage is available farther S nearer Kampung Ilat, in depths of 35 to 40m.

Close N of **Kampung Batujungkoar** (Batoedjoenko) (3°26'S., 127°15'E.) there is a point with some detached rocks in the shallows off it. A suitable anchorage, in 21m, is available about 183m NE of these rocks.

Teluk Kayeli (3°19'S., 127°07'E.), on the NE side of Buru, is 4.5 miles wide between the two low entrance points Tanjung Waat and Tanjung Karbau. A light is shown at an elevation of 14m from Tanjung Karbau.The land at these points rises immediately to the hills in back of them; this and the low, marshy inner shore, backed by the Plain of Namlea, make it easy to recognize. There is little or no current in the bay.

The river Wai Apu (Wa Apu), discharging at the head of the bay, gives a dirty gray muddy color to the waters of the bay, especially after heavy rains. The river has been navigated by a motorboat for a considerable distance above the mouth. A least depth of 3m was reported and the width varied from about 80 to 100m. The rate of the stream was estimated at from 3 to 4 knots.

Kayeli Roads (3°22'S., 127°07'E.), in the S part of Teluk Kayeli, is in a spacious bight with suitable anchorage, in depths of 35 to 40m, mud and sand. When entering near HW the drying reef on the E side of the bight should be given a wide berth. On the S part of this reef are the islets Pulau Besar and Pulau Kecil.

Namlea Roads (3°16'S., 127°05'E.), in the N part of Teluk Kayeli, has irregular depths and a number of dangers, most of which front the shore abreast of the village on the NE side. It is free from rollers at all times but is encumbered by shoals some of which are marked by beacons.

3.12 **Kampung Namlea** (3°17'S., 127°06'E.) (World Port Index No. 52760) is the residence of a government official. There is a boat pier with a depth of 1.8m at its head. Lighters unload and load cargo on the beach. A mosque NW of the pier is prominent from seaward. A light, shown only when vessels are expected, is shown from the head of the boat pier.

The entrance of the channel leading to the inner roads is marked by two beacons 0.35 mile W of the pierhead. A pole beacon marks a 5.5m shoal about 1.75 miles W of the pier.

Tides—Currents.—At Namlea Roads the lowest LW level occurs in May and June, and in November and December. The maximum rise and fall of tide that can be expected are, respectively, about 0.4m above and 0.8m below mean sea level.

Anchorage.—The usual anchorage is about 0.5 mile WSW from the head of the pier at Kampung Namlea. This anchorage has a depth of 20.1m, but a 3.9m shoal and a 2.4m shoal are N and SW, respectively, from it. A deep channel used by small craft and lighters leads from the anchorage to the beach. There is no difficulty in the approach to the roads, but the N entrance point to Teluk Kayeli should not be rounded too closely because of 0.3m depths close to the point.

Selat Manipa

3.13 **Selat Manipa** (3°20'S., 127°22'E.), between Buru and Pulau Manipa, about 14 miles E, is a wide, clear deep-sea passage connecting the Seram Sea with the Banda Sea. It is much used by vessels passing through this region. During continuous winds, which cause a high sea in the strait, small vessels give preference to Selat Kelang, discussed in paragraph 3.15, even

though the current may be almost as strong there as in Selat Manipa.

Tides—Currents.—Strong currents flow through Selat Manipa, but they are more or less influenced by the monsoon drifts. Strong tide rips were reported mid-channel in the strait.

3.14 Pulau Manipa (3°19'S., 127°34'E.), about 14 miles E of Buru, is mountainous and rises to a height of 632m at Kala Huhun. On the S side is a narrow plain on which are several villages where most of the island's inhabitants live. There are hardly any plantations. A large coastal reef, on which are the islands Masawoi and Asamamonuke (Asamamonoeke), extends from the N end of Pulau Manipa. Other islands near Pulau Manipa are Pulau Suanggi (Soeanggi), Tuban (Toeban) and Luhu. The channel between Pulau Suanggi and Pulau Manipa is clear; the channel between Pulau Manipa and the large reef on which Tuban lies can be navigated with due care.

Suanggi Island Light (3°18'S., 127°28'E.) is shown from a 21m white iron framework structure on the summit of the island. It is irregular during strong winds. The island is a good radar target at a distance of up to 26 miles.

Anchorage can be found on the S, W, and NE coasts. Anchoring on the NE coast is not recommended, however, because strong tidal currents strike this coast from the N. A current with a velocity of 5 to 6 knots has been observed by a vessel anchored NW of Tanjung Samala, the SE point of the island. Tidal currents with rates of 5 to 6 knots have also been observed in the strait off Tanjung Saniani, the W point of Pulau Kelang.

The best anchorage at Pulau Manipa is off the NW coast is in **Reede Hayasa** (Hajasa) (3°17'S., 127°31'E.) which is entered between Tanjung Hapale and Tanjung Hakuluane (Hakoeloeanoe). The head of this bight is encumbered with drying reefs and shoals. Anchorage is available, in 16.4 to 46m; fair shelter, during the Southeast Monsoon.

Selat Kelang

3.15 Selat Kelang (3°16'S., 127°39'E.), between Pulau Manipa and Pulau Kelang, has a least navigable width of 4 miles and is deep and clear. The points of the islands forming it can easily be recognized even at night. The tidal currents are very strong making it advisable to maintain a mid-channel course if navigating the passage at night. The maximum rate of tidal current of from 5 to 6 knots has been observed in the strait off Tanjung Saniani, the W extremity of Pulau Kelang and off Tanjung Samala, the SE extremity of Pulau Manipa.

Pulau Kelang (3°12'S., 127°44'E.), NE of Pulau Manipa, is mountainous; its highest peak, **Tonu** (3°13'S., 127°45'E.), is 828m high and is an old volcano. Kampung Sole, on the NE side, is the largest village. Fishermen may be encountered all around the island.

Tanjung Saniani (3°14'S., 127°38'E.), the W extremity of Pulau Kelang, has a mosque with a conspicuous silver-colored dome standing on its S side.

Anchorage.—Suitable anchorage can be found at the N end of the island W of Tanjung Batugoso except during strong continuous winds during the Northwest Monsoon. On the S coast, there is anchorage near Kampung Pamariki, 2.5 miles W of the SE end of the island. On the E coast are several anchorages N of the parallel of the mountain, Tonu.

3.16 Pulau Babi (3°10'S., 127°48'E.), off the NE side of Pulau Kelang, is comparatively low. It is separated from Pulau Kelang by Lobang Sole, a narrow strait which cannot be recommended as a passage because of strong currents which cause eddies.

Lobang Haja (3°09'S., 127°50'E.), the narrow strait between Pulau Babi and Tanjung Haja, on Seram, can be navigated by small vessels with local knowledge and draft no greater than 3.3m. The currents attain a maximum rate of 6 knots and local knowledge is necessary. Shoals, with depths of 2.7m and 3.6m, are 0.6 and 0.4 mile, respectively, S of Tanjung Haja.

Directions.—Vessels approaching Lobang Haja from S should steer 015° for Tanjung Haja passing W of the abovementioned shoals. Then come to 357° to pass about 91m W of Tanjung Haja, and continuing on that course past the point and through the strait.

Selat Boano

3.17 Selat Boano (3°00'S., 128°00'E.), between Pulau Boano and the NW coast of Seram, is a good passage, but tidal currents will be experienced within it. When approaching from NE, Tanjung Tanduru Besar (Tandoeroe Besar), the NW point of Seram, is a conspicuous landmark. Tide rips may be seen off the NE end of Pulau Boano. When passing through the strait, favor the E side of Pulau Boano because it is steep-to. On the NE side of Boano, N of Tanjung Pamali, shoals with depths of 2.8m and 5.9m, extend about 1 and 1.5 miles offshore, respectively.

Pulau Boano (2°58'S., 127°55'E.), 8.5 miles NE of Pulau Kelang, is mountainous over its SW part. The highest point is a conspicuous 624m high conical summit. The NE part of the island is a low plateau, not over 59m high. The pointed SW end of the island is rocky and very conspicuous. In contrast to the E and SE sides of the island, many shoals and reefs front the NW side. Because the bottom on the NW side is also very irregular, it is advisable to keep at least 3 miles off, considering also that the currents are also irregular.

Pua (Poea) (2°56'S., 127°54'E.), an island 403m high, is close off the NW side of Pulau Boano. The passage between the two is obstructed by reefs. A 10.9m shoal and a 1.4m shoal are 2 miles NW and 1.5 miles NNW, respectively, of the SE point of Pua.

Several dangers lie off the W sides of Pua and Boano; this coast should not be approached within 3 miles.

A light is shown at an elevation of 60m from Pulau Niene.

Pulau Boano is rocky and infertile, and sparsely inhabited. There are no inhabitants on the N and NW part of the island.

Seram (Ceram)

3.18 Seram is about 185 miles long and has irregular mountains over its entire length. Its highest point, in about the middle of the island, is **Gunung Binaiya** (Binaija) (3°10'S., 129°27'E.), 3,055m high. Except for a few coastal reefs projecting from Seram and nearby islands, vessels can navigate close to the shore.

Earthquakes occur often, more so on the S coast than on the

N coast. Mud volcanoes are found in the vicinity of **Bula** (3°06'S., 130°30'E.) on the NE coast. Although violent tremors have been recorded, there have been no decided volcanic eruptions.

Winds—Weather.—The rainy season on the N coast occurs during the Northwest Monsoon and the dry season during the Southeast Monsoon. The reverse is true for the S coast. That part of Seram forming the W side of **Teluk Piru** (3°21'S., 128°10'E.) is subject to the same conditions as the N coast because the high mountains of Ambon catch the moisture carried by the Southeast Monsoon. Land and sea breezes will be experienced on both the N and S coasts.

Sera—West Coast

3.19 The W side of Seram, as seen from the coast, appears as a rising, hilly and mountainous territory, wood-covered with no conspicuous summits. The W coast of the Hoalmoal Peninsula between Tanjung Sial and Tanjung Haja, can be approached close-to because the 10m curve is close to the shore. The only other known dangers, other than the two shoals S of Tanjung Haja (discussed in paragraph 3.16), are an 8.7m shoal about 2.5 miles NNW of Tanjung Sial, and a rock awash about 0.2 mile S of the same point. The points along this stretch of coast are easily recognized. It is sparsely populated; the only village of any importance is **Kampung Supe** (3°13'S., 127°52'E.), abreast of Pulau Kelang. A strong current sets around Tanjung Sial. Otherwise there is not much of a current along the coast until the channels on either side of Pulau Babi are reached.

Between Tanjung Haja and **Tanjung Tanduru Besar** (2°52'S., 128°10'E.) the NW coast of the island has several inlets and is generally hard to approach because of the many islets and dangers. The hills are close to the coast in many places, but E of **Pulau Marsegu** (Marsegoe) (3°00'S., 128°03'E.) and at the villages of Kampung Kotana, Kampung Kawa, and Kampung Lawawu, the shores of the bay are marshy and covered with mangrove trees. The only coast hills that are of value as landmarks are N of **Asaudi** (3°08'S., 127°56'E.).

3.20 **Asaudi Roads** (3°08'S., 127°56'E.), 6.5 miles ENE of Tanjung Haja, is safe during both monsoons. The best anchorage is in 39m, mud and sand, S of Asaudi and 0.65 mile from the shore abreast of the village.

Teluk Kotania (3°03'S., 128°02'E.) is not navigable in its inner part because of numerous reefs. Only small vessels with local knowledge can find their way to the village at the head of the bay. Anchorage can be obtained, in 40 to 50m, sand, in the outer part of the bay W of the alignment of the E extremity of Pulau Marsegu (Marsegoe) and Tanjung Wantebu bearing 021°.

The bay E of Pulau Marsegu is clear outside the shore reef and may be preferred to Teluk Kotania. The depths are great but anchorage may be found, in 40 to 55m, off the E side of Pulau Marsegu or near the N edge of a drying reef extending from the point E of that island. The best anchorage is in about 37m in the NE corner of the bay abreast of the mouth of the river **Wai Tosu** (2°58'S., 128°07'E.).

Kawa Roads (2°56'S., 128°08'E.) provides suitable anchorage, during the Southeast Monsoon, in 29m, off the village of Kampung Kawa, which is 6 miles NE of Pulau Masegu, and with the small rocky islet of Sirih, 3.5 miles SW of Tanjung Tanduru Besar, bearing 347°. At this place the bottom consists of mud, sand and stones. In general, good holding ground may be found in almost any depth. The bottom inside the 10m curve rises steeply to the sandy beach.

Seram—North Coast

3.21 The N coast of Seram is not much frequented by shipping. Navigation along this coast, however, is not difficult because there are no dangers beyond 0.5 mile offshore except at Teluk Wahai, Teluk Sawai (Seleman Bay), and Kepulauan Tudjuh. Furthermore, the 20m curve is not more than about 1 mile offshore for practically the entire coast.

Between **Tanjung Tanduru Besar** (2°52'S., 128°10'E.) and Kepulauan Tudjuh, about 50 miles E, the coast is deep and clear. The mountains and hills are close to the sea at many places and at intervals there small valleys with streams and coconut plantations. There are several coastal villages. Many of the hills and mountains are easily identified. The most conspicuous are **Little Dromedaris** (2°52'S., 128°34'E.) and **Great Dromedaris** (2°52'S., 128°32'E.), 473m and 697m high, respectively, which are near the middle of this stretch of coast. Nakaela, farther to the W, is 793m high and has a flat top. The Cecelia Mountains, SE of Little Dromedaris, attain a height of 1,354m and are somewhat conspicuous. The Lumute Mountains (Loemoete Mountains), farther to the ESE, is one continuous range, 914 to 1,372m high. Tanjung Tanduru Besar, the NW point of Seram, is particularly conspicuous because of the high land which rises abruptly from the sea. Towile Bubui, 1,125m high, 16 miles ESE of Tanjung Tanduru Besar, and Sarusi, 1,171m high, 37 miles ESE of the same point are reported to be easily identifiable from N at 45 miles.

Tides—Currents.—The current along the coast is very weak; farther off the monsoon drifts prevail. When in the vicinity of Tanjung Tanduru Besar, remember that tidal currents set in and out of Selat Boano. No currents have been reported in the vicinity of Kepulauan Tujuh (Poelau Toedjoeh). Countercurrents prevail close inshore on the N coast of Seram during the Southeast Monsoon.

Anchorage.—Between Tanjung Tanduru Besar and **Tanjung Kalawai** (2°51'S., 128°15'E.), 6 miles E, anchorage is out of the question. From Tanjung Kalawai to **Tanjung Hanua** (Hanoea) (2°52'S., 128°21'E.), 5.5 miles farther E, there is anchorage close to the shore near the mouths of the streams. From Tanjung Hanua E to Kepulauan Tujuh, anchorage can generally be found near the points, although very close to the shore in some cases. It is inadvisable to anchor with a shore line because the currents are too strong. These anchorages are only temporary.

3.22 At **Kampung Noniali** (2°52'S., 128°24'E.), 2.5 miles E of Tanjung Hanua, there is temporary anchorage, in 55m, about 180m offshore.

West of **Tanjung Lamana** (2°50'S., 128°31'E.), 9 miles E of Tanjung Hanua, there is temporary anchorage, in 42m, coral and sand, about 0.3 mile from the drying shore reef.

North of **Tanjung Uli** (Oeli) (2°50'S., 128°40'E.), 10 miles

farther to the E, there is temporary anchorage, in 55m, coral and sand, 0.25 mile offshore.

At Kampung Sukaradja, 3 miles SE of Tanjung Uli, there is temporary anchorage in 37m over sand, with Rapapine Hill bearing 192°.

North of **Tanjung Makina** (2°51'S., 128°45'E.), 5.5 miles E of Tanjung Uli, there is anchorage, in 55m, coral and sand, about 0.3 mile offshore.

Off Kampung Lisabata, 7.5 miles farther E, there is anchorage in 37m E of the mouth of the river Wai Ela and about 0.1 mile offshore.

Tides—Currents.—Kampung Taniwel (2°51'S., 128°28'E.), 19 miles E of Tanduru Besar, the lowest LW occurs in May and November. The maximum rise and fall of tide that can be expected are, respectively, about 0.5m above and 0.8m below mean sea level.

This tidal datum is applicable to the NW part of Seram and nearby islands from Selat Manipa to Teluk Sawai (Seleman Bay).

3.23 Kepulauan Tujuh (Poelau Toedjoeh) (2°45'S., 129°01'E.), off the W entrance point to Teluk Sawai (Seleman Bay), are six partly-inhabited islands which have been cleared for coconut plantations. A large conspicuous tree is on Pulau Besar, the NW and largest island. **Telegraaf Reef** (2°48'S., 128°56'E.), a 2.7m shoal 4 miles SW of Pulau Besar, and the shore reefs are well-marked by discoloration. **Lasi** (2°48'S., 129°01'E.), a drying reef of coral and mud, 4.5 miles E of Telegraaf Reef, is generally not marked by discoloration at HW. The best channel through the group, night or day, is between the islands of Tengah and Air. Air lies 2.5 miles SSE of Pulau Besar and has a drying reef extending 1 mile off the S coast.

A depth, 4.9m, is about 0.5 mile SSW of Tengah. A shoal with a depth of 9.1m is 2.2 miles N of Tengah.

Directions.—The islands of Kepulauan Tujuh are difficult to distinguish at night from the W approach because the islands blend in with the high Seram Coast. The islands can be safely approached from E on a clear night.

3.24 Teluk Sawai (Seleman Bay) (2°51'S., 129°12'E.), SE of Kepulauan Tujuh is 19 miles wide between the low points **Tanjung Namaa** (2°47'S., 129°03'E.) and **Tanjung Pamali** (2°48'S., 129°22'E.). At the head of the bay the mountains come very close to the shore; this is particularly true at and W of the peninsula on which the 180m **Olat Hill** (2°56'S., 129°12'E.) is located. Two low mangrove-covered islets, **Radja** (2°55'S., 129°10'E.) and **Sawai** (2°55'S., 129°11'E.), are on a large drying reef off the end of the peninsula. Bare limestone rocks rise vertically out of the sea at **Tanjung Hatu Supun** (2°57'S., 129°10'E.), 2 miles W of Olat Hill. Somewhat farther to the W, pyramidal **Lusiala Hill** (2°57'S., 129°06'E.) rises to a height of 440m. The first conspicuous mark to be made out is Saka, a blunt top, 1,492m high, directly S of Lusiala Hill. Two miles E of Saka are two other peaks on an approximate N-S line and are 1,658m and 1,925m high. Sapolewa, a 214m hill near the SE side of the bay, is also very conspicuous.

Anchorage.—Excellent anchorage can be found almost anywhere in the W part of Teluk Sawai. In **Paoni Roads** (2°52'S., 129°05'E.), 4.5 miles S of Tanjung Namaa, there are four detached reefs of 1.8 to 2.4m, which cannot be located by discoloration of the water because of the discharge of the streams in the vicinity. These reefs extend about 0.8 miles offshore. Only the N of several creeks N of the village of Paoni is accessible for boats, for a short distance.

3.25 Campedak Bay (2°54'S., 129°04'E.) is on the W side of Teluk Sawai S of Paoni Roads. The bay is about 0.25 mile wide and extends a little over 1 mile S of its entrance between Pulau Campedak (Tjampedak) and the shore E. There are general depths of 18.3 to 35m and, except for the fringing coastal reef, there are no off-lying dangers.

Seleman Roads (2°57'S., 129°07'E.), E and NE of Lusiala Hill, can be approached on a 206° course direct for the conspicuous mosque at the village. This course leads between two shoals of 4.9 and 9.1m and are not marked by discoloration of the water.

Teluk Sawai (2°57'S., 129°10'E.), on the SW side of the peninsula on which Olat Hill is located, is approached on the same course used for Seleman Roads. When Lusahita, a small islet on a drying reef N of Teluk Besi disappears behind the N end of Radja, one can head into the bay.

Teluk Besi, on the E side of the same peninsula, is partially obstructed by shoals and drying coral reefs fronting it. Two islets, Lusahiti and Lusaolot, covered with coconut trees, and Sialumaina, a sand bank covered with shrubs, are on the drying coral reef. The best entrance is along the E shore, but there is also a good channel W of Lusahiti, the westernmost of the islets, which can be used safely when the reefs are visible.

3.26 Teluk Wahai (2°47'S., 129°30'E.), 8 miles E of Tanjung Pamali, is an inlet in the drying coastal reef which affords anchorage in reasonable depths. There is no anchorage between Teluk Sawai (Seleman Bay) and Teluk Wahai. Approaching from N, Teluk Wahai is difficult to locate, but the metal roofs of the village on the rising ground are useful marks. **Pamali** (2°48'S., 129°30'E.), a 54m coastal hill E of the bay, is conspicuous.

Aspect.—The edges of the reef on the W side of the fairway are marked by two white iron beacons with ball topmarks and the E side by three black iron beacons with truncated cones as topmarks. A light is shown from a wooden post near the outer end of the pier at the village.

3.27 Wahai (2°48'S., 129°30'E.) (World Port Index No. 52660), a fairly large village, is built on rising ground in the S part of the bay. The villages of Hatuwu and Hatiling are to the E. Copra and jungle products are shipped from here. A pier, which can accommodate a vessel 50m long with a maximum draft of 3m, is situated at the village.

Anchorage.—The W corner of the shed on the pier, in range with the middle black beacon bearing 154°, leads safely through the entrance to the inlet. There is anchorage in a depth of 45m. Larger vessels anchor just outside the entrance, W of an 11.9m shoal patch on the E side.

Teluk Hatiling (2°48'S., 129°31'E.), 1 mile E of Teluk Wahai, is formed on its W side by Tanjung Hewal. This bay is more spacious than Teluk Wahai, but is seldom visited. A 6.7m shoal is just outside the entrance. Tanjung Hewal, which appears as an islet lying off the hilly land S, serves as a good mark, but care must be taken to avoid the 6.7m shoal and the

drying reef E of the point.

Between Tanjung Hewal and **Tanjung Lama** (2°58'S., 130°21'E.), 52 miles to the E, the coast is backed by a broad rolling plain which rises gradually to the mountains of the interior. The only conspicuous points are Tomo, the 407m hill 8 miles SW of Tanjung Hewal, and Talirin (Kapailoe), the double-topped hill 3.75 miles SE of Tanjung Lama; the summits of the latter hill are 249m and 271m high. The peaks of the higher mountains S of this coast can be seen from offshore, but they are closer to the S coast than the N.

The coastline is low and wooded and is fringed by a narrow and steep coastal reef with drying banks of mud and sand with occasional coral. The points which are covered with trees and bushes are conspicuous only when close inshore.

Tides—Currents.—Tidal currents close offshore are fairly strong. In depths over 180m, the monsoon drift may be experienced and in June a constant E current with a velocity of 1 knot has been observed off the NE extremity of Seram.

Anchorage.—Suitable anchorage can be found anywhere along this coast, but at the steeper places caution is necessary because of the currents. The best anchorages are found in the bights of the small villages of Kampung Pasahari, Kampung Seliha, and Kampung Bengoi, 8, 19, and 42 miles E, respectively, of Tanjung Hewal.

3.28 **Tanjung Lama** (2°58'S., 130°21'E.), the NE extremity of Seram, and **Tanjung Bobo** (2°59'S., 130°23'E.), about 2 miles ESE, are low and distinctive, with steep-to coastal banks of mud and sand. The bay formed between these points affords sheltered anchorage during the Southeast Monsoon, in a depth of 7m, NNE of the mosque in Kampung Hoti, at the head of the bight.

Karang Bais (Leeuwarden Reef) (2°55'S., 130°26'E.), 6 miles NE of Tanjung Lama, is a drying reef on a small oval-shaped bank with depths of less than 183m; it is steep-to and marked by discoloration. There are no other dangers around it.

Seram—East Coast

3.29 The E coast of Seram trends generally SSE for 62 miles from **Tanjung Lama** (2°58'S., 130°21'E.) to the SE extremity of the island. Vessels navigating off this coast will find the two islands, Pulau Parang and Pulau Madorang, useful landmarks. The conspicuous summits of the mountains will be described below with the detailed description of the coast. The tidal current off the E coast of Seram sets N or NE with a rising tide and in the opposite direction with the falling tide. It is believed that a combination of both monsoon drifts and tidal currents will be encountered off this side of the island.

The part of the coast between Tanjung Lama and **Tanjung Ilor** (3°25'S., 130°48'E.), 35 miles E, is alternately hilly land and low plains. The most conspicuous are: **Talirin** (3°02'S., 130°23'E.) 271m high, and S of Tanjung Lama; the 489m Boela Hill, S of the bay of the same name; the two 134m and 149m hills on the W side of Teluk Waru; the 118m hill farther to the NW; and the 98m hill, **Keli Dukun** (3°25'S., 130°44'E.) on the S side of Teluk Waru. The most conspicuous summits farther inland are Serawantufa (Serawantoefa), 513m high, SW of Teluk Ingelas, and **Keli Badir** (3°29'S., 130°43'E.), the steep 295m hill S of Keli Dukun. Between these last two are several other peaks; the central group are the Waelila Mountains, of which the 806m SE summit is more conspicuous than the 921m NW summit. There are many streams along this stretch of coast.

The narrow drying bank along the coast consists of mud and sand and is steep-to. Outside this bank it is deep and clear, except for the S side of Teluk Waru and reefs, extending 1 mile offshore, with a least depth of 6.8m, running along the coast 3.5 miles SE of Tanjung Lama. Between Tanjung Bolifar and Tanjung Nif, coastal reefs, with a least depth of 0.9m, extend up to 0.75 mile offshore.

3.30 **Teluk Ingelas** (3°03'S., 130°27'E.), 7 miles SE of Tanjung Lama, is spacious and clear; the shores are low but rise close within and are bordered by a narrow steep-to bank of mud and sand. Suitable anchorage with good holding ground is found, in 11.9 to 12.8m, about 0.3 mile offshore. The anchorage can be approached on a 220° bearing on the summit of Serawantufa. A bank of mud and sand projects from **Tanjung Sisal** (3°04'S., 130°27'E.), the S entrance point. During the Southeast Monsoon the bay is sheltered, and even during the Northwest Monsoon it is more protected than Teluk Bula.

Teluk Bula (Teluk Boela) (3°06'S., 130°30'E.), 11 miles SE of Tanjung Lama, is a bight forming an open roadstead with anchorage, in depths of less than 22m, soft mud. The shore of the bay is low with hilly land behind it. This bay affords shelter in the Southeast Monsoon, but high seas may be experienced in the Northwest Monsoon. Vessels do not normally anchor because the holding ground in Teluk Ingelas is preferred.

3.31 **Bula** (3°06'S., 130°30'E.) (World Port Index No. 52680), a village in the S part of Teluk Bula, is a petroleum shipping port.

A stone pier at the village is about 503m long and has the hulk of a ship moored end-on to its head. A vessel berths close off the hulk with lines secured to piles on the inshore side and to hauling-off buoys on the port bow and quarter. The berth will accommodate vessels up to 168m long with a draft of 10.1m.

Another pier extends about 0.3 mile N from an oil depot close E of the stone pier.

A flagstaff stands near the root of the pier.

Anchorage may be obtained, in a depth of about 21.9m, soft mud, with the pier head bearing 174°, distant 0.2 mile. A vessel approaching from S or E should steer for Serawantufa until the pier is identified. It is suggested that only a daylight approach be made due to lack of navigational aids. The holding ground is not as stiff as in Teluk Ingelas.

Tides—Currents.—The lowest LW level occurs in May or June and in November or December. The maximum rise and fall that can be expected are, respectively, 0.6m above and 0.9m below mean sea level.

3.32 **Waru Roads** (Waroe Roads) (3°24'S., 130°40'E.), 20 miles SSE of Teluk Bula, is at the head of Teluk Waru, a large indentation in the coast. East of the roads the muddy shore bank changes to coral reefs which dry in places. The roads afford safe anchorage at all seasons, in 29m, mud. The village of Kampung Waru (Waroe), built on the shore, has a pier for boats but it cannot be approached at LW. A stranded wreck is close offshore 3.5 miles NNW of Kampung Waru.

Pulau Parang (3°19'S., 130°47'E.), an island NE of Teluk Waru and N of Tanjung Ilor, is separated from Seram by a clear channel with a depth of more than 183m. It is 138m high and has a rather broad flat summit. The island is fringed with several detached and fringing reefs which dry, and generally the depths in the immediate vicinity of the island are very irregular.

Between **Tanjung Ilor** (3°24'S., 130°48'E.) and the SE extremity of Seram the coast is rather low. The N part of this section is backed by a low plain through which the river Wai Masiwang flows, but along the S and greater part the hills rise a short distance inland. About 12 miles S of Tanjung Ilor is a 516m summit which is more or less conspicuous. Gunung Selagor, a somewhat detached mountain 793m high, is 18.5 miles S of Tanjung Ilor and is particularly conspicuous when seen from E. Of the group of mountains 3.5 miles farther SSE, **Suru** (3°46'S., 130°46'E.) is 723m high and has a steep E side, and **Tunlean** (3°47'S., 130°46'E.) is 689m high and has a very steep side.

3.33 The bight between **Tanjung Masiwang** (3°27'S., 130°50'E.) and **Tanjung Danama** (3°35'S., 130°53'E.), 3.25 and 11.5 miles respectively, S of Tanjung Ilor, has many dangers inside the 20m curve. A reef, Karang Ulin, is within the 20m curve and lies 0.75 mile E of Tanjung Masiwang. Pulau Akat, low and covered with coconut trees, and a large tree near the shore at the middle of the bight are conspicuous from seaward. South of Pulau Akat, a channel leads to a limited anchorage off Kampung Air Kasar, where there are depths of 8m. A boat pier, with a depth of 2.4m, is at Kampung Air Kasar.

With the exception of a 3.9m patch 1 mile S of Tanjung Danama, the coast S of that point is clear and steep-to as far as the bight at **Kampung Arnanan** (3°50'S., 130°49'E.), NW of the SE point of Seram. Two detached shoals with a least depth of 0.4m are in this bight. This coast is covered with coconut trees as far S as Tanjung Kopeng Watu, the only rocky point on this stretch; S of this point are mangroves. Only temporary anchorage can be found along this coast during the Northwest Monsoon, and the depths are great. Except in the bight at Kampung Arnanan, where anchorage is also possible during the East Monsoon, one cannot escape the currents.

At **Kampung Kilgah** (3°38'S., 130°52'E.), 2 miles S of Tanjung Danama there is a small inlet in the drying shore reef which has depths of 10.9m and can be used by boats. Between this village and Tanjung Kopeng Watu there is no coastal reef, but sloping sandy beaches are found at several places.

Pulau Madorang (3°39'S., 131°04'E.), a small islet 11.5 miles ESE of Tanjung Danama, is on the SW side of a drying reef which has very steep sides, but is on a bank with less than 183m. The islet is low but is covered with fairly tall trees.

There are no other dangers in the vicinity.

The E part of the S coast of Seram will be described beginning in paragraph 3.47.

Ambon Island and the Uliasers

3.34 Ambon Island and three islands, Pulau Haruku (Haroekoe), Pulau Saparua (Saparoea), and Nusa Laut (Noesa Laoet), collectively known as the Uliasers, are separated from Seram by Selat Ceram. They are all high and hilly and when seen from S appear as part of Seram. The passage between the islands and Seram is safe, but a wide berth should be given to the S side because of the reefs that project from Pulau Saparua and Pulau Haruku. These islands are mountainous and earthquakes occur, although no volcanic eruptions have been known. The most recent earthquake occurred in 1950; the previous one in 1898 caused great devastation in the port of Ambon.

Ambon Island

3.35 Ambon Island (3°37'S., 128°10'E.), the westernmost and largest of the group, is almost divided into two parts, the Hitoe Peninsula and the Laitimor Peninsula, which are connected only by a low sandy isthmus.

The Hitoe Peninsula, the N part, is the largest. **Salahutu** (3°33'S., 128°15'E.), a 1,060m double-topped peak, is at the NE end of the Hitoe Peninsula and is the highest and most conspicuous point. Numerous spurs with lower tops extend from this peak; the most conspicuous is **Setan** (3°31'S., 128°14'E.) near the N coast which rises to a sharp point, 564m high. At the SE end and entirely separated from Salahutu are three very conspicuous peaks of which Huwe, 368m high, is the highest. On the W side of the Hitoe Peninsula are many peaks, but because of their similarity in shape and height they are not easily distinguished from each other.

The Laitimor Peninsula, the S part of Ambon Island, is not as high as the N part. **Horiel** (3°43'S., 128°14'E.), the highest point, is 581m high and has a fairly flat top. Suwal (Soewal), 5.25 miles farther to the SW, is 344m high and is conspicuous because of a group of trees on its summit.

Ambon Island gives a good radar return at a distance of 27 miles.

Teluk Ambon (Baai van Amboina) (3°43'S., 128°07'E.) is a large inlet, lying between the two peninsulas of Ambon described above. The entrance, open to the SW, is between Tanjung Alang and Tanjung Nusanive.

Tanjung Alang (3°46'S., 128°00'E.), the W entrance point of Teluk Ambon, rises steeply out of the water and can be approached close-to. The point is reported to be a good radar target up to a distance of 22 miles. A white cross is reported to be conspicuous at the village of Lilibooi, about 1.5 miles NE of Tanjung Alang.

3.36 Tanjung Nusanive (3°47'S., 128°05'E.), the E entrance point of Teluk Ambon, lies about 6 miles E of Tanjung Alang. The point also rises steeply out of the water and can be approached close-to. A light, from which a radiobeacon transmits, is shown from a white metal framework tower about 0.5 mile NE of the point. A radio mast stands on the 463m high summit 6 miles NE of Tanjung Nusanive. An airfield, with a white memorial monument at its NW end, lies on the N shore of Teluk Ambon, about 4.5 miles N of Tanjung Nusanive. A light is shown from a white metal framework tower on Tanjung Sikoela, about 1.25 miles SSW of the monument.

Teluk Ambon is very deep and, except for the upper end and the inner bay, the bottom is steep, so that anchorage can only be found close to the shore. The bay provides good shelter during both monsoons. An area off the SE side of the outer bay has been swept to depths of 18 and 15m; an area off the NW side has been swept to a depth of 15m.

Tides—Currents.—During the Northwest Monsoon, a moderate current will generally be encountered close to Tanjung Alang; it sets to the N and follows the coast around to the

N. A current may occasionally set out of the bay. Eddies occur around Tanjung Nusanive; a strong current may be encountered along the coast to the E.

3.37 **Ambon Roads** (3°42'S., 128°10'E.), off the town of Ambon (Amboina) on the SE side of Teluk Ambon and about 7.5 miles NE of Tanjung Nusanive, affords anchorage for vessels not exceeding 75m in length, in a depth of 46m, off **New Victoria Fort** (3°41.3'S., 128°10.8'E.). The best anchorage in the roadstead, however, is reported to be off the **Coaling Wharf** (3°42.0'S., 128°09.7'E.) in depths of 50m.

Pilotage.—Pilotage is compulsory. The pilot boards about 1 mile W of Joos Sudarso Pier. The pilot boat is stationed in Teluk Ambon and can be requested by radio or by displaying the International Code Flag G. A doctor boards with the pilot. Radio pratique cannot be obtained. Tugs are available.

The limits of the roadstead are a line drawn in a 236° direction from **Tanjung Batu Merah** (3°41'S., 128°11'E.) and the meridian 128°09'35"E.

Vessels are not permitted to enter or leave harbor between sunset and sunrise without permission of the local Naval Control Officer.

Signals.—Berthing and tidal signals are displayed from the flagstaff on **Joos Sudarso Pier** (3°41.6'S., 128°10.4'E.), as follows:

1. The signal DB—Vessel should proceed to the anchorage.
2. The signal A plus the third substitute—Vessel may proceed to Joos Surdarso Pier.
3. The signal B plus the third substitute—Vessel may proceed to the Coaling Wharf.
4. The signal C plus the third substitute—Vessel may proceed to Digul Pier.

The following tidal signals are also displayed from the same flagstaff:

Ambon Roads—Tidal Signals	
Signal	**Meaning**
Red flag (or white over red light)	Flood tide
Blue flag (or red over white light)	Ebb tide
White flag (or white light)	Slack water

Storm signals are also displayed from the signal mast.

A light is shown from a position about 0.9 mile SW of the signal mast.

Ambon (Ambonia) (3°41'S., 128°10'E.)

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3.38 The town of Ambon lies 7.5 miles NE of Tanjung Nusanive, on the SE side of Teluk Ambon. The town is identifiable by a mosque with a cupola, not visible from all directions, standing 0.25 mile SE of **Joos Sudarso Pier** (3°41.5'S., 128°10.4'E.); a prominent landmark is the mosque in the village of Batu Merah, 1 mile NE. the main exports are spices and copra; the main imports are cloth, ironware, canned goods, and timber.

Port of Ambon

http://www.portina4.go.id/ambon.htm

Winds—Weather.—During the Southeast Monsoon (May to September), sudden squalls are sometimes experienced; sea or swell is often considerable. The working of cargo is rarely affected except by heavy rains occasionally. The wettest months are May, June, and July.

From November to January, prevailing winds are from the E; from May to August, prevailing winds are from the W.

Tides—Currents.—At Ambon Roads the highest water level occurs in April or May, and in October or November, and the lowest in June and December. The maximum rise and fall of tide that can be expected are, respectively, 0.9m above and 1.0m below mean sea level. A current, setting in a SW or NE direction, may be experienced in the roads and at the piers; the direction and velocity, which seldom exceeds 1 knot, apparently depend on the wind. Because eddies are occasionally observed near the piers, the currents in the roads are not indicative of what to expect at the piers.

Aspect.—Joos Sudarso Pier, well protected by large rubber fenders, has a frontage of 450m; a vessel with a maximum length of 187m, a beam of 35m, and a draft of 12m can berth here. Berth designations are given by the distance measured from the SW corner of the pier. Vessels should have all anchors ready to be used when coming alongside.

Gudand Arang Wharf (Pertamina), a concrete and wooden jetty, 0.75 mile SW of Joos Sudarso Pier, is 65m long, with a maximum depth of 5m at HWS; it is used by tankers. Vessels lie quietly here even with a considerable sea and swell in the bay. The wharf is connected by pipeline to three tanks a short distance S and is the main refuelling wharf; vessels up to 10,000 dwt, with a draft of 8m, use the facility. General cargo is handled. An extension WNW was under construction.

There is a port medical center and five hospitals. Deratting and deratting exemption certificates can be issued.

Directions.—A vessel approaching Ambon in the rainy season, with reduced visibility, will find it difficult to identify its features. Approaching from W, the high land in the vicinity of Tanjung Alang will be distinguished first. Coming from S or just E of Tanjung Nusanive, the light-green hill **Kapal** (3°47'S., 128°06'E.), 230m high and about 1.5 miles NE of the point, will appear as an islet in front of the high land of the NW shore of the bay.

It is recommended to approach the anchorage with the anchor lowered and with 46 to 55m of cable out.

Caution.—An obstruction lies 0.25 mile NNW of Joos Sudarso Pier. Piles uncovering at LW lie abreast from New Victoria Fort.

Ambon Inner Harbor and its approaches, E of a line bearing 335° from **Kampung Batu Merah** (3°41'S., 128°11'E.), are closed to navigation.

The inner bay is entered by a narrow channel swept to depths of 7.9m and 7.0m over a least width of 137m. The inner bay is swept over a large area to a depth of 10.3m. Several villages are on the shores of the inner bay.

Lighted beacons stand 91m E and 0.3 mile SW of **Tanjung Martafons** (3°39'S., 128°12'E.).

Irian Wharf, a T-headed concrete pier 152m long with a depth of 11m alongside, which is used by the Indonesian Navy, is on the S shore of the inner bay 0.75 mile ENE of Tanjung Martafons.

3.39 South coast of the Laitimor Peninsula.—The S coast of the Laitimor Peninsula is practically unapproachable during the Southeast Monsoon. Teluk Seri is about 5 miles E of Tanjung Nusanive. The small bight in front of Kampung Seri is clear, but the bottom is too steep for anchoring. There is no anchorage along the shore E of Teluk Seri. A conspicuous house with a light-colored roof is at Kampung Hutumuri, a village 13 miles ENE of Tanjung Nusanive.

Teluk Baguala (3°39'S., 128°17'E.), on the NE side of the Laitimor Peninsula, is only safe as an anchorage during the Northwest Monsoon. A shoal, with a least depth of 2.1m, is at the middle of the entrance, and other dangers are near the NE side of the entrance. The SW part of the entrance is clear. At the head of the bay and on the E side of the isthmus separating this bay from Ambon is the village of Kampung Paso.

Caution.—Teluk Seri and Teluk Baguala are still regarded as dangerous due to mines laid during 1941-1945. Due to the lapse of time, the risk in this area to surface navigation is now considered no more dangerous than the ordinary risks of navigation, but a real risk exists with regard to anchoring, fishing, or any form of submarine or seabed activity.

See Pub. 120, Sailing Directions (Planning Guide) Pacific Ocean and Southeast Asia, for danger areas and locations of swept channels in Teluk Seri and Teluk Baguala.

3.40 West coast of the Hitoe Peninsula.—The W and N coasts of the Hitoe Peninsula can be approached close-to as far as depths are concerned. The W coast is more rocky than the N coast. Between Tanjung Alang and **Tanjung Wairole** (3°41'S., 127°55'E.), the W extremity of the island, about 7.5 miles to the NW, anchorage may be found, in 70m, close to the shore, but there is no shelter during either monsoon and the currents are strong. The Nusa Telu Islands (Noesa Teloe Islands), including the small islets of Nusa Lain, Nusa Hatala, and Nusa Ela, are off Tanjung Wairole; they are separated from that point and from each other by deep channels. These channels should not be used due to their narrowness and the sometimes strong currents.

3.41 North coast of Ambon.—More suitable places for anchorage are found on the N coast than on the W coast, even though the bottom is steep and the currents strong. Safe anchorage during both monsoons can be found off **Kampung Said** (3°35'S., 128°02'E.), 9 miles NE of Tanjung Wairole and close E of low Tanjung Hulung (Hoeloeng). In the roads the bottom consists of sand and stones and the depths decrease gradually to the shore, but outside the roads the bottom drops off steeply. A reef E of the road is usually marked by discoloration. The recommended anchorage is in 29 to 50m, with a conspicuous stairway with low gray pillars bearing S and Nusa Ela in behind Tanjung Hulung. This anchorage is out of the currents.

There are no suitable anchorages W of Kampung Said nor E as far as **Kampung Hila** (3°35'S., 128°05'E.), but then E along the coast to **Kampung Hitu Lama** (Hitoe Lama) (3°35'S., 128°10'E.) there are several anchorages, in 79 to 90m. To anchor at Kampung Hitu Lama, steer for the mosque on a 145° bearing until such depths are reached.

The only other possible anchorage is in front of **Kampung Liang** (3°30'S., 128°19'E.) which lies in the bight just W of Tanjung Honimua (Metiela), the NE point of the island. A reef extends from this last point. Vessels anchoring at Kampung Liang should steer for the mosque, bearing S, until depths of 70 to 90m are reached.

3.42 East coast of Ambon.—A large bight with **Batu Duear** (Batoe Itam) (3°32'S., 128°21'E.) and **Batu Lompa** (3°35'S., 128°21'E.), two large rock formations, as its entrance points is on the E coast of Ambon.

Caution.—See Pub. 120, Sailing Directions (Planning Guide) Pacific Ocean and Southeast Asia, for danger areas off **Kampung Waai** (3°34'S., 128°19'E.). This area is still regarded as dangerous due to mines laid during the war of 1941-45.

Selat Horuku

3.43 Selat Horuku (Selat Haroekoe) (3°35'S., 128°23'E.), between the island of Ambon and Pulau Horuku (Haroekoe), is easily navigated even at night. The most prominent features are the large rock formations, Batu Duear and Batu Lompa, previously mentioned in paragraph 3.42, and a group of trees on the 333m mountain about 3.25 miles NNE of Tanjung Batu Kapal on the Pulau Horuku side. In the middle of the N entrance to the strait, Nusu Pombo is on a large drying reef. The channel W of this reef is preferred because a drying shoal patch is 1.5 miles ENE of Nusa Pombo.

Tides—Currents.—For tidal information, see Ambon Roads, previously described in paragraph 3.37. The currents in Selat Horuku are tidal and set in a N or S direction with a maximum velocity of 1.5 knots. The currents are strongest near Tanjung Batu Kapal, the SW point of Pulau Horuku, and here as well as on both sides of the reef at Nusa Pombo, tide rips may be seen.

Pulau Horuku

3.44 Pulau Horuku (Haroekoe) (3°34'S., 128°30'E.), E of the island of Ambon, is a hilly island which rises to a height of 601m at **Huruano** (3°35'S., 128°30'E.), the highest peak which is near the middle of the island. This peak has a rounded shape when seen from E or SE, and a conical shape when seen from the N and NW. The S coast is very steep where the mountain range from this peak extends to it. At Tanjung Waisu (Waisoi) Besar, near the middle of the S coast, are two conspicuous conical hills, and to the W is a high plateau. Close to Tanjung Batu Kapal, the SW point, is a high and wooded rock with the same name.

A light is shown on the NW coast of Pulau Horuku. About 7 miles to the SW, on Ambon, a light is shown at Waai from an elevation of 14m.

Anchorage.—Anchorage is available at Kampung Horuku, 2 miles NE of Tanjung Batu Kapal, in 50m, with the conspicuous high roof of the church bearing 100°.

Off Kampung Kabau, 3.25 miles farther N, there is a detached reef near the edge of which there is anchorage, in 50m, with the southernmost of three mosques bearing 169°.

On the N coast there is anchorage, in 50 to 61m, off Kampung Pelauw with the mosque in range with the summit of Huruano bearing 159°.

On the E coast, temporary anchorage is available, in a depth of 28m, abreast of **Kampung Hulaliu** (3°33'S., 128°33'E.).

Teluk Aboru (Aboroe) (3°36'S., 128°31'E.), on the S coast about 1 mile NE of Tanjung Waisu Besar, affords anchorage, in 29 to 70m, with a white house bearing 332°. This anchorage is not safe during the Southeast Monsoon. Off Kampung Wasu and Kampung Oma, farther to the W, the water is too deep for anchorage.

Selat Saparua

3.45 Selat Saparua (Saparoea) (3°35'S., 128°35'E.), between Pulau Haruku and Pulau Saparua (Saparoea) is less than 0.5 mile wide in its narrowest part. It is easily navigated by day, but its use by night is not recommended. A mid-channel course should be maintained through the passage. The shore reefs on either side of the narrow section is well marked by discoloration.

Tides—Currents.—The currents in the strait are tidal and set in a NW and SE direction with a maximum velocity of 3 knots. Tide rips have been observed in the bight NW of the narrows.

Pulau Molana (3°38'S., 128°36'E.), S of Teluk Saparua, is an uninhabited island 176m high. The sea bottom around it is too steep to afford anchorage and there are currents near it.

Pulau Saparua

3.46 Pulau Saparua (3°33'S., 128°40'E.) is hilly and has a more or less conspicuous gap across its narrowest part between the two large bays in its coast. The higher hills are very similar in shape, round or conical. Takuku (3°34'S., 128°37'E.), near the W coast, is the highest and rises to a height of 360m. Booi, the 324m hill near Tanjung Booi, the SW point of the island, is particularly conspicuous. A small rocky islet is near this last point. Generally the coast is rocky, except in Teluk Tuhaha (Toehaha), the large bay on the N side, where the land is flat.

Anchorage.—Teluk Haria (3°35'S., 128°37'E.), an inlet on the W coast, affords anchorage, but a few rollers may be experienced during the Northwest Monsoon. The church at Kampung Porto, on the N shore of the bay, is an excellent mark.

In Teluk Tuhaha, the large bay on the N side of the island, anchorage can be found almost anywhere near the shore free from dangers. A shore reef extends from the middle of the E shore and the N part of the W shore. A detached reef with two drying patches is off the latter shore. Vessels can anchor S of Kampung Nolot, near the NE point of the bay; N of here the currents are strong and variable. This end of the bay is thickly populated.

3.47 Saparua Roads (3°35'S., 128°40'E.) is at the head of the large bay on the S side of Pulau Saparua. Tanjung Ouw, the E entrance point, rises steeply to 50m. The W side of the bay is steep and has a narrow shore reef. The E side of the bay, NW of Kampung Ulat, has a broader shore reef and a shoal with a least depth of 31m is off of it. The middle of the bay is deep.

Vessels bound for the roads can steer 320° direct for the boat pier, which will lead clear of a 2.1m reef on the SW side of the bay. This reef is marked by a beacon. Large vessels can then anchor near the 20m curve. A white tomb on the W shore is a conspicuous mark. The roads are calm except during the Southeast Monsoon, when a swell may be experienced; communication with the shore, however, is never interrupted.

A light is shown from a flagstaff on the pier head; however, this light is not reliable.

Saparua (3°35'S., 128°40'E.) has a boat pier, with a depth of 0.3m alongside. Vessels call here regularly.

Nusa Laut (3°40'S., 128°47'E.), an islet 2.3 miles SE of Pulau Saparua, is separated from that island by a deep channel. Vessels using the channel should give the Pulau Saparau shore a berth of at least 0.33 mile and that of Nusa Laut of at least 0.55 mile. Nusa Laut rises to a height of 358m. A drying reef fringes the coasts.

Teluk Nalahia (3°38'S., 128°47'E.), a bay on the N side, affords the only anchorage in the island. Its shores are very hilly, and it is sheltered during both monsoons. Vessels entering the bay should steer 196° for a gap in the hills and anchor, in about 64m, abreast of the high round point on which Kampung Nalahia is located. The village is 40m above sea level and is reached by a steep road.

Seram—South Coast

3.48 Teluk Piru (Piroe Bay) (3°20'S., 128°10'E.), at the W end of the S side of Seram is a large bay, bounded on the W by the peninsula which terminates in Tanjung Sial and fronted on the S by the Ambon Islands. The passage N of these islands is deep and clear. Tanjung Sial is a sharp point with a drying rock 0.15 mile S of it. Because of a strong current in the vicinity, it is advisable to give the point a wide berth.

A mountain range extends over the entire length of the peninsula forming the W side of Teluk Piru. Its highest point is Sahua (Sahuai), a 1,059m peak 21.5 miles NNE of Tanjung Sial. The W shore of the bay is fringed by a narrow reef which is steep-to. **Tanjung Saala** (BatoeKapal) (3°22'S., 128°01'E.), 13.5 miles NE of Tanjung Sial, can be recognized by rock lying close of it.

Anchorage.—Anchorage can be found at many places along this shore. At **Kampung Luhu** (3°23'S., 127°58'E.) there is anchorage outside the detached reef, in 40m, sand with the mosque bearing 250°. Another mosque is at Kampung Iha close S but it has a pointed roof while the one at Kampung Luhu has a round tin roof.

3.49 Loki Roads (3°17'S., 128°04'E.), in a bight formed by the coast reef 5 miles NE of Tanjung Saala, affords anchorage near the boat pier, in a depth of 23m. When entering pass N of the reef marked by a beacon with a rectangle topmark in the middle of the roads. The village maybe recognized by a church near the beach. Vessels call here occasionally. The reef on the S side of the entrance is also marked by a beacon.

The inner part of Teluk Piru is entered either E or W of **Pulau Kasa** (3°18'S., 128°09'E.), a flat but well-wooded islet on a drying reef 5 miles E of Loki Roads. A light is shown from the

S end of the islet. **Pulau Babi** (3°13'S., 128°10'E.) is a 131m high islet close to the E entrance point of the inner part of the bay. South of this islet and the shore to the E of it is a string of reefs which dry when the water is at its lowest level. Tetu, a drying reef marked by discoloration with a 2.3m patch close S of it, lies 2.75 miles NW of Pulau Babi. Several reefs with drying patches are 4.25 miles NW of Babi; **Sasadau** (3°10'S., 128°06'E.), the northwesternmost is marked by an iron beacon with a white ball topmark. The reefs S of Pulau Babi are unmarked.

The points N of Pulau Babi are 61 to 152m high and are part of a group of hills, of which **Huhula** (3°12'S., 128°12'E.), 643m high, is the highest peak. North of these hills, a wide plain extends back from the E shore; this plain also runs back of the N shore, but is much narrower there. A reef extends from **Tanjung Sisi** (3°10'S., 128°10'E.), 3.5 miles N of Pulau Babi; a 5.5m shoal is close off **Tanjung Terua** (3°08'S., 128°11'E.), 5 miles NNE of Tanjung Babi.

Suitable anchorage may be found almost anywhere along the shores.

Tides—Currents.—The currents in the bay appear to be entirely dependent upon the winds and run in one side and out the other. A velocity of 1 knot has been reported in the vicinity of Pulau Kasa.

3.50 Piru Roads (3°04'S., 128°11'E.), at the head of Teluk Piru, is a small bight in the shore reef. The anchorage, described below, is in front of the entrance.

A reef that dries is a little less than 1 mile SSW of the pier at Piru. It is marked on the W side by a beacon with a white spherical topmark. A 9.1m shoal is about 0.2 mile WNW of the reef.

Approaching the roadstead, pass W of the 9.1m shoal and steer for the head of the pier on a bearing of 033° until 0.35 mile off it, then anchor, in 29m, off the reefs.

Piru (Piroe) (3°04'S., 128°11'E.) is on the shore abreast of the roads.

The bight NE of Pulau Kasa is not very much frequented. Along its N shore are several narrow inlets with drying reefs at their entrances. On the reef S of Teluk Latal, the westernmost and largest of these inlets, is a shoal which is always above water and on which a small tree stands. About 5 miles ENE of Tanjung Tutualmatwai (Toetoealmatwai), there is a conspicuous 412m hill with a single round-topped tree on it.

Temporary anchorage may be found at a few places close to the shore. The principal villages on the E shore are Kampung Waisamu, Kampung Hatusua, Kampung Kairatu, and Kampung Seruawan. A vessel reported to find good anchorage, in 37m, good sandy holding ground, just W of the mouth of the small river at Kampung Kairatu. A sandbar, dry at LW, fronts the shore near the stream.

Selat Ceram

3.51 Selat Ceram (3°28'S., 128°34'E.) is the wide and clear passage between Seram on the N, and Pulau Horuku and Pulau Saparua on the S. Because the points on both sides of the strait are conspicuous it can be easily navigated day or night. The N side is a low narrow plain with hills immediately behind it rising to a group of mountains, of which Gunung Toplana, a 1,346m peak, is the highest. Totaniwel, 1 mile SE of Toplana, is a conical peak 1,260m high. The current in the strait is not strong and usually runs to the W.

The only anchorage out of the current is in Teluk Tuhaha, on the N side of Pulau Saparua, and which has previously been described in paragraph 3.46. Although the bottom is very steep, anchorage may be found off the villages of **Kampung Seruawan** (3°26'S., 128°25'E.), **Kampung Tohulala** (Tihoelale) (3°27'S., 128°31'E.), and **Kampung Rumakai** (Roemakan) (3°27'S., 128°32'E.), on the Seram side of the strait. The bottom is steep and a 0.9m shoal is off the latter village.

Seram—South Coast (Continued)

3.52 Teluk Elpaputih (Elpapoetih) (3°17'S., 128°51'E.) is nearly 15 miles wide between its two entrance points Tanjung Latu (3°25'S., 128°42'E.) and **Tanjung Ailusiha** (3°21'S., 128°56'E.). Both of these points are low, but the latter has a conspicuous group of tall trees on it; a low tongue of land ending in Tanjung Kuako extends NW from it. The mountains and hills are rather close to the W shore. Here Pohon Batu, a 383m summit with a small distinctive tree on the SW side of a wide ridge and Batu Mani, a 652m table mountain 6 miles farther N, are most conspicuous. The inner end and E side of the bay are bordered by an alluvial plain covered with bamboo trees. Hot springs are found in many places around the bay. Earth tremors occur frequently.

Tides—Currents.—In front of the bay and along the coast to the E, a monsoon drift will be experienced, although it is not as strong as out in the open part of the Banda Sea. A countercurrent may be running along the coast.

Anchorage.—In general, the bottom is too steep in front of the villages to serve as anchorage. Exceptions to this are Teluk Meruru, an indentation at the W end of the bay, and off the villages of Kampung Makariki and Kampung Hururu (Hoeroeroe), on the E coast. A landing can usually be made during the Northwest Monsoon, but during the Southeast Monsoon the surf is generally so heavy that small-craft traffic between the villages is impossible. On the W shore, close NE of Pohon Batu, is a large settlement consisting of the villages of Kampung Paulohi, Kampung Mani, and **Kampung Samasuru** (3°16'S., 128°46'E.). At Kampung Waija, on the N shore, there is a coffee and cacao plantation which can be recognized by a tin roof.

3.53 Teluk Amahai (3°20'S., 128°55'E.), directly N of the E entrance point to Teluk Elpaputih, is formed by the tongue of land Tanjung Kuako. Although this point serves as a breakwater, the sea may be choppy occasionally. Other than that, and except for heavy afternoon showers that may come up during the Northwest Monsoon, the bay is sheltered. Reefs with depths less than 1.8m, extend up to 0.5 mile from the E shore. Between these reefs and the W shore there is anchorage in depths of 10.9 to 29m.

Two mooring buoys are about 0.5 mile SE of Tanjung Kuako.

3.54 Amahai (3°20'S., 128°55'E.), at the head of Teluk Amahai, is the residence of a government official. A pier for boats, with a depth of 2.4m alongside, extends from the shore

abreast the village; the pier was reported in ruins. A light is shown from the root of the pier and a flagstaff is close S.

Between Teluk Elapaputih and Teluk Teluti, about 39 miles E, the land along the coast becomes much higher to the E, but there are no conspicuous summits. A conspicuous tree stands on a 202m elevation 8.5 miles E of Tanjung Ailusha and 2.5 miles farther E is a conspicuous mosque in the village of **Kampung Sepa** (3°21'S., 129°07'E.), NW of Tanjung Oepa. Between **Kampung Tamilaoe** (3°23'S., 129°12'E.), 4.5 miles E of Tanjung Upa, and the W point of Teluk Teluti, the coast is fronted by many reefs; some of which, at the E end of this stretch, dry at LW. There is a heavy surf on this coast during the Southeast Monsoon. This surf, in conjunction with the earth tremors, causes portions of the foreshore to break away.

Teluk Teluti (Teluk Taluti) (3°24'S., 129°45'E.) is about 24.5 miles wide between its two entrance points **Tanjung Seitu** (Seitoe) (3°26'S., 129°34'E.) and **Tanjung Mataia** (3°26'S., 129°58'E.). The former is low, but the land behind it rises steeply; the latter is also low and has a plain in back of it. High mountains surround the bay.

Waja, 790m high, is the highest summit of the wide and steep tongue of land forming the W side of the bay. Gunung Binaija, a 3,055m peak and the highest part of Seram, is NW of the bay. Pegunungan Manusela (Manoesela), a range of mountains on the N part of the bay, form a range extending E from Gunung Binaija. In contrast to the W side, the N side has a low narrow coastal plain which becomes wider in the valley of the river, **Wai Bobot** (3°23'S., 129°58'E.), on the E side.

Anchorage.—The principal villages in the bay are Kampung Tehoru (Tehoea), Kampung Wolu (Woloe), Kampung Laimu (Laimoe), and Kampung Bemu (Bemoe). Anchorage can be found in several places close to the shore. Kampung Tehua is not approachable during the Southeast Monsoon. The wide rivers such as Wai Lau, Wai Kaba, and Wai Bobot can be navigated only by small craft for short distances above the mouth.

3.55 Tehoru Roads (3°22'S., 129°32'E.), on the W side of the bay, is a suitable anchorage during the Northwest Monsoon, but less so during the Southeast Monsoon. Anchorage can be found, in a depth of 20.1m, over sand and mud, with the flag pole bearing 140° and 0.15 mile distant. There is also anchorage about 183m offshore, with a stern line to the beach and the mosque bearing about 135°.

Between Teluk Teluti and **Tanjung Undur** (Oendoer) (3°47'S., 130°36'E.), about 44 miles E, the mountains and hills are not very conspicuous. Exceptions are Watu Lus (Watoe Loes), 506m high, and the double top of Oson, 853m high, which is back of Watu Lus and 19.5 miles ESE of Tanjung Mataia. East of Tanjung Undur, the mountains are more conspicuous. The westernmost and one of the highest of the group is 723m high and is visible for a great distance to the S and SW; its sides are partly bare. When seen from the W, it appears to have a flat top. The other mountains of this group are well wooded.

Detached shoals become more numerous and the drying shore reef becomes more apparent toward the SE point of Seram.

Tides—Currents.—There is little or no current close to the coast, but further outside the monsoon drift will be encountered, although it is weaker than that farther out in the Banda Sea.

Anchorage.—There are many bights along this coast. The villages can be located by the coconut plantations near them. During the West Monsoon and the turning periods, anchorage can be found almost anywhere. Reefs can only be distinguished at a short distance by discoloration.

3.56 Kisalaut Roads (Kisalaoet Roads) (3°36'S., 130°19'E.), 24 miles SE of Tanjung Mataia, affords anchorage, in 16.4m, sand, abreast of the village.

Near Tanjung Ultotin, 2 miles farther E, there is temporary anchorage, in a depth of 16.4m, in the vicinity of a loading place for lumber. Vessels call here occasionally.

Kilmuri Roads (Kilmoeri Roads) (3°40'S., 130°27'E.), about 2 miles NW of the village of the same name and 6.5 miles SE of Tanjung Ultotin, affords anchorage, in depths of 10 to 20.1m, sand, between the shore and two reefs with depths of 1.2 and 3.9m. On the shore abreast of the roads in the village of Selor.

Undur Roads (3°47'S., 130°36'E.), NW of the point of the same name, affords anchorage, in 35m, between the shore and a 6.7m shoal.

Teri (3°47'S., 130°43'E.), 722m high and standing 7 miles E of Tanjung Undur, is a steep dome with partly barren sides. From W it appears as a flat summit; from E the E side appears highest. It can be identified from a great distance. Suru and Tunlean, two peaks located E of Tori, have been previously described in paragraph 3.32.

3.57 Pulau Gofa (3°50'S., 130°43'E.), a small low islet covered with coconut trees and 7.5 miles SE of Tanjung Undur, has anchorage to the E, in 20.1m. To approach this anchorage, steer for Teri on a 354° bearing until Pulau Gofa is abeam. Smaller vessels can then proceed more to the E and anchor between Tanjung Aran and a 6.7m shoal 1 mile S of it. Local knowledge is necessary. During the Northwest Monsoon, anchorage may be obtained in most places off this coast; the reefs are marked by discoloration and can be seen from a short distance.

Kampung Guli Guli (Goeli Goeli), on the coast 3.5 miles E of Pulau Gofa, can be reached by small craft through a channel in the drying reef.

The SE point of Seram is a low marshy peninsula with many creeks and it is surrounded by a wide drying reef. The point is more easily identified by the string of reefs and islands extending E from it than by the mountains to the NW. Four channels lead in a N-S direction through these reefs.

Islands Southeast of Seram

3.58 Tides—Currents.—Strong tidal currents, which may attain a velocity of 3 knots at springs, run through the above channels. They set S with the ebb and N with the flood. At Geser it has been noted that the S currents set in 2 hours after HW at full and new moon, and 1 hour after HW at quarter points. In Selat Kefing they are accompanied by tide rips which render navigation difficult. Winds blowing in the opposite direction to the current sometimes cause a heavy sea. At the E end of the string of reefs and on the N side of Kepulauan Gor-

ong, the currents are strong and variable and cause violent tide rips. In the strait between the reefs and the westernmost of Kepulauan Gorong it was noticed that the current set diagonally across toward the reefs on a rising tide.

Pulau Seram Rei (Pulau Ceram Rei) (3°52'S., 130°51'E.), on a drying reef extending E from the SE point of Seram, is a small low island covered with tall trees and surrounded by a white sandy beach which is submerged at HW. There are also several trees on the drying reef between this island and the SE point of Seram.

Geser (3°53'S., 130°54'E.), a small flat island on a drying reef 1.6 mile E of Pulau Seram Rei, is covered with trees. It is separated from the other reefs by two straits, Selat Kefing on the W side and Selat Kilwaru (Kilwaroe) on the E side.

A 9.1m shoal is on the W side of the S entrance to Selat Kefing; a 7m shoal is on the W side, 0.85 mile SW of the S end of Geser.

Caution.—See Pub. 120, Sailing Directions (Planning Guide) Pacific Ocean and Southeast Asia, for danger area and swept channel information in Selat Kilwaru.

3.59 Geser Roads (3°53'S., 130°54'E.), in Selat Kilwaru on the E side of Geser island, affords anchorage abreast the boat pier, in about 9.1m. It is inadvisable for more than one vessel to anchor in the roads at the same time. The holding ground is not good because the bottom is smooth stones. A choppy sea may be experienced when the wind and the current are in opposition. When the currents are strong and the sea is rough better anchorage may be found in the N entrance to the strait.

Selat Kilwaru is marked by beacons; those on the W side of the channel are black and those on the E are white.

The E side of Selat Kefingis marked by a beacon with a square topmark close N of the N end of the drying reef on which Geser is located and by another beacon with a truncated cone topmark on the SW edge of the same reef.

Tides—Currents.—At Geser, the lowest LWlevel occurs in June or July and in December or January. The maximum rise and fall of tide that can be expected are, respectively, about 0.7m above and 1.2m below mean sea level.

Current signals are occasionally shown from the mast at the head of the boat pier at Geser. A red flag indicates N current, a white flag slack water, and a blue flag a S current.

Directions.—Because it is not desirable to anchor with the current setting in the same direction that the vessel is heading, it is advisable to enter Selat Kilwaru against the current.

When coming from the S steer for the conspicuous summit of Pulau Seram Laut on a 056° bearing until the S beacon on **Pulau Kilwaru** (3°53'S., 130°54'E.), a low island about 0.5 mile ENE of Pulau Geser, is bearing about 020° (this beacon is reported difficult to identify sometimes), then alter course northward and be guided by the beacons to the anchorage.

When coming from N, stand in for Selat Kefing until the NE point of Pulau Geser is in range with the SW side of Pulau Seram Laut, then steer for Selat Kilwaru and proceed to anchor with the aid of the beacons.

The beacon, topmarked with a black truncated cone, on the NE end of the reef extending from Pulau Geser is very difficult to see when approaching from E.

3.60 Geser (3°53'S., 130°54'E.) is on the island of the same name. The village is on both sides of a lagoon, the entrance of which is crossed by a bridge. A pier is on the N side of the entrance to the lagoon and there is a 75m long stone mole on the N side of the village. A government official has headquarters here. Forest produce and copra are exported. A light is shown from a flagpole on the outer end of the pier when vessels are expected.

Pulau Seram Laut (Pulau Ceram Laoet) (3°53'S., 130°26'E.), the largest island on the string of reefs extending 22 miles E of the SE end of Seram, is rocky and largely covered with coconut trees. In the middle it is about 90m high. Kilwaru and Marlau, islands off the NW side and E end, respectively, are both low. Of the other islets on the reef to the E, Kifar, Kidang, Nukus, Grogus, and Pulau Koon are the largest and are covered with coconut trees. The remainder are mainly small wooded rocky formations. There are passages through the reefs 1 and 7 miles E of Pulau Seram Laut, but these are not marked with navigational aids and are not recommended.

Kepulauan Gorong

3.61 Kepulauan Gorong (4°03'S., 131°20'E.), a group of islands 22.5 to 38 miles ESE of the SE point of Seram, consists of Pulau Panjang, Pulau Manawoka, and Pulau Gorong. The first two are connected by a bank of soundings of less than 183m, but a deep-sea passage separates these two from Pulau Gorong. There are no detached dangers far beyond the fringing reef, except on both sides of the N part of Pulau Gorong where they extend up to 1 mile off. Valuable woods are cultivated on all of these islands and praus are built. Natives are engaged in coconut and sago culture and fishing.

Tides—Currents.—Currents have been observed to set N with a rising tide and S with a falling tide. South of Pulau Manawoka the latter current draws to the SSW, so that it sets across the strait between Kepulauan Gorong and Kepulauan Watubela to the S. At full moon, it may attain a velocity of 2.5 knots. Strong tide rips occur in places.

3.62 Pulau Panjang (Pulau Pandjang) (4°01'S., 131°14'E.), the NW island, is lower than the other two, rising to a height of 100m. The villages are small and in places built on poles on the reefs. The coastline on the S and SW side is rocky but has several short sandy beaches. The S part of the E side is covered with mangrove trees. The entire island is heavily wooded and there are some scattered coconut plantations. There is no anchorage near this island. The passage between Pulau Panjang and Pulau Koon, to the N, is clear of dangers, but there are violent currents and cross currents setting toward the Pulau Koon reef on the flood.

Pulau Manawoka (4°07'S., 131°20'E.), SE of Pulau Panjang, is the highest mountain in the group and rises to a height of 359m in Lololi, which resembles a table mountain but is more pointed when seen from N or S. The coast is alternately low and rocky. The W coast is almost uninhabited, but on the E coast there are several villages with large coconut plantations. Tidal currents set SSW with the falling tide S of the island at a rate of 2.5 knots at springs.

Amar Roads (4°05'S., 131°19'E.), on the NW side of Pulau Manawoka, affords suitable anchorage on or near the 11.9m bank N of the village, but the anchorage is not favorable at the height of the monsoons, especially the North Monsoon, when a heavy sea may be experienced. Landing is difficult at that time. The village and its flagpole are hard to distinguish, but on the approach of a vessel the national flag is hoisted. On the drying reef E of the flagpole there are some large rocks which are covered only at the highest HW level.

3.63 Pulau Gorong (4°01'S., 131°24'E.), the easternmost island of the group, has a range of hills ranging up to 321m high at **Watu Keliang** (4°00'S., 131°24'E.). Generally the coasts are low and covered with coconut plantations. Tanjung Assan, the NW point, is rocky; Tanjung Namalen, the NE point, is sandy.

Ondur Roads (4°00'S., 131°23'E.), on the W side of Pulau Gorong, has a shore which is fronted by reefs and shoals up to 0.5 mile offshore, however, a navigable channel, marked by beacons, leads in a NE direction to the village. An outer shoal on the N side of the channel has a depth of 3.9m. Larger vessels may find anchorage, in about 40m, in the outer part of this channel. Local knowledge is necessary.

Kailakat Roads (4°03'S., 131°26'E.), near the S end of the E side of Pulau Gorong, is in a small bay with a sandy bottom over which the depths decrease uniformly to the head. The bay can be recognized by a red bare spot close S of the rocky entrance point. The spot is easily identified from the N, NE, or SE. Entrance can be safely made on a 265° bearing on the white bridge over the mouth of the stream S of the southernmost mosque. A 16m shoal lies 0.8 mile ESE of the village of Kailakat. Local knowledge is necessary for anchoring in this area.

Kepulauan Banda

3.64 Kepulauan Banda (4°25'S., 129°55'E.), a group of islands about 65 miles SW of the SE end of Seram, are hilly and mountainous and separated from each other by deep passages. The only off-lying danger is Karang Saaru Arrungesi (Rif Van Rosengain), which is discussed in paragraph 3.70.

About June and September, the sea for several miles around assumes a milky white appearance, as though a thin mist covers the surface. This is attributed to masses of microscopic organisms which float near the surface of the water.

Earthquakes occur very often and violent eruptions of Vuuberg Volcano, on Pulau Gunung Api (Goenoeng Api), have been recorded.

Except for Pulau Suanggi, all of the islands are inhabited. The inhabitants engage in fishing and coconut and nutmeg cultivation.

Tides—Currents.—Because the Banda Sea is subject to monsoon drifts, strong currents will be encountered in the passages between the islands; their velocity depends on the width of the passage. In the narrower channels of the main group of islands tidal currents dominate. Current rips will also be encountered.

3.65 Pulau Suanggi (Soeanggi) (4°19'S., 129°42'E.), the NW island and most isolated from the group, is a large rock 107m high, with almost vertical bare sides and a wooded top. Except on the W side, a coastal reef fringes the shores. A light is shown from the summit of the island.

Pulau Run (Roen) (4°33'S., 129°41'E.), 13 miles S of Pulau Suanggi, is 203m high at Gandulang Hill and has a coastal reef on all sides. Except for the steep slope at the SW point, the S slope of Gandulang Hill, and Run Hill near the N point, the land rises gradually. The small low islet of Nailaka is on a drying reef extending from the N end of the island.

Pulau Run is a good radar target at a distance of 18 miles.

Anchorage.—The only anchorage near Pulau Run is in a depth of 70m in a bight of the coastal reef between Nailaka and the E point of Pulau Run. This anchorage, however, is good only during the West Monsoon.

3.66 Pulau Ai (4°32'S., 129°46'E.), 4.25 miles ENE of Pulau Run, is 145m high and is fringed by a drying reef on all sides. Generally, the island is steep, except for somewhat of a slope on the N side. When seen from a considerable distance it appears flat with the conspicuous and highest hill, Kota Perampuan, on the E side. The NE and NW points are high.

The sea bottom on the NE and S sides of the island are too steep for anchoring. On the W side, there is a small area where large vessels may find anchorage, in a depth of 68m, sand and stones. It can be approached with the NW point of the island bearing 060° until the S side bears 128°. **Kampung Ai** (4°31'S., 129°46'E.), with the old Fort Revenge in its W part, is on the N side of the island.

3.67 Pulau Banda Besar (Groot Banda) (4°33'S., 129°55'E.), 10 miles E of Pulau Run, is fairly high. A chain of hills and small mountains runs through the entire length of the island. Bandera, a 536m mountain is the highest point, but it is not very conspicuous. Peri, a 176m hill, is the highest elevation of the tongue of land extending from the E end of the N side of the island. Generally there is very little drying coastal reef except of the N side of the W half of the island. Most of the villages are on the N side. **Kampung Lontor** (4°33'S., 129°52'E.), at the NW part of the island is built on the slopes of an old crater. A stairway of about 200 steps leads from a landing place to the village. The bays on the S side of the island are too deep for anchoring, and landing is difficult because of breakers. The island is a good radar target at a distance of 27 miles.

Pulau Gunungapi (Goenoeng Api) (4°31'S., 129°52'E.), close N of the W end of Pulau Banda Besar, is separated from that island by Lontor Channel (Gat Van Lontor), which is constricted by the reef extending N from Pulau Banda Besar. The island is almost entirely the volcano, Vuurberg, which rises to a height of 656m and has a bare upper part. Clouds of smoke and fumes rise continuously from the two craters and from crevices in the sides. On the NE side of the island is a small peninsula formed by the steep **Uluweru Hill** (4°31'S., 129°53'E.), which is 94m high. Only the W side of the island is free of drying reefs. With due precautions, anchorage is available off the SW side of the island.

3.68 Pulau Naira (4°31'S., 129°54'E.), close E of Pulau Gunungapi, is not as hilly as the other islands but rises to 250m in Papenberg. It is separated from Pulau Gunungapi by Zonnegat, a channel whose N entrance is divided into two channels

by Kraka, an islet 26m high, where a light is shown from its N tip. The S entrance to Zonnegat is practically obstructed by a reef with greatest depths of 0.5 to 4.1m in a very narrow passage. Oostgat, the wide channel between Pulau Naira and Pisang, is deep and clear.

Pisang Islet (4°30'S., 129°56'E.), 66m high, is about 0.5 mile NNW of the N extremity of Pulau Banda Besar and is covered with coconut trees, except for a large conspicuous bare rock on its N point. **Batu Kapal** (4°29'S., 129°56'E.), a bare islet, is about 0.3 mile N of Pisang Islet. Passage between the two islets is not advised, but Selat Selamo, the passage between the N point of Pulau Banda Besar and Pisang Islet, is deep and clear of dangers, except for the 2.8m shoal extending 0.2 mile off the NW side of Tanjung Burang.

Pisang Islet has been reported to be a good radar target at a distance of 21 miles.

Tides—Currents.—Strong tidal currents set through the channels. In the roadstead S of Pulau Naira the current sets E during the flood and W with the ebb at the rate of up to 3 knots.

3.69 Naira Roads (4°32'S., 129°54'E.) consists of two parts, one S of Pulau Naira and the other in the S part of Zonnegat, on the W side of Pulau Naira, close NE of the SW extremity of the island. In the former, anchorage is available in any desired depth over a bottom of sand, coral, and stones. The roads in Zonnegat are rather deep for anchoring, therefore, it is best to moor at the Government Pier. Squalls which come down off Pulau Gunungapi make it advisable to moor with the bow to the N and an anchor laid out ahead.

Tides—Currents.—At Naira Roads, the lowest LW occurs in May or June and in November or December. The maximum rise and fall of tide that can be expected are, respectively, about 0.8m above and 1.3m below mean sea level.

Aspect.—A light is shown from a white metal framework tower at the head of the E pier when a vessel is expected or is in the roads S of Pulau Naira. Two lights are shown occasionally from the Government Pier in Zonnegat. A light is also shown on the NW point of Pulau Naira, 0.3 mile E of Kraka.

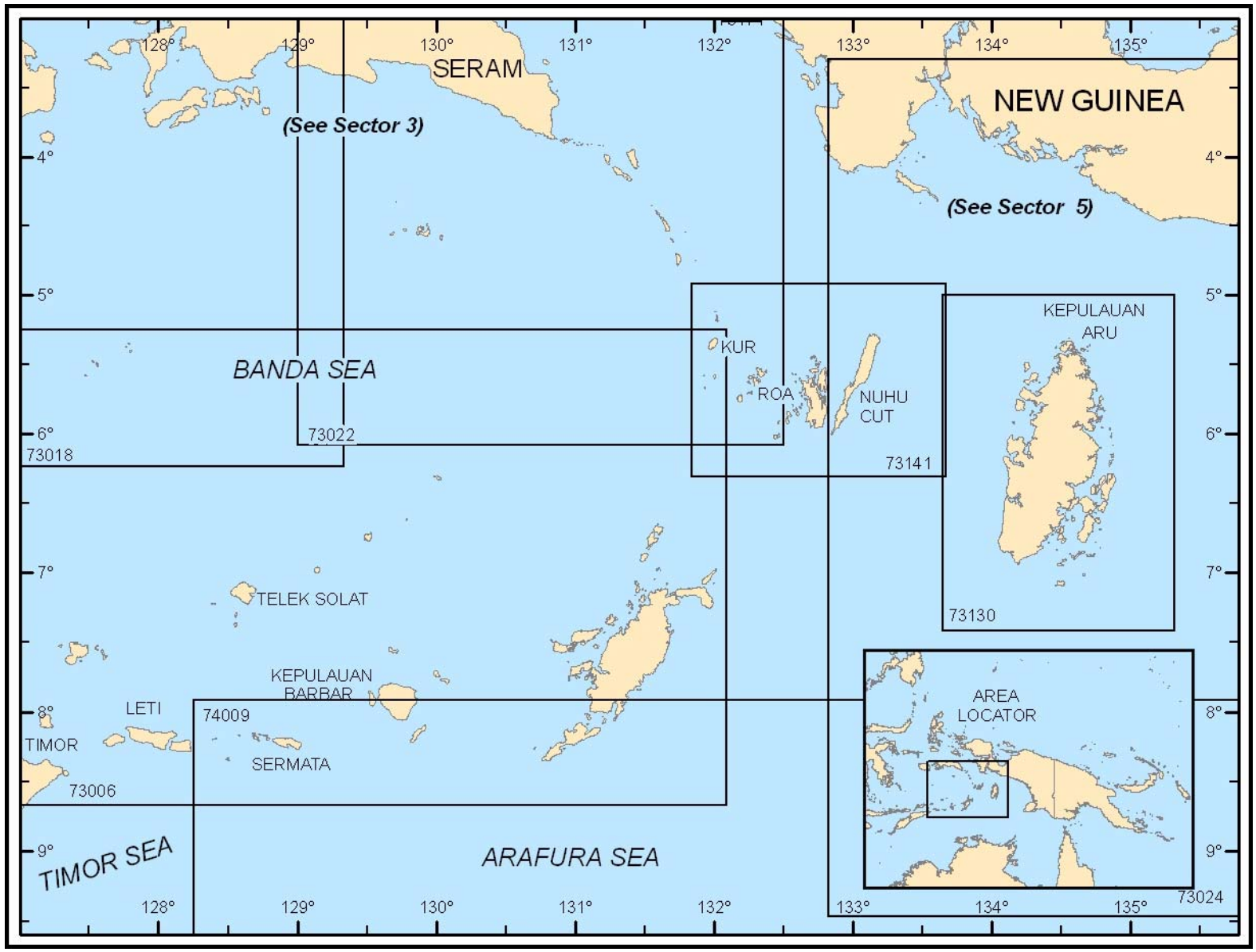
Directions.—The approach from the N to the roads S of Pulau Naira is clear and should present no difficulty. Vessels approaching from W by way of Lontor Channel (Gat Van Lontor) will find the passage rather narrow; the N side of this channel should be favored. There is a least depth of 7.8m in the fairway.

Vessels bound for the road in Zonnegat can pass either W or E of Kraka. To pass W of the islet, steer for a village on the W side of Naira 0.9 miles SE of Kraka, bearing 121° and open NE of Pulau Vera, the NE point of Gunungapi; this will lead over the bar SW of Kraka with a least depth of 11.9m. The shoals on the starboard hand are usually marked by discoloration. To pass E of Kraka Islet, bring the S end of the **Government Pier** (3°32'S., 129°53.5'E.) in range with Pulau Vera. This will lead in mid-channel through a least depth of 13.7m.

3.70 Kampung Naira (Bandanaira) (4°32'S., 129°54'E.) is on the SW side of Pulau Naira. There are two piers on drying reefs on the S side of Pulau Naira and a Government Pier on the Zonnegat side, with depths of 4.5 to 7.9m alongside. Vessels berth bow N using their port anchors. This pier is used by inter-island ferries. There are two old forts, Belgica and Nassau, in the village.

Pulau Rozengain (4°35'S., 130°02'E.), about 5 miles ESE of Pulau Banda Besar, is fringed by a drying shore reef marked by discoloration, except for a part on its SW side. It has two hills, of which Lari, the N one, is 171m high and wooded. Kota Batu Merah, the S one, is 170m high, bare, and conspicuous. Two large rocks are on the coastal reef, one on either side of Tanjung Pulu the NE point of the island. The only village on the island is near a small sandy beach on the N side. There is no anchorage near the island.

Karang Saaru Arrungesi (Rif Van Rozengain) (4°38'S., 130°03'E.), 2 miles SSE of Pulau Rozengain, dries about 0.9m at LW springs on its N part. It is always marked by heavy breakers. There is no anchorage in the vicinity.



Additional chart coverage may be found in NGA/DLIS Catalog of Maps, Charts, and Related Products (Unlimited Distribution).

SECTOR **4** — CHART INFORMATION

SECTOR 4

THE BANDA SEA AND OFF-LYING ISLANDS

Plan.—This sector describes the Banda Sea briefly, then Kepulauan Kai, Kepulauan Aru, Kepulauan Barbar, Kepulauan Tanimbar, and the smaller islands in their vicinity.

The Banda Sea

4.1 The Banda Sea is generally regarded as being within the area bounded as follows: on the N, the chain of islands extending SE from the E extremity of Sulawesi to and including Seram; on the E, the chain of islands between the SE end of Seram and Kepulauan Kai, then to Kepulauan Tanimbar; on the S, the chain of islands between Kepulauan Tanimbar and the NE part of Timor then by the chain of islands between this part of Timor and the E extremity of Flores; on the W, the chain of islands between the E extremity of Flores and the S end of Sulawesi and by the SE side of the latter island.

The islands of Kepulauan Banda would properly be included in the description of this sea, but for the sake of convenience they have been included with the islands adjacent to Seram and have been previously described beginning in paragraph 3.64. The islands of Kepulauan Tukanbesi and Timor and Wetar together with the islands W of them are described in Pub. 163, Sailing Directions (Enroute) Borneo, Jawa, Sulawesi, and Nusa Tenggara. Pulau Kisar and the islands E of Timor are described beginning in paragraph 4.70.

Tides—Currents.—Very little is known about currents in the open part of the Banda Sea, except that the winds set up perceptible surface movements. In the W part of the sea, S of Kepulauan Banggai and Kepulauan Sula, the current sets ESE at the rate of 0.8 knot to 2 knots during the Northwest Monsoon and sets NNW at a rate of 0.6 knot to 2 knots during the Southeast Monsoon. During both seasons, most of the flow is in the N part of the Banda Sea; in the S the rates are weak and the direction of the set is very variable.

Regulations.—For information regarding designated Archipelagic Sea Lanes, as defined by the United Nations Convention on the Law of the Sea (UNCLOS), passing through the Banda Sea, see the Indonesia section of Pub. 120, Sailing Directions (Planning Guide) Pacific Ocean and Southeast Asia.

Kepulauan Lucipara

4.2 **Kepulauan Lucipara** (5°29'S., 127°31'E.), in the central part of the Banda Sea about 110 miles SE of Buru Island, consists of four coral islands named Mai, Laponda, Kaurangka, and Selatan. These islands are on a reef about 5 miles long in a NW-SE direction.

Although the islands are uninhabited, turtle fishermen from Buru Island and Ambon frequent them during October, November, December, and sometimes April.

The islands are wooded and bearings can be taken at a distance of as much as 15 miles. The tallest trees, more than 30m high, are on Mai. The reef is so steep-to that there are no good places to anchor, but boats may be landed at several places on the lee side with a calm sea. Drinking water can be obtained from well on the NW side of Mai. The islands are a good radar target at a distance of 15 miles. Irregular currents and whirlpools have been observed close S and NW of the islands.

Caution.—The reefs surrounding Kepulauan Lucipara have extended considerably and caution should be observed when in the vicinity.

Beting Sekaro (Skaro Reef) (5°35'S., 127°28'E.), a reef about 6 miles SW of Kepulauan Lucipara, is separated from that group by a clear deep channel. The reef, about 3 miles long, has two white sand banks that cover only during exceptionally HW. A stranded wreck on the NE side of the reef was reported radar conspicuous.

Kepulauan Penyu

4.3 **Kepulauan Penyu** (Schildpad Islands) (5°23'S., 127°47'E.), about 15 miles ENE of Kepulauan Lucipara, consist of three low coral islands, Mai (not to be confused with the island of the same name in the nearby Kepulauan Lucipara group), Kadola, and Bingkoedoe. These islands are on a reef and are separated from each other by clear deep channels. Exercise caution when approaching these reefs because they have extended considerably. Because of their high trees the islands can be identified at a distance of 15 to 16 miles. The steep coral reefs that fringe these islands make anchorage impossible.

Pulau Manuk

4.4 **Pulau Manuk** (Manoek) (5°33'S., 130°18'E.), about 150 miles E of Kepulauan Penyu, is a cone-shaped volcanic island, 285m high, 1 mile long NNW-SSE and 0.5 mile wide. In the center of the island is an open crater best seen from SSE. No eruptions have been recorded, but sulfurous fumes have been reported to rise from the crater and there is a large amount of sulfur on the island. The lower part of the N side of the island is wooded. On the W side of the island there is a small sandy beach. A coral reef, projecting out about 183m in its N part, skirts the shore between the beach and the NW extremity of the island.

Small craft can anchor, in 81m, about 0.15 mile from the sandy beach in calm weather and during the transition period of the monsoons (April and November).

Kepulauan Watubela

4.5 **Kepulauan Watubela** (4°33'S., 131°43'E.), about 60 miles SE of the SE end of Seram, includes Ingar, Pulau Watubela (Watoebela), Pulau Kaisiui (Kaisioei), Pulau Kurkap (Koerkap), Pulau Baam, Pulau Tioor, and Pulau Uran (Oeran). The first three are on a long steep-to submarine plateau with depths of less than 201m. The remaining islands are on separate reefs surrounded by very deep water.

Pulau Ingar (4°21'S., 131°33'E.), the northernmost of the

group, is low and entirely surrounded by a white sandy beach. It is uninhabited, but there are coconut plantations belonging to inhabitants of Pulau Watubela. Pulau Watubela is covered with large trees and there are several large villages. Dadan, its summit, is 215m high and is distinctive from the E and W. Pulau Kasiui (Kasioei), separated from Pulau Watubela by Selat Horot Lomi, a strait which is about 0.5 mile wide, is the largest island of the group. The use of Selat Horot Lomi is not recommended because of strong tidal currents accompanied by heavy tide rips; the fairway is narrowed to a width of about 0.2 mile by a reef extending from the S side of Pulau Watubela. The highest of Pulau Kasiui's several hills, 2.75 miles from the SE end of the island, is 352m high. There are several villages on the island. On Pulau Baam there are two hills; the N hill, 80m high, and the S hill, 62m high, are separated by a low sandy area which makes Pulau Baam appear as two islands. A wide drying reef surrounds the island. Pulau Kurkap (Koer-kap), 6.5 miles E of the SE end of Pulau Kasiui, is low, flat and surrounded by a wide drying reef. A detached reef which dries is about 0.5 mile E.

Pulau Tioor (4°45'S., 131°44'E.), about 5.5 miles S of Pulau Baam is almost entirely rugged hilly land rising to a height of 376m. The N coast and the greater part of the E coast is fringed with a drying reef. Shoals with depths of 7 and 10m are off the middle of the E side of the island, about 0.75 mile and 1.25 miles, respectively, offshore.

4.6 **Pulau Uran** (Oeran) (4°46'S., 131°52'E.), 6.5 miles E of Pulau Tioor, is low, sandy, and mostly covered with coconut trees. An extensive drying reef surrounds the island.

Pulau Baam, Pulau Kurkap, and Pulau Uran are all uninhabited, but have coconut plantations.

In the otherwise deep and clear passage between Pulau Tioor and the northernmost island of Kepulauan Kai, to the S, there are three shoals, with depths of 4.9m, 9.1m, and 10.9m, which are 16 miles SSE, 21 miles SE, and 23 miles SE, respectively, from the S end of Pulau Tioor.

Tides—Currents.—In the vicinity of Kepulauan Watubela, the flood current has been found to set E and the ebb current W. The strength of the flood current is increased during the Northwest Monsoon and that of the ebb during the Southeast Monsoon. Between the islands the strength of the currents is often considerable. In February and March, a current with a velocity of 3.5 knots has been reported. When the monsoons are blowing with their maximum velocity, strong rips are set up off the N and S ends of the islands.

Anchorage.—There are no good anchorages in Kepulauan Watubela but there are several places where temporary anchorage may be taken. Anchorage is available close NW of Pulau Ingar, in 39m, stone bottom; currents here, however, are strong. There is another anchorage off the NW end of Pulau Watubela, but here too the currents are strong and the holding ground poor. There is a 5.9m shoal off the NW end of Pulau Watubela. During the Southeast Monsoon and the transition period a comparatively-comfortable anchorage is off the village of **Rumah Lusi** (4°42'S., 131°44'E.), which is near the NE end of Pulau Tioor. Anchorage is available in depths of 55m, sand and stone bottom. There are depths of from 70 to 90m close outside this anchorage.

There is a 5m shoal extending from the N shore of Pulau Tioor.

Kepulauan Kai

4.7 Kepulauan Kai, an archipelago between the parallels of 5°07'S and 6°03'S and the meridians of 131°55'E and 133°11'E, may be divided into five groups, namely, Kepulauan Kur, Kepulauan Tiga Saudara (Drie Gebroeders), Kepulauan Tayandu (Tajandoe Islands), Pulau Kai Kecil (Nuhu Roa), and Pulau Kai Besar (Nuhu Cut). The islands are formed almost entirely of coral and limestone, covered with forests and coconut trees in great abundance. Except for Pulau Kai Besar, the islands are comparatively low and most of them are encircled by extensive reefs. There are no roads on the island, but some of the villages are connected by footpaths. The inhabitants live mainly in villages along the coasts and engage in coconut culture and boat building.

Kepulauan Kur

4.8 **Kepulauan Kur** (5°20'S., 131°59'E.) consists of four islands, in order, from N to S, Pulau Bui, Pulau Tengah, Pulau Kaimeer, and Pulau Kur (Koer). The first three islands are on a drying reef, with Pulau Kur 7 miles farther S. The islands are all wooded.

Pulau Bui (Pulau Boei) (5°07'S., 132°00'E.), about 23 miles SE of Pulau Tioor and the northernmost island of the group, is 57m high, wooded, and uninhabited. A light is shown at an elevation of 15m from the N side of Bui. A shoal, with a depth of 4.9m, is about 9 miles NW of Pulau Bui and about 7.5 miles E of this shoal are two shoal patches about 1.6 miles apart, with depths of 9.1m and 10.9m, respectively.

Pulau Tengah (5°09'S., 132°01'E.), on the reef connecting Pulau Bui and Pulau Kaimeer, is really a sand bar covered entirely with coconut trees. The island may be temporarily inhabited at certain seasons. Several shoal patches and reefs with depths of about 1.8m are about 0.75 mile offshore along the E coast of Pulau Tengah.

Pulau Kaimeer (5°10'S., 132°01'E.), composed mainly of coral lime, rises in terraces to a height of 151m; the island has a flat top, and from seaward has the appearance of a large fort. The SE side is rocky and rises steeply from the sea. There is a conspicuous small mosque about midway of the W side of the island. The island is sparsely wooded, but there are several coconut plantations on the W coast.

4.9 **Pulau Kur** (5°21'S., 131°59'E.), the southernmost of the islands of Kepulauan Kur, is a hilly island about 5 miles long in a NE-SW direction rising in its central part to a height of 423m. Namsar, the highest hill and in the central part of the island, appears to be very sharply pointed. Soar, a flat summit, 81m high, stands at the N end of the island. The land rises steeply from the sea on the N and E sides, but on the W side, where most of the villages are, the land slopes gently. The S part of the island is very uneven and the S extremity shows a broad cleft extending down to the sea. A reef with a maximum width of about 0.5 mile skirts most of the island.

A light is shown from the NE tip of the island at an elevation of 120m.

Anchorage.—During the Southeast Monsoon, medium-

sized vessels can take temporary anchorage, in about 70m sand, abreast the village of Nam, about 2.25 miles N of the S end of Pulau Kur. There is an indentation in the coastal reef here that provides a good natural harbor for small craft. On the reef there are several fish dams built of blocks or coral.

Temporary anchorage may be obtained by vessels with local knowledge during the Southeast Monsoon in an indentation on the W side of the surrounding reef between Pulau Bui and Pulau Tengah.

During the Northwest Monsoon temporary anchorage can be taken, in 70m, E of the N end of Pulau Kaimeer; this anchorage is reported undesirable because of the close proximity of the coast reefs and the possibility of the anchor slipping off the steep bank.

Kepulauan Tiga Saudara

4.10 **Kepulauan Tiga Saudara** (Drie Gebroeders) is a group of three islands, the northwesternmost which is 11.5 miles SW of Pular Kur. These islands, named Pulau Manggur (Manggoer), Pulau Wonin, and Pulau Fadol, are each surrounded by a reef but are separated from each other by passages free of dangers.

Pulau Wonin (5°35'S., 131°55'E.), the northernmost island of the group, is about 0.5 mile in diameter, is 31m high, and is covered with trees. The island is uninhabited, but there are some coconut plantations on it.

Pulau Manggur (Manggoer) (5°35'S., 132°00'E.), the northeasternmost and largest of the group, is 1.25 miles long and nearly a mile wide; it is 42m high and surrounded by a drying reef extending out to a maximum of 0.45 mile. Several small villages are on the N part of the island.

Pulau Fadol (5°40'S., 131°56'E.), the southernmost of the group, is about 1 mile in diameter, 136m high, and about 5.25 miles SW of Pulau Manggur. The island is rather steep and, on the E side, can be approached fairly close; on the other sides, however, reefs project some distance from the island. There is a village on the low N end of the island. The island is a good radar target at a distance of 27 miles.

Anchorage.—The only suitable anchorage of Kepulauan Tiga Sandara is off the NW side of Manggur during the Southeast Monsoon and off the SE side during the Northwest Monsoon.

Kepulauan Tayandu

4.11 This group consists of three large and four small islands with a few outlying rocks. The islands are all coral formations, densely wooded, and surrounded by extensive reefs. The group extends 19 miles in a NE-SW direction and is about 8 miles wide. The southernmost island, **Pulau Taam** (5°44'S., 132°11'E.), is 134m high and round-backed. On the other islands are low hills which can be seen at a distance of 12 to 15 miles. There is some good timber on the islands.

Pulau Tayandu (Tajandoe) (5°33'S., 132°19'E.), 86m high, is the northernmost and largest of the group. Close N of Tanjung Matot, the NE extremity of the island, is Matotjanat, a small rocky islet. On the coastal reef off the NW side of the island there are several rocky inlets, on some of which there are a few shrubs and trees. The N side of the island is indented by Lengiar Bay, an inlet where vessels can anchor with local knowledge. There are several shoals and reefs in the bay, however, which are hard to avoid because of discolored water. Kampung Lengiar, a village on the shore of the bay, is surrounded by a wall. **Kampung Jembro** (Yembro) (5°32'S., 132°19'E.), a village on the NW extremity of Pulau Tayandu, has a conspicuous mosque.

An islet, 1.8m high, lies about 1.5 miles N of Kampung Jembro. A shoal, dangerous to navigation and over which the least depth is unknown and whose position is approximate, lies about 1 mile N of this islet.

Caution.—There are several dangers N and W of Pulau Tayandu. Rembang Reef, 6 miles N of Tanjung Matot, has a least depth of 11.9m; it is composed of sand and stones and is occasionally marked by discoloration. Depths of less than 14.6m lie within 1 mile N of it.

Telegraaf Reef, two shoal reefs lying close together that are seldom marked by discoloration and with a least depth of 14.6m, is 3.5 miles N of Tanjung Matot. Huisman Reef, sand and stones, with a least depth of 5.5m, is 6 miles NW of the NW extremity of Pulau Tayandu.

A 14.6m shoal is 4.5 WNW of the NW extremity of Pulau Walir, the next island S. There is also a 9.1m shoal 2.1 miles N of the NW extremity of Pulau Walir.

There are probably other dangers within the bank of soundings in the vicinity of these islands.

4.12 The 86m summit of **Gunung Raja** (5°32'S., 132°19'E.) and a church tower at Kampung Ohiil, about 1.25 miles to the S, are conspicuous on the W coast of Pulau Tayandu.

The passage between Pulau Tayandu and Pulau Walir is encumbered by reefs, some of which dry, and is suitable only for small craft.

Pulau Walir (5°37'S., 132°18'E.), the next largest island of the group, is close SW of Pulau Tayandu and is uninhabited. Pulau Heniar (Heniaar) is on the reef E of Pulau Walir. The village of Kampung Jamtil on the island has a conspicuous mosque. Watleu is a small rocky islet on the S end of the reef S of Pulau Walir.

Pulau Waratneu (5°35'S., 132°17'E.) is a small island between Pulau Tayandu and Pulau Walir. A 9.1m shoal is 2.5 miles NW of Pulau Waratneu.

Anchorage.—Large vessels can anchor E or W of the line of reefs between Tayandu and Walir. In the W anchorage vessels should keep W of Pulau Waratneu. This is a good berth during the East Monsoon. In the E anchorage, a vessel is safe during the West Monsoon S of **Tanjung Watloren** (5°35'S., 132°20'E.), the S point of Pulau Tayandu. To reach this anchorage, steer for Pulau Waratneu on a WNW course until the last islet on the reef E of Pulau Walir disappears behind the E rocky coast of Pulau Heniar.

4.13 Pulau Ree and Pulau Reejanat are islets on a reef close W of Pulau Walir. The former is bold and 33m high; the latter is a wooded sand bank. The water area between the islets and Pulau Walir is too shallow and irregular to be used as a channel.

Pulau Nusreen (Noesreen) (5°42'S., 132°16'E.), Pulau Nuniai (Noeniai), and Pulau Nuwait (Noewait), on an extensive

reef 2.5 miles SSW of the S end of Pulau Walir, are low and sandy; the first two are covered with coconut trees. The channels N and W of the reef on which the islands are located are about 1.25 miles wide and free of dangers.

Pulau Taam (5°44'S., 132°11'E.), 2.25 miles SW of the W end of Pulau Nuniai, is quite bold except at its NE extremity; it has a maximum elevation of 134m. There are numerous rocks on the reef that encircles the island. The most noticeable of these rocks is Watfera, a large flat rock close off the W side of Pulau Taam. A conspicuous tree on the rock gives it the appearance, when seen from the N, of a ship with a single mast. A large white rock is on the reef 0.75 mile NNE of Watfera. There are two villages on the W side of Pulau Taam.

Tides—Currents.—In the vicinity of Kepulauan Tayandu, LWSs sometimes coincide, with the result that a LW level of 1.1m below mean sea level can be expected, generally around June and December. The highest HW level that can be expected is about 0.8m above mean sea level. This occurs at all semidiurnal spring tides.

Anchorage.—Vessels can anchor, in 40m, W of the village of Ohitoom, about 1.5 miles NW of the S point of Pulau Taam, and be sheltered against all winds except Southeast Monsoons; this anchorage is especially uncomfortable when the winds are blowing against a S current.

Kai Kecil Group (Nuhu Rowa) (Nuhu Roa)

4.14 The Kai Kecil Group of islands, E of Kepulauan Tayandu, consists of two large islands and a number of small islands, all of which are generally low and are located on a bank of soundings with depths of less than 183m. The group occupies an area about 40 miles long and 20 miles wide.

Pulau Kai Kecil (Noehoe Efroean) (5°47'S., 132°44'E.), the central and largest island of the Kai Kecil Group, is known as Nuhu Tawun (Noehoe Tawoen) in its N part and Nuhu Tutut (Noehoe Toetoet) in its S part. Pulau Kai Kecil is separated from Pulau Kai Dulah, the second largest island of the group and close E, by Rosenberg Strait.

Pulau Kai Kecil is about 22 miles long in a N-S direction and about 7.5 miles wide. Its outline is irregular and it is deeply indented in places. It is covered with trees and is generally low except for a few moderate hills, the highest of which is **Gelanit** (5°39'S., 132°41'E.), which is 3.5 miles S of the northernmost point of the island and is 119m high.

The N coast of Pulau Kai Kecil, between the northernmost point of that island and **Tanjung Ngidiun** (5°36'S., 132°36'E.), the NW extremity 6 miles to the W, has alternate stretches of cliffs and sandy beaches. Tanjung Ngidun is a narrow, rocky headland that rises gradually to 79m. In the middle of this coast is a large but unimportant bight the E shore of which is composed of limestone cliffs averaging 12.2m high. Fronting the coast is an extensive reef ending close W of Tanjung Ngidiun. There are a few villages along this coast.

4.15 Reefs and islands N of Pulau Kai Kecil.—Ender Reef (Karang Ender) (5°20'S., 132°41'E.), the northernmost danger of the Nuhu Efruan Group, is a sand and coral reef 1 mile long with a least depth of 5.8m; it is 6.5 miles NNW of Pulau Maas and can be distinguished by discolored water.

Batavier Reef (5°24'S., 132°45'E.) is 3 miles NE of Pulau Maas and has a least depth of 4.9m. This reef is about 0.5 mile long and is reported to be marked by discolored water.

Datu Reef (Datoe Reef) (5°25'S., 132°43'E.), about 1 mile N of Pulau Maas, is about 1.3 miles long. The least depth is said to be 4.9m and it is marked by discolored water.

Tegal Reef (5°29'S., 132°49'E.), 3 miles NNE of Tanjung Serbat, the N extremity of Pulah Kai Dulah, has a least depth of 6.8m. This reef is 0.8 mile long and marked by a lighted beacon and is marked by discoloration.

Caution.—There are many other dangers in the vicinity of these reefs.

4.16 Pulau Baeer (5°27'S., 132°42'E.) and Pulau Maas are two islands N of the N extremity of Pulau Kai Kecil. There are numerous coconut trees on these islands. The islands are 0.33 mile apart and they are connected by a reef extending 1.75 miles E from Pulau Maas. Watlora Islet is on this reef a water 0.2 mile E of Pulau Maas. Sua Island (Soea Island) is nearly 1 mile SE of Pulau Maas.

Pulau Rumadan (Pulau Roemadan), nearly 3 miles NW of Tanjung Serbat, is almost divided into two parts. Detached reefs extend 3.5 miles W of the island. Pulau Dranan is a small islet about 0.75 miles S of Pulau Rumaden.

Pulau Duroa (Doe Rowa) (5°33'S., 132°42'E.), S of Pulau Rumadan, is the largest of the islands N of Pulau Kai Kecil. It is surrounded by a reef extending 1.5 miles W and about 0.75 mile N and S of the island. An islet is on the reef S of the island. A detached 2.7m shoal with an islet on it is close off the SE side of Pulau Duroa. This shoal is marked by a beacon. The reefs extending S of Doe Rowa and a 0.9m shoal, 1.3 miles SW of the SW side of the island are marked by a beacon and a lighted beacon, respectively. There are two villages on the NE side of the island.

Pulau Duroa is separated from the reef S of Pulau Rumadan. A shoal, with a depth of 6.7m, was reported in the channel, about 3.5 miles due W of Pulau Dranan.

4.17 Pulau Ut (Oet) (5°35'S., 132°40'E.), 2 miles SE of Pulau Duroa and 1 mile N of the N part of Pulau Kai Kecil, is a narrow crescent-shaped islet, rocky at both ends with a low, sandy formation in the middle. A reef extends about 0.75 mile W of the islet, but it cannot always be distinguished by the color of the water. Pulau Krus (Kroes), a low, rocky islet, is on the reef close W of Pulau Ut; there is a small but conspicuous sand beach on the N side of the islet.

Selat Duroa (Doe Rowa Strait) (5°35'S., 132°43'E.) is the channel between Pulau Duroa and the N side of Pulau Kai Kecil. On the N side of the channel is a reef that extends W and S from Pulau Duroa and a detached reef that is more to the S. On the S side of the channel are Pulau Krus (Kroes), Pulau Ut (Oet), and Pulau Uber (Oeber), and a detached drying reef NW of the latter island. A light is shown from a beacon standing on a drying reef 0.5 mile NW of the NW side of Pulau Ubur. A light shows from a beacon marking a drying reef on the N side of the strait about a mile NNE of Krus. The navigable width of the channel is about 0.25 mile; the least depth of 18.3m, which is found at its E end.

Tidal currents in the strait set E with the rising tide and W with the falling tide.

Caution.—Several shoals with depths of 5.8 to 16.4m are in

the W approach to Selat Duroa, about 3 miles E of **Pulau Godon** (5°34'S., 132°35'E.).

The N end of a 7.6m bank is about 1.5 miles off the reef that extends NW from Pulau Ut and Pulau Krus. A 4.9m shoal extends nearly 1 mile NW from Pulau Krus. A 4.2m shoal is about 1 mile NW of the N point of Pulau Ubur.

The shoals on the N side of Selat Duroa are marked by beacons. Vessels should keep about 0.35 mile S of these beacons.

4.18 West coast of Pulau Kai Kecil.—The W coast of the island is irregular and trends SSE for about 22 miles from **Tanjung Ngidiun** (Ngidioen) (5°36'S., 132°36'E.) to **Tanjung Doan** (5°57'S., 132°41'E.). This coast is generally rocky with occasional sandy beaches and is fronted by a broad reef. The coast is backed by hilly land. The villages along the coast can usually be recognized by their small churches or mosques.

The coast from Tanjung Ngidiun for 5 miles S forms a bight, with shores that are alternately small sandy beaches and cliffs 9.1 to 12.2m high. There are three villages along this stretch of coast; a church is at Kampung Ngilgof, the southernmost. West of this village the coast bends E and forms a tongue of land on which there are two shallow coves on its E side that are closed by reefs. Beyond the E of these coves the coast trends S.

Totoad Bight (5°43'S., 132°39'E.) is located S of the village of Kampung Sulaer (Kampung Soelaer), where the coast forms a wide bight, narrowing to a creek which penetrates Pulau Kai Kecil in a S direction almost to its S coast. The entrance to the bight is divided into two parts, both affording good anchorage, by Pulau Wahru. In the N part, where the depths range from 10.9 to 39m, there is a small 0.5m detached reef and a long narrow reef is farther E, near the coast. The S part of the entrance has depths of 16.4 to 33m over a 0.5 mile width and is the preferred anchorage. A strong current usually sets out of the inlet. **Kampung Totoad** (5°45'S., 132°41'E.) has a conspicuous mosque and there is a small pier for boats. Two small islets are off the point W of the village.

Directions.—Vessels approaching the anchorage in Totoad Bight from N steer SW between Pulau Godon and Pulau Ngaf until the W end of Pulau Nai bears 180°, then steer 180°, passing close W of the 6.7m shoal 1.5 miles SW of Pulau Ngaf. When Gelanit Hill bears 088°, steer for the W side of Pulau Liek bearing about 151°. When the S end of Pulau Valtimas is in range 266° with the S side of Pulau Hoa, head SSE or SE. Vessels should navigate with caution due to the numerous drying reefs and shoals in these waters; pass on either side of the 3.9m shoal 2 miles SW of the S point of Pulau Uhiteer. When the N side of Pulau Tonquin bears 264°, steer 084°, which passes N of Pulau Liek. Then proceed to the anchorage, heading NE. Care should be taken to avoid the 0.9m shoal 0.5 mile SE of Pulau Wahru (Wahroe) and the 3.2m and 5.9m shoals 0.8 mile SW of this island.

There is a shorter route for vessels with local knowledge by passing between Tanjung Ngidiun and Pulau Ngaf, then following the coast as far as Pulau Wahru. It is essential that the reefs are plainly visible.

The approach from the S offers no difficulty. The W coast of Pulau Kai Kecil from Ngoersit, 0.5 mile W of Totoad, to Watngit, about 3.25 miles further S, has a reef extending as far as 0.75 mile offshore.

The coast between the entrance to Totoad Bight and the village of Kampung Watngit, 3.75 miles to the S, is low and sandy; between that village and **Tanjung Arat** (5°55'S., 132°40'E.), 6 miles farther S, it gradually increases in height. There are several villages along this coast.

4.19 Islands W of Pulau Kai Kecil.—A large number of islands and reefs are off the W coast of Pulau Kai Kecil; some of the islands are as much as 73m high. These islands and reefs extend 6 to 17 miles from Pulau Kai Kecil. The positions of these islands and reefs can best be ascertained by reference to the chart, but particulars of a few are given below.

Pulau Godon (5°34'S., 132°35'E.), 1.75 miles NW of Tanjung Ngidiun, is a low island about 0.5 mile long, covered with coconut trees, and with a rocky S point. It is surrounded by a reef extending about 0.5 mile to the N and SW. Pulau Er, about 1 mile W of Pulau Godon, is a low sandbank covered with coconut trees and surrounded by a reef extending 1.25 miles to the W. There is a conspicuous tree on the W side of the islet.

To the N of Pulau Er, there is a large detached drying reef, well marked by discoloration, about 0.75 mile long, the outer edge of which is 5 miles NW of Tanjung Ngidiun. A vessel has anchored on the N side of this reef, in 21.9m, coral. Approach was made with the hill inside Tanjung Ngidiun in range with the summit of Pulau Godon. There is a 5m shoal 0.75 mile N of this detached reef.

Pulau Ngaf (5°38'S., 132°35'E.), about 2 miles SW of Tanjung Ngidiun, is surrounded by a reef extending about 0.5 mile on all sides. A shoal patch in a depth of 6.8m, is about 1.5 miles SW of the S extremity of the island; Mittilir, a 4.5m shoal, is about 3 miles to the S of the island.

An extensive reef on which there are several islets lies 7.75 miles S of Pular Er; the W edge of this reef extends nearly 1.5 miles out from its islets and Mitfeer, a 6.7m shoal, is 3 miles SW of Pulau Nai, the 60m N islet on the reef. The other principal islets and reefs on the W side of Kai Kecil are **Uhiwa** (Oehiwa) (5°42'S., 132°37'E.); Uhiteer (Oehiteer), 1 mile SSE of Uhiwa; **Wahru** (Wahroe) (5°45'S., 132°39'E.); Hoa, 0.8 mile S of Nai; **Tonquin** (5°47'S., 132°34'E.); **Taroa** (5°48'S., 132°37'E.); **Warbal** (5°50'S., 132°35'E.); and Manir, 70m high, 0.5 mile SE of Warbal.

4.20 Pulau Ur (Pulau Oer) (5°51'S., 132°32'E.) and Pulau Utier (Pulau Oetice), two islands, 73m and 57m high, respectively, are on a reef 8 miles W of Tanjung Arat.

Pulau Nuhu Taa (Noehoe Taa) (5°55'S., 132°28'E.), about 2.75 miles W of Pulau Utier, is a low sandbank surrounded by an extensive reef on the S end of which is Pulau Var, a rocky islet 25m high. A 9.1m shoal is 1.75 miles NE of the N end of Pulau Nuha Taa; a 4.9m shoal is 0.7 mile NNW of the same point; and another 9.1m shoal is 1 mile NW of that point.

Pulau Tanimbar (Kai Tanimbar) (6°02'S., 132°27'E.), the southernmost off-lying islands, is 3.25 miles long in a NE-SW direction and has a very conspicuous tree-covered summit, 54m high. Its shores are rocky and it is surrounded by a wide reef that partly dries at LW; the N side of the reef is 1.1 miles N of the W extremity of the island. Warna, a small islet, is on this reef close off the NE extremity of the island. The N side of Pulau Kai Tanimbar is deeply indented, but the cove so formed is filled with a coastal reef. Kampung Atnebar is on top of a 25m elevation at the head of the cove. A small drying boat harbor

formed of coral stones is in front of the village. Shoals with a least depth of 5.9m are located 2.1 miles N of the W end of Kai Tanimbar.

Several charted shoal spots are E, SE, and S of Pulau Tanimbar.

The island is a good radar target at a distance of 20 miles.

The various islands and groups of islands W of Pulau Kai Kecilare separated from each other by deep channels that are easily navigated when the reefs are visible. Strangers, however, will have difficulty in recognizing and identifying the different islands.

The channel between these off-lying islands and reefs and Kepulauan Tayandu to the W is clear and is 8.5 miles wide in its narrowest part.

4.21 South coast of Pulau Kai Kecil.—From Tanjung Arat (5°55'S., 132°39'E.), the coast trends E and S for 4.5 miles to **Tanjung Doan** (5°57'S., 132°41'E.) forming a semicircular bight about 1.75 miles in diameter. Tanjung Arat, the SW extremity of Pulau Kai Kecil, although not very high, is backed by a hill which attains an elevation of 107m 1 mile NE of the point. Tanjung Doan, slightly higher than Tanjung Arat, may be identified by its orange colored rocks and by the 60m hill standing 1 mile N and by Noiko Islet, 0.65 mile S of the point. Between Tanjung Doan and **Tanjung Muslenar** (Moeslenar) (5°57'S., 132°43'E.), a rocky point 1.75 miles to the E, the coast recedes sharply forming the inlet Teluk Uf (Oef). From Tanjung Muslenar the coast trends ENE for a distance of 3 miles to **Tanjung Hoar** (5°57'S., 132°46'E.), a somewhat low but rocky point. This stretch of coast curves in slightly but is fronted by a drying reef that is nearly 0.5 mile wide.

Mitroa Reef (6°00'S., 132°43'E.), with a least depth of 4.9m, is 3 miles S of Tanjung Muslenar; the reef discolors slightly.

Shoal patches from 1.8 to 7.6m are between Mitroa Reef and Tanjung Muslenar.

Anchorage.—Anchorage can be taken in the bight between Tanjung Arat and Tanjung Doan opposite the village of Kampung Ohoideer Tutut, which may be recognized by a small church. Anchorage can also be taken in Teluk Uf.

Teluk Uf is a rectangular inlet about 3.5 miles long and 0.5 to 1 mile wide and with general depths of 1.8 to 11.9m. Vessels entering the inlet should proceed in on a course of 000° passing about 0.5 mile W of Tanjung Muslenar, in order to avoid three shoals with depths of 4.1m, 4.9m, and 5.8m, respectively, NE of Noiko. Anchorage, sheltered against both monsoons, can be taken in the bight, in depths of 9.1 to 11.9m, sand.

4.22 East coast of Pulau Kai Kecil.—The E side of Pulau Kai Kecil from Tanjung Hoar to Rosenberg Strait, 13 miles to the N, is low and the inland hills afford no landmarks. Pulau Daar and Pulau Bararan, parallel to each other close off the N part of this coast, can scarcely be distinguished from the mainland coast itself. N of Kampung Abean, 5.5 miles NNE of Tanjung Hoar, the soundings inside the 200m curve are very irregular and the water is discolored. Parallel to and 1.5 miles E of Pulau Daar is a sandy reef. Shallow waters with depths of 1.8m and 2.7m extend up to 0.9 mile S of this reef. A reef with a depth of 0.5m is 2.25 miles S of the sandy reef. Two miles farther S is another reef with a least depth of 4.9m. There is a reef and rock dangerous to navigation about 2 miles E of Tanjung Vadsit.

There are numerous unimportant villages along this coast.

Rosenberg Strait (5°42'S., 132°45'E.), separating the SW side of Pulau Kai Dulah from the NE side of Pulau Kai Kecil, is a winding channel 1.5 miles wide at its E end decreasing to about 91m at its NW end. Because of reefs extending out from the shores, the channel is very tortuous. Branching off from each side of the strait are several arms with irregular depths. Because the depth at its NW end is not more than 1.8m, the strait has no navigational importance as a channel. A wooden bridge spans the NW end of the strait about 0.5 mile S of Tual (Toeal).

4.23 Northeast coast of Pulau Kai Kecil.—From the NW end of Rosenberg Strait to the northernmost point of the island, the coast of Pulau Kai Kecil is very irregular and is fronted by several islands including Pulau Fair, Pulau Kran, and Pulau Ubur (Oeboer). A broad reef skirts this coast and connects these islands with the shore.

Teluk Gelanit (5°38'S., 132°41'E.) is an inner bay separated from Tual Roads by Pulau Fair. It consists of two basins with depths between 9.1m and 23.8m connected by a bar with a least depth of 1.8m. The entrance, S of Fair, has a narrow and tortuous entrance with a depth of 5.5m and its use is limited to small craft only. Four mooring buoys are moored close to the S side of the entrance opposite the S extremity of Pulau Fair.

Pulau Kai Dulah (5°37'S., 132°46'E.), the second largest island of the Kepulauan Kai Kecil group, is close off the NE side of Pulau Kai Kecil. The S part of the island is higher than the N. The highest hill, located on the W side of the island, is 115m high. Tanjung Vadsit, the S extremity of the island, is a steep point, 11.9m high. **Kampung Naam** (5°33'S., 132°48'E.) is on the sandy NE extremity of the island. Tanjung Serbat, the N extremity of the island, is low and sandy. Kampung Tual and Kampung Dulah, the most important villages, are on the W side of the island and are mentioned below.

There are several reefs within the 200m curve along the E coast of Pulau Kai Dulah.

4.24 Tual Roads (5°38'S., 132°44'E.) is within the limits of a line drawn in a 225° direction from the point W of Kampung Dumar to Pulau Fair and a line drawn in a 045° direction from the SE extremity of Pulau Fair to the shore S of Kampung Tual.

Vessels approaching the roads from NE may have difficulty in making out the entrance to the channel to the roads. Among the useful landmarks in the vicinity are Gelanit Hill, 3.5 miles S of the N extremity of Pulau Kai Kecil; the E extremity of Pulau Duroa; Kran Islet, close S of Pulau Ubur; and **Lobi Islet** (5°35'S., 132°45'E.), close off the W side of Pulau Kai Dulah. The W coast of Pulau Kai Dulah S of Kampung Dulau is distinguished by several fairly high hills.

Winds—Weather.—In November, the Northwest Monsoon sets in; during December, the winds blow predominantly from the W and NW with an average velocity of 6 knots, but winds of very considerable force are not uncommon. Calms are frequent between November and January. In April, the monsoon changes and the direction of the prevailing winds shifts to E and SE, with those from the SE predominating until October.

Thunderstorms are most frequent at the change of the monsoon.

There is greater precipitation among the Kepulauan Kai group and Kepulaun Tanimbar group than on Timor to the W. This condition is caused by SE winds that blow from the Pacific Ocean through Torres Strait.

Tides—Currents.—At Kampung Tual, the highest water level occurs in March or April and the lowest occur in July, August, and September. The maximum rise and fall that can be expected are, respectively, about 2.5m above and 0.2m below mean sea level.

Little is known about the currents in this group of islands, except that in Selat Duroa an E current has been noted during the flood and a W current during the ebb; the maximum recorded velocity was 2 knots.

Anchorage.—A safe anchorage may be obtained in Tual Roads, in depths of 20.1 to 24m. Anchorage may also be obtained during the Southeast Monsoon off Kampung Dulah, but heavy swells occur here during the Northwest Monsoon.

Small craft use a small shallow inlet in Kai Dulah, abreast the village of Tual. There is a small pier in the inlet.

Directions.—Approaching Tual Roads from N steer 180° for Tanjung Serbat which leads about 1.25 miles W of Tegal Reef, previously described in paragraph 4.15. When Lobi Islet, close off Tanjung Lobi, about 4.25 miles SW of Tanjung Serbat, bears 210°, steer for it on that bearing until abeam of Kampung Dulah, then steer for the sandy patch on the NE point of Pulau Ubur bearing 246°. When the beacon 0.5 mile SE of the SE point of Ubur bears 180°; alter course to pass W of this beacon between it and the reefs and shoals extending from the SE shore of Ubur. The vessel can be guided by the beacons to the roadstead, but care must be taken to avoid the shoals in the approach to and within the roadstead.

To enter Tual Roads from NW through Selat Duroa, set course for Tanjung Nigidiun from a position about 10 miles N of that point. From this position Pulau Tayandu, Pulau Er, and Tanjung Ngidiun are good landmarks. Pulau Er is easily distinguished from the other islands because it is lower and less overgrown. A course of 180° should be steered toward Tanjung Ngidiun until the N end of Pulau Godon is nearly abeam. Then steer E, keeping the NW end of Pulau Er astern and open N of Pulau Godon. Pass between the 5.6m and 8.1m shoals lying 3 miles E of Godon. These dangers are best located by reference to the chart. When the two beacons marking the N side of Selat Duroa bear 094°, steer into the strait, favoring the N side of the channel. Reference should be made to the chart as the reefs extend about 0.6 to 1.0 mile from the S shore of Doe Rowa and a 4.1m reef is 0.6 mile SSE of Muha Nuhu Janat (Moeha Noehoe Janat). Local knowledge is necessary. When Muha **Nuhu Janat** (5°33'S., 132°43'E.) bears 000° steer around the N side of Pulau Ubur. Then proceed as directed for the N approach above for Tual Roads. The unmarked dangers along this route are best shown on the chart.

Caution.—A 5.5m bank extends about 0.75 mile N and 0.5 mile W from **Tanjung Serbat** (5°31'S., 132°48'E.), the N extremity of Pulau Kai Dulah. There are shoal patches, with depths of 10m, 6.9m and 7.8m, lie 1.2 miles NW, 2.0 miles W, and 1.3 miles W of Tanjung Serbat respectively. There is a beacon on the S end of the 6.9m shoal.

A detached reef, with a least depth of 0.9m, is about 0.5 mile ESE of the SE extremity of Pulau Ubur and is marked by a beacon.

A shoal, with a depth of 7m, lies in the center of the fairway, 0.4 mile E of the SE end of Pulau Ubur.

A narrow reef, about 0.5 mile long in a N-S direction and with a depth of 0.9m, is 1 mile S of the SE extremity of Pulau Ubur. This reef is marked by beacons, but they may be missing.

A reef projects N about 183m from the point of land W of Kampung Tual.

4.25 Kampung Tual (5°38'S., 132°44'E.), the principal village of the Kepulauan Kai Kecil group, is the headquarters of a governmental official. Located in the S part of the W side of Pulau Kai Dulah, it is partly on the beach and partly on the slopes of the hills that back the coast. Kai Dulah Tual Light is shown on the shore close W of the village on a white metal framework tower. Provisions can be obtained here. There is a boat pier with a flagstaff and a hospital. There is also a hospital in Selat Rosenberg, 1.5 miles to the S.

It was reported that a T-head pier at the village had a length of 35m, with depths of 5m at the outer berth and 2m at the inner berth. A smaller T-head pier is situated directly S of preveouly-described berth. No further details are available.

Pulau Kai Besar (Noehoe Tjoet)

4.26 Pulau Kai Besar (5°40'S., 133°00'E.), the easternmost of the Kepulauan Kai group 4 to 13 miles E of the Kepulauan Kai Kecil group, is about 50 miles long in a NNE-SSW direction and a width varying from 1 to 5.25 miles except at the S end where there is a tongue of relatively low land about 3.5 miles long and 0.5 mile wide. The mountainous aspect of this island distinguishes it sharply from the comparatively low islands of the Kepulauan Kai Kecil group. The entire island is wooded but there are patches of cultivation in places along the slopes of the hills. The coast is high and bold, but there are occasional sandy beaches with villages. The coasts of the island are principally projecting points, offshoots of the mountains and hills.

A chain of mountains extends along the middle of the island for almost its entire length. The mountains are well wooded and can be sighted for a considerable distance, except when their summits are enveloped by clouds, which is generally the case of those mountains with elevations greater than 396m.

The principal mountains from S to N are **Morbait** (5°52'S., 132°56'E.), 521m high; Wirmangle, 454m high; Nonaibal, 575m high; and Advilnas, 380m high. These four mountains are peaks of a generally steep mountain range extending N from the S end of the island; for a considerable distance N of Advilnas, however, this range consists of hilly ridges with inconspicuous peaks.

Close SW of that section of the island that is narrowed by **Teluk Elat** (5°38'S., 133°00'E.), is Warhuk, 554m high, which is conspicuous because it resembles the back of an elephant with its head facing S. Sicek (Sitjek), 455m high and 2 miles NE of Warhuk, has the shape of a truncated cone. Fakoi, 619m high and 2 miles NE of Sicek, rises almost vertically on the SE side and has many light-yellow-colored stone sections.

4.27 Gunung Daab (5°35'S., 133°04'E.), the highest peak

on the island, 800m high and about 3 miles NNE of Fakoi, has a cone shape, but it is usually enveloped in clouds. Triple Top, 590m high and about 7.5 miles NNE of Gunung Daab, has three equally high peaks that appear as a slightly waving line when seen from seaward. Boo, 793m high and about 3 miles N of Triple Top, has a notched top that slopes to the S. Kaar, 742m high and about 2 miles N of Boo, has a rather pointed top. N of Kaar, there are several peaks, the highest of which, Wokra, is 688m high, but they stand so close together that they are of little use as landmarks.

Winds—Weather.—The coasts of Pulau Kai Besar are subject to violent squalls which sweep down from the mountains on to the E coast during the Northwest Monsoon and on to the W coast during the Southeast Monsoon. These squalls are dangerous to small craft and even call for caution on larger vessels, especially when at anchor. On the E coast such squalls are particularly strong in the vicinity of Fakoi, near the center of the coast, on the W coast they are strongest at the S end of the island, between **Nerong** (5°47'S., 132°56'E.) and **Fer** (5°57'S., 132°51'E.). During the period of change between the monsoons, in the months of October/November and March/April, the winds are not especially strong and temporary anchorage can be obtained anywhere along the E coast. Local knowledge is necessary. The Dutch referred to such bora-like winds as "Valwinden."

4.28 East coast of Pulau Kai Besar.—The E coast of the island is so steep-to that a vessel can proceed quite closely along the shore. The most conspicuous points along this coast are **Tanjung Weduar** (6°01'S., 132°50'E.), the steep S extremity of the island; Tanjung Obahan, a rocky point 11.75 miles NNE of Tanjung Weduar; and Tanjung Wahadan, 15 miles farther NNE. The latter point is not particularly high, but it is rocky and the mountains immediately behind it rise steeply.

Tanjung Weduar is a good radar target at a distance of 25 miles.

Anchorage.—In as much as the E coast of the island is steep-to and subject to winds during the monsoons, it affords no good anchorage at these times. During the change periods from the Northwest Monsoon to Southeast Monsoon, however, when there are no such winds, vessel may anchor, in depths of 46 to 73m, sand and stones, close to the shore.

4.29 Weduar Roads (Wedoear Roads) (5°50'S., 132°56'E.) is an indentation in the coast 2 miles NW of Tanjung Obahan. A conspicuous house is on the shore of the bight close S of Kampung Weduar. The preferred anchorage during the Northwest Monsoon is in a depth of 29 to 40m, with the conspicuous house bearing 235°. An 8.8m shoal, not marked by discoloration, lies about 0.3 mile SE of the village.

Kampung Ohoiwait (5°45'S., 132°57'E.), about 4.5 miles N of Kampung Weduar is on a high, steep, conspicuous hill. In the middle of the village is a sacred spot called "Woma," which is surrounded by a low brick wall.

Kampung Jamtimur (Jamtimoeri) (5°36'S., 133°06'E.), has a small but conspicuous church. Kampung Kilwaer, 1.5 miles NNE of Kampung Jamtimur, can easily be recognized by a flagstaff at the village.

Small craft can find good anchorage during the Northwest Monsoon in an indentation in the coastal reef off the village of **Kampung Hollat** (5°30'S., 133°08'E.). The two churches in the village are good landmarks. The Roman Catholic Church, without a tower, stands close N of the highest point of the built-up area; the spire of the Protestant Reformed Church stands 0.25 mile N of it.

Vessels approaching the village should steer 276° for the southernmost church, which leads through the opening in the reef, then anchor, in 5.8m ,about 0.15 mile off the reef with Tanjung Nuwahan (Noewahan), 4 miles SSW, bearing 196°. The reefs are fairly well marked by discoloration. Copra is exported but cargo transfer from lighters is only possible during the Northwest Monsoon.

Kampung Bandan Eli (3°25'S., 133°09'E.), 4 miles S of Tanjung Ngarmin, may be recognized by its conspicuous mosque and a large number of dark red-roofed buildings. This village is concealed from vessels coming from the S by Tanjung Kawas, a high rocky point with a small rounded summit, about 3 miles S of the village.

Ur Roads (Oer Roads) (5°22'S., 133°10'E.) is a small inlet 5.5 miles S of the N end of the island. The Wer Ur, a small stream emptying into the inlet, flows through the valley across which Watnus, a sharp peak, 617m high, can be seen on a clear day. This peak in line with the center of the valley leads to the anchorage. In case of poor visibility, vessels can approach on a WNW or NW course by steering for a wooden bridge that crosses the Wer Ur just N of the village. The preferred anchorage is near the reef, in a depth of about 55m, sand, 0.25 mile offshore.

4.30 The N coast of Pulau Kai Besar is lower than the E coast, but it is characterized by spurs of the mountains that project out from the shore. **Tanjung Borang** (5°17'S., 133°09'E.), the northernmost point of the island, is the most important landmark on this coast. It is usually the first point of land to be sighted by vessels approaching Kepulauan Kei from the N. An unexploded ordnance is reported to be about 3.25 miles NE of Tanjung Borang. The mountains to the S of the point are usually enveloped in clouds. Between Tanjung Oratu (Oratoe), the NE extremity of the island, and Tanjung Borang the coast is generally rocky although there are a few sandy beaches. This area within the 10m curve, which extends out nearly 1 mile, is decidedly foul. On the shore 0.5 mile NW of Tanjung Oratu there is a conspicuous sandy spot.

Labuan Dabu (Laboean Daboe) (5°17'S., 133°09'E.), just SE of Tanjung Borang, is a channel in the coastal reef. A 5.8m shoal is in the approach at the N end of the channel. Good anchorage is available with local knowledge, in depths of 7.3 to 14.6m.

Teluk Hoh (5°17'S., 133°09'E.), between Tanjung Borang and Tanjung Vorwahan, is an elongated indentation of the coast that penetrates the coast for about 0.75 mile. The navigable width of the bay is only about 137m. The bay is fronted by a bar with a least known depth of 7m. Anchorage is available with local knowledge, in depths of 9.1 to 11.9m, sand, int all seasons; proceed to the anchorage by passing along the Tanjung Borang side of the bay at a distance of about 183m offshore. A number of houses built on piles on the W side of the bay are seasonally occupied.

Teluk Wair (5°17'S., 133°08'E.), between Tanjung Borang and Tanjung Patingru (Patingroe), the NW extremity of the is-

land and about 9.1m high, affords safe anchorage to vessels with local knowledge during the Southeast Monsoon, in a depth about 40m, at a moderate distance offshore. Kampung Wair is at the head of the bay. The shore is rocky and steep, except at the head of the bay.

4.31 The W coast of Pulau Kai Besar has a wider coastal reef than the E coast and, therefore, affords better anchorage. The shore is sufficiently steep-to to enable vessels to come rather close inshore. **Teluk Elat** (5°38'S., 132°59'E.), about midway along this coast is, from a navigational standpoint, the most important place on the island.

Tanjung Patingru (Patingroe) (5°17'S., 133°07'E.) is a rocky cape, about 9.1m high, consisting of a mountain spur. Niv Rock, close N of the cape, is an aid in identification. From Tanjung Patingru to the village of **Kampung Hor** (5°21'S., 133°05'E.), 4.5 miles to the SSW, the coast is fairly high and characterized by gray rock with many white dots. Woho, a mountain 4 miles S of Tanjung Patingu rises almost vertically to a height of 566m. S of this mountain the land slopes gradually toward the middle of the island, but the coast continues rocky with a few conspicuous points among which are **Tanjung Ohiserkum** (5°23'S., 133°04'E.) and Tanjung Hebri, about 4 miles farther S. South of the latter point the mountains are farther from the coast.

There are more villages on the W than on the E coast of the island. They are easily recognized; some have conspicuous white mosques.

Anchorage may be obtained anywhere along this coast N of Teluk Elat during the Southeast Monsoon, in a depth of 44m; there are, however, heavy squalls during that period.

Caution.—Several detached steep-to dangers are off the coast between Tanjung Hebri and the entrance to Teluk Elat. The channel between these dangers and the coast is deep and clear.

Mituwat (Mitoewat) (5°30'S., 133°01'E.), the northernmost of the dangers, is about 1 mile long and 0.75 mile wide; it partly dries but is completely covered 1 hour before HW.

Mitduan (Mitdoean) (5°31'S., 133°00'E.), a rocky shoal close S of Mituwat, is about 1.75 miles long and partly uncovers.

A 2.7m shoal is 1.25 miles S of the S end of Mitduan and 2.5 miles NW of **Tanjung Jarleie**r (5°36'S., 133°01'E.).

Mitnaloa (4°36'S., 133°01'E.), a crescent-shaped reef about 1 mile long, is abreast of Tanjung Jarleier. The S part of this reef is awash at HW. The reef is in the approach to Teluk Elat. An 11.9m shoal is close N, and a depth of 9.6m is 0.5 mile SW, respectively, from Mitnaloa.

4.32 **Teluk Elat** (5°38'S., 132°59'E.), about midway along the W coast of Pulau Kei Besar, is a roughly circular inlet with a diameter of about 1.5 miles. Close to the E side of the bay are two small islets, Nuhu Ru and Krad, connected by a reef that projects from the shore of the bay. Farther S is the larger Sfat Islet, which is surrounded by an extensive reef and is connected with the S shore of the bay by a shore bank. Close off the W entrance point is the much larger Nuhu (Noehoe) Jaan island, 20m high. A beacon stands about 0.15 mile off the NE point of Nuhu Jaan and a 9.4m shoal lies about 1 mile NNW of the same point; another beacon stands midway along the E side of Nuhu Jaan. In the bay itself there are several rocky patches, but some are marked and entrance into the bay is not difficult.

Beacon at Teluk Elat

Tides—Currents.—At Teluk Elat, the highest water level occurs in February and March, and the lowest in July, August, and September. The maximum rise and fall that can be expected are, respectively, about 2.5m above and 0.2m below mean sea level.

Aspect.—The principal landmarks in the area are Warhuk (Warhoek) and Sicek (Sitjek), mountains that have been previously described in paragraph 4.26, and a light green hill on Sfat Islet that can be seen for a considerable distance from seaward. There are numerous coconut trees in the vicinity of the bay.

It should be noted that foul ground extends about 0.15 mile outside the beacon NE of Nuhu Jaan and a 4m patch lies about 1 mile ESE of the N end of Nuhu Jaan. This patch is marked by a black beacon. The inner black beacon on the W edge of the reef is about 0.15 mile from the W extremity of Sfat islet. The topmark is reported missing on this beacon. A 5.9m shoal extends about 0.6 mile from the S end of Nuhu Jaan and should be noted when entering Elat Bay.

The passage between the S end of Nuhu Yaan and the main island is only for small boats with local knowledge.

Anchorage.—Teluk Elat affords anchorage in all seasons of the year. During the Southeast Monsoon, the best anchorage is in a depth of about 26m, sand, W of the pier at Kampung Banda Elat. During the Northwest Monsoon, the preferred anchorage is in a depth of 24 to 29m, sand and coral, W of Nuhu Jaan, with Kampung Raharin, which is close SW of Kampung Elat, bearing about S.

Directions.—Vessels approaching Teluk Elat from the N should sight the light green hill on Sfat Islet and steer for it until the beacons are identified. Once the aids are identified, there should be no difficulty in proceeding to either of the anchorages.

4.33 **Kampung Banda Elat** (5°39'S., 132°59'E.), on the S shore of Teluk Elat, is the most important village of Pulau Kai Besar and is the center for the exportation of copra. A 302m

long stone pier projects out to a depth of 4.9m close NW of the village. A red-roofed shed is on the pier. Another small pier with a flagpole at its root and E of the stone pier is reported to be in disrepair. A light is shown from a structure in the village. Good drinking water and provisions can be obtained here. The large village of Kampung Butun (Boetoen) is close E of the village.

Between Teluk Elat and **Kampung Werka** (5°42'S., 132°57'E.), 3.75 miles to the SSW, the coast is rocky cliffs that have a sheer rise from the sea to a height of about 21.3m. Tanjung Laer Mayoran, 2.75 miles SW of Teluk Elat, can be recognized by a waterfall that plunges directly into the sea. A 0.5m shoal lies 0.5 mile off the coast abreast of Kampung Watoear. The coast from Kampung Werka to Kampung Larat, 6.5 miles SSW, is low and gently sloping. A reef which breaks, with a 1.8m patch close N, is 3.5 miles N from Kampung Larat and about 1.5 miles offshore. There is a 18.3m patch about 1 mile N of this reef. Abreast of Kampung Nerong, 5 miles S of Kampung Werka, is a small inlet suitable only for small craft. The point at Kampung Larat is easily recognized by Aran, a rock fringed by a drying reef. There are several charted shoal spots along this stretch of coast.

The coast between Kampung Larat and Kampung Fer trends SSW for 9.25 miles with several indentations, the largest of which is 5.5 miles SSW of Kampung Larat. The most prominent marks along this part of the coast are a conspicuous white rock close to the shore 2.25 miles SW of Kampung Larat; Kampung Hoiko, on the shore of a small inlet whose sides rise almost vertically from the sea; Duvin (Doefin) Islet, on the shore reef close SW of Kampung Hoiko; and rocky Rerean Islet, on a reef 4 miles S of Duvin Islet. Very heavy squalls are experienced along this stretch of coast during the Southeast Monsoon.

4.34 Fer Roads (5°57'S., 132°51'E.) is an open anchorage 3.75 miles NNE of the S tip of Pulau Kai Besar. On the N side of the anchorage is a white sandy shore bank that remains dry at all stages of the tide. From this bank a tongue, with a least depth of 2.1m, extends S about 0.35 mile, forming within the shore bank a bight 0.2 mile wide, with depths of 10 to 29m. Vessels should approach the anchorage with the mosque in Kampung Fer bearing between E and SE and anchor in any depth on that bearing.

Kampung Fer is built on two terraces on a slope overlooking the roadstead. Kampung Langgear, surrounded by coconut trees and with a conspicuous mosque, is on the beach about 0.5 mile S of Kampung Fer.

Tanjung Weduar (6°01'S., 132°50'E.), the S extremity of Pulau Kai Besar, consists of vertical cliffs about 52m high.

Selat Nerong, the strait between the Pulau KaiKecil group and Pulau Kai Besar, is deep and clear with no difficulties to navigation. The least width of the strait, 4 miles, is between the villages of Kampung Abean on Pulau Kai Kecil and Kampung Hoiko on Pulau Kai Besar. Approaching from S or SW the high land of Nuhu Cut will first be sighted, resembling two coffins; a very large one being formed by mountains and hills between the village of Fer, 4 miles NNE of Tanjung Weduar, the S steep point of the island and the mountains 8 miles NNE. Nothing is known of the currents in the strait, but it is presumed that they are very weak.

Mataholar—W coast of Nuhu Cut

Kepulauan Aru

4.35 Kepulauan Aru (6°10'S., 134°30'E.), about 65 miles E of Pulau Kai Besar and about the same distance SW of the nearest coast of New Guinea, are generally low and very uniformly wooded. The group consists of five large islands, separated by very narrow and shallow channels, and numerous smaller islands. The larger islands are Pulau Kola, Pulau Wokum, Pulau Kobroor, Pulau Maikoor, Pulau Koba, and Pulau Trangan. The smaller islands are grouped around these five; most of them are connected to the principal islands by reefs, but some are connected by navigable channels. The highest elevations in the group, 89m and 73m, are located, respectively, near the S end of Pulau Trangan and on Pulau Karawair-Besar (Great Karawaira Island), which is E of the N end of Pulau Kobroor.

The reefs can generally be safely approached on soundings. Since the water in their vicinity is not clear the reefs are generally not marked by discoloration. Between the reefs there are passages through which small craft can reach the villages and the rivers and channels that separate the principal islands. It is not possible to place a definite limit on the danger zone around these islands, but is it not advisable to approach within the 20m curve.

There is little uniformity in the names given by the natives to the various islands, points, and channels of this group; some places are known by as many as six or seven different names.

These islands are generally very sparsely settled. The population in general is on the E side of the principal islands. Although there are many different tongues and dialects on the islands, Malayan is generally understood.

Most of the villages on the E coast are built on cliffs and can be reached only by means of flights of steps. The principal occupations on the islands are agriculture, hunting, fishing and pearl diving. Dobo, situated on the NW side of Pulau Wamar, one of the smaller islands on the NE side of the group, is the only port of any importance in the group and all trade is concentrated there.

Tides—Currents.—The tide at the village of Dobo will be

discussed later. HW occurs simultaneously on opposite sides of this group of islands in places of the same latitude, but the time of the HW becomes progressively later from N to S. HW at the S end of the group is 2 hours later than at Dobo. Throughout the group the amount of rise and fall of tide is about the same as at Dobo.

Tidal currents are perceptible 15 to 20 miles from Kepulauan Aru. In the open sea the flood current sets to the E and the ebb to the W; the maximum drift is about 2 knots. The flood and ebb currents, respectively, become established 1 to 2 hours after the H and LW at the shore.

Along the W side of the group the flood current sets S and the ebb N, with a maximum drift of 1.5 knots. The duration of the ebb current is considerably longer than that of the flood. In the mouths of the narrow channels between the islands there is a very strong ebb current lasting practically as long as that tide, followed by a strong incoming current during a few hours with the rising tide. The same condition exists at Dobo Roads, except that there is a brief period of slack water.

The flood current sets SE and E around the S end of the group. Off Tanjung Ngaburoamlu the S extremity of the group, this current has a maximum drift of three knots.

Along the N side of the group the flood current sets SE at a rate of about 2.5 knots as far as Kepulauan Jedan (Djedan Eilanden) where it turns SSE and continues in that direction along the E side of Pulau Wokam and Pulau Kobroor to Pulau Mariri, about midway along the E side of Pulau Kobroor. At that position it meets the flood current that sets ENE from the S end of the group. Turning with that current it sets back N along the E coast. At the junction of these two currents, a rotary movement is set up toward the shore when the tide is rising and away from the shore on the falling tide. North of the N end of **Pulau Penambulai** (6°17'S., 134°52'E.) the ebb current sets NNE and N as far as **Pulau Konan** (5°34'S., 134°46'E.), a small islet 44 miles to the N, where it turns to the NNW. North of Kepulauan Jedan its direction is NW by N. South of the N end of Pulau Penambulai, the ebb current follows the line of offshore reefs to the S. Off the entrances to the channels separating the islands the current is deflected to the SE and S.

Off the E coast, the direction of the tidal currents is considerably affected by the currents that set through the channels separating the islands. The currents setting out of these channels exert much more influence on the coastal currents than do those setting into the channels.

Heavy rips caused by the irregularity of the bottom and giving the impression of the existance of dangerous shoals have been observed at the height of the tidal currents off the N and S ends of the group, particularly SW of **Kultubai Selatan** (6°52'S., 134°43'E.) and the S and W extremity of Pulau Jeudin (Djoeedin).

Caution.—A reef of indefinite size has been reported S of Kepulauan Aru within a 5 mile radius of position 8°33'S, 134°26'E. This reef is unexamined.

A bank, with a depth of 22m, has been reported about 36 miles SW of Tanjung Ngabordamlu, the southernmost extremity of Kepulauan Aru; a bank with depths of less than 37m extends about 33 miles SSE and 36 miles ESE from the same point. A depth of 31m is close to the S extremity of this bank. Another bank with depths of less than 37m extends E from the E side of Kepulauan Aru, but the E limit of this bank has not been defined. A least charted depth of 20.1m is about 105 miles ENE of Tanjung Ngaboradamlu in position 6°44'S, 135°54'E. A detached bank,with a depth of 29m, is in position 7°28'S, 136°17'E, about 49 miles SSE of this last depth. An incomplete survey showed depths between 9.1m and 20m within a 14-mile radius of position 8°24'S, 135°45'E. **Kolff Bank** (7°00'S., 136°51'E.) has a least depth of 14.6m; **Le Chur Bank** (8°30'S., 136°15'E.) has a least depth of 24m.

A 6.4m shoal and a 9.1m shoal lie 34 miles WSW and 46 miles WNW, respectively, from Tanjung Ngabordamlu.

4.36 North side of Kepulauan Aru.—Pulau Warilau (Warilaoe) (5°22'S., 134°32'E.) the largest island N of Pulau Kola, is uniformly covered with tall trees. A small village of the same name is on the SW side of the island. The island has been reported to be a good radar target at a distance of 19 miles. A light is shown from the northernmost tip of the island. Pulau Toba, a small islet with an extensive reef extending from its N, W, and SW sides, is 1.5 miles W of Pulau Warilau and is covered with tall trees. Ngoba is a small crescent-shaped islet on a wide reef extending NW from Pulau Warilau, its trees are not as high as those of Pulau Toba. A dangerous wreck, reported (1980) to lie approximately 8 miles NW of Ngoba, can best be seen on the chart. A detached reef with a small grass-covered islet is between Pulau Toba and Ngoba. Another detached reef with a similar grass-covered islet is 1.2 miles NNE of **Tanjung Watulaijuring** (Watoeleidjoering) (5°20'S., 134°34'E.) the N extremity of Pulau Warilau. A sand bank that covers at HW is on the shore bank E of Pulau Warilau and NW of Kepulauan Jedan.

Kepulauan Jedan (Djedan Eilanden) (5°23'S., 134°40'E.), consists of a group of uninhabited islands, the larger of which are low but well wooded. **Pulau Jedan** (5°23'S., 134°41'E.), the northernmost island of the group, is the most important landmark in this part of Kepulauan Aru. The trees on this island are about 51m high. In daytime the island can be seen at a distance of 13 miles. The reefs on which these islands lie are intersected by several tortuous channels through which the tidal currents are strong when the reefs begin to uncover. Pulau Lutur (Loetoer), 1.25 miles SW of Pulau Jedan, has a small summit that is slightly above the surrounding foliage. Santigi, a group of five low mangrove-covered islets, are on the reef that extends E from Pulau Lutur (Loetoer). Surat Islet (Soerat), a small atoll-shaped sandbank, is on an extensive reef S of Pulau Jedan. Pulau Belading, the largest island of this group is close W of Pulau Lutur; a narrow channel separates the reefs on which these last two islands lie.

A dangerous sunken rock is in position 5°17'S, 134°45'E about 6.75 miles NE of Pulau Jedan, outside of the 20m curve,; a reported depth of 5.5m is about 3.8 miles W of this rock. There is a shallow spot with a least depth of 5.9m, outside the 20m curve, 4.5 miles WNW of Toba Island.

A group of eight or nine rock islets densely covered with vegetation are SE of Pulau Warilau; the southernmost is named Tapusur (Tapoesoer).

4.37 Watoe (5°24'S., 134°28'E.), a deep channel in which there are no dangers, is between Pulau Warilau and the N side of Pulau Kola, the northernmost of the principal islands of the group. The reefs on either side are generally marked by discol-

oration. The Tiga Islets are three high thickly-wooded islets on the shore of this channel close off Pulau Kola. Klipklip Watu is a small, unsurveyed channel that leads from N close along the SE shore of Pulau Warilau into Sungi Kola Watu. The E approach to Sungi Kola Watu is either N or S of Tapusur, but the S channel is suitable only for small craft. The N part of this channel has not been completely surveyed. In the N channel there are general depths of 4.1 to 17.8m, but there is a 3.9m shoal in mid-channel about 0.8 mile S of the SE end of Pulau Belading. The edges of the reefs along this channel are generally marked by discoloration. The channel leads NW to a point abreast the W end of Pulau Belading and then SSW along the E shore of Pulau Lafusa, an islet about 0.8 mile W of Tapusur. This part of the channel, in which there is a least midchannel depth of 6.8m, joins Sungi Kola Watu SW of Pulau Lafusa. Local knowledge is necessary.

4.38 West side of Kepulauan Aru.—Except for the S part of Pulau Trangan, which is hilly and has a sheer rise from the sea, the W side of the islands of Kepulauan Aru are low and uniformly covered with dense woods. There are no landmarks that can be used to fix the position of a vessel along this coast. The mouths of the various rivers and channels and the more or less protruding section of the islands are of use to vessels passing close along the shore. Inside the 10m curve there are numerous reefs. The bottom along this coast is regular, except along the S part where soundings can be used as a guide. Vessels can anchor outside the 10m curve in sand almost anywhere along this coast.

Pulau Kola (5°28'S., 134°33'E.), the northernmost of the main islands of Kepulauan Aru, is low and densely wooded. Sungi Kola Watu, previously discussed in paragraph 4.37, separates Pulau Kola from Pulau Warilau. The island is intersected by several channels and creeks of various depths. The two largest channels are Sungi Marjina which opens into the E part of Sungi Kola Watu, and Sungi Marlassi, which is entered on the E side of the island. Sungi Sisirwatu, which limits the S side of Pulau Kola and separates it from Pulau Wokam is said to be suitable only for small craft. Tidal currents rush through the channel with great force. At its W end the channel is narrow and tortuous and has formed a sort of delta on which there are numerous islets and drying flats.

Buar Island (Boear Island) (5°26'S., 134°27'E.), separated from the NW end of Pulau Kola by a narrow channel, is similar to that island in that it is low and densely wooded. A drying reef extends nearly 0.75 mile from the NW side of the island. A 3m reef about 0.5 mile in diameter is 2 miles SW of the SW extremity of Buar Island.

4.39 Pulau Wasir (5°31'S., 134°15'E.), the northwesternmost of the Kepulauan Aru group, is about 11 miles WSW of Pulau Buar. It is rocky and somewhat higher in the N part than in the S part. Along the W side of the island, which can be approached rather closely, there are four large wooded rocks. The northernmost of these rocks can be recognized at a considerable distance offshore. Java Reef, a 15.8m shoal, is 3.75 miles N of the N end of Pulau Wasir. Selat Wasir, the strait separating Pulau Wasir and Pulau Ujir, has general depths of 18.3m, but near mid-channel at the NE end there are two shoals that make navigation rather difficult. Over the E shoal, 1 mile NW of the N end of Pulau Ujir, there is a depth of 4.9m; the other shoal, 0.75 mile W of the E shoal, has a least depth of 5.5m. This strait is navigable by vessels drawing less than 4m.

Pulau Ujir (Pulau Oedjir) (5°36'S., 134°17'E.), just outside a bight of Pulau Wokam and 3 miles SE of Pulau Wasir, is 7 miles long NE-SW, and 1.25 to 3 miles wide. The N part is higher than the S. A sand bank, dry at all stages of the tide, is on the drying shore reef SW of Tanjung Tutupano (Toetoepano), the W extremity of Pulau Ujir. Reefs extend 0.8 mile from the SE coast and a depth of 0.9m is about 1.4 miles N of the NE end of Udjir. the W extremity of Pulau Ujir.

The W side of Pulau Wokam, the largest island of the Kepulauan Aru group, between the entrances to the rivers Sungi Sisir Watu and Sungi Waliramai, is bordered by a reef about 0.75 mile wide which dries in places. Sungi Waliramai is shallow and has Lewakai Islet off its mouth. The shore in the vicinity of Tanjung Samang, S of Pulau Ujir, is rocky in places and is light gray in color. Between this point and Tanjung Malakafani, the W extremity of Pulau Wokam, the coast is fringed by a reef 0.75 mile wide. Several villages on the N part of this stretch of coast are nearly concealed by trees. The channel between Pulau Ujir and Pulau Wokam contains several dangerous reefs and its use is not advised. Vessels that do use the passage usually await low tide.

Pulau Wamar (5°48'S., 134°12'E.), close S of the westernmost projection of Pulau Wokam, is low, thickly wooded, and fringed by a drying bank except at its NW extremity, where there is a drying reef. The town Dobo is on the NE extremity of the island. On the coast just S of Tanjung Ular (Oelar), the NW extremity of the island, there are three conspicuous rocks, and on the reef near Tanjung Batudua (Batoe Doea), the SW extremity of the island, there are two similar rocks.

4.40 Dobo Harbor (5°45'S., 134°11'E.), the limits of of which is between the coast of Pulau Wokam and the NE side of Pulau Waram, are lines drawn 045° from Tanjung Ular and 225° from Tanjung Merukujuring. The harbor is low and rocky. The Pulau Wokam shore of the harbor is mostly covered with mangroves. The width of the channel between the 10m curves is about 0.5 mile at the W entrance and about 0.3 mile abreast the town of Dobo. The area between these curves and the shore is occupied principally by broad drying shore banks. The sandy point on which Dobo stands can be approached closely. The water in the harbor is so muddy that discoloration is no guide to dangers except those that dry at LW. Shoals, some of which dry, are in the channel about 1.25 miles E of Dobo.

The least depth in the channel to Dobo is 9.3m and is located N of Tanjung Ular. There are depths of 20 to 46m in the anchorage.

The most prominent feature in the vicinity of the harbor is the light structure on Tanjung Ular, from which a light is shown. Another light is occasionally shown on the head of the pier at Dobo.

A submerged pile marked by a buoy is on the S side of the fairway about 1.5 miles E of Tanjung Ular.

A beacon is on the shore bank on the S side of the fairway about 0.6 mile WNW of the light post at Dobo. A partially-submerged wreck lies 0.5 mile W of the light at Dobo.

Tides—Currents.—At Dobo the highest water level occurs in February and March, the lowest in July, August, and September.

The maximum rise and fall that can be expected are, respectively, about 2.5m above and 0.2m below mean sea level.

Off the entrance to Dobo Harbor, the flood current sets to the S, the ebb to the N. During the Southeast Monsoon, the flood current is weak, but the ebb current has a velocity of 1.5 knots and lasts longer than the flood; the ebb current is sometimes strong at the anchorage off Dobo.

Directions.—Approaching from W, four openings in the coast will be seen for a considerable distance; the third from the N is the entrance to Dobo harbor. Closer in the light structure on Tanjung Ular will be seen. A vessel should enter with the flagstaff at Dobo or, if this cannot be distinguished, the northernmost building, a large black shed with a zinc roof, in line with the white beacon bearing 116°. This will lead over the S extremity of the bank extending S of Tanjung Malakafani. The beacon is sometimes difficult to identify. When the light structure at Tanjung Ular bears 220°, steer 101° until **Tanjung Fanadjuring** (5°48'S., 134°19'E.) is seen midway between Dobo and Tanjung Merukujuring bearing 115°. This leads to the anchorage, in depths of 20 to 46m, near the pier. The drying banks on each side of the channel may not be marked by discoloration.

4.41 Dobo (5°45'S., 134°13'E.), on a small sandy point on the NE side of Pulau Wamar, is the principal port in the Kepulauan Aru group. A 33.5m long pier, with a depth of 3.5m at its head, is used by local trading craft; it was reported in poor condition. An oil jetty is situated 4 miles S of Dobo, on the SE side of Wamar.

There is a small hospital and a doctor. Some provisions are available.

Between Tanjung Malakafani, the W extremity of Pulau Wokam, and **Tanjung Fatujuring** (6°00'S., 134°08'E.), the NW extremity of Pulau Maikoor, the irregular coast forms a roughly rectangular unnamed bay about 17 miles long and 8 to 10 miles wide, in the NW corner of Pulau Wamar, which has been previously described in paragraph 4.39. The entrance to the unimportant river, Sungi Tunguwatu, is at the NE corner of the bay and the entrances to the rivers, Sungi Manumbai and Sungi Workai, are near the SE corner. The E shore of the bay N of Sungi Manumbai is irregular in outline, with numerous points and bights; between Sungi Manumbai and Sungi Workai the coast is rocky, with several small islets close off near the entrances to the river channels. The S part of the bay is somewhat higher and has rocky points in places. Between **Tanjung Meijuring** (6°01'S., 134°13'E.), about midway along the S shore, and Tanjung Fatujuring there is a small unimportant unnamed bay partly closed by a reef with a depth of 1.8m.

Pulau Meirang (5°50'S., 134°17'E.) and Lomar are two islets in the N part of the bay close off Pulau Wokam. **Pulau Babi** (5°55'S., 134°09'E.), on the W side of the bay between Pulau Wamar and Tanjung Fatujuring, is low but covered with high trees; it is easily recognized by three rocks on the shore reef close of the SW extremity of the island. Several dangers with depths of less than 0.9m are within a 3.25 mile radius SW, W, and NE of **Tanjung Toardefete** (5°55'S., 134°17'E.). A rock with a least depth of 1.8m is about 2.75 miles WNW of the same point.

There are so many dangers in the N part of the bay that local knowledge is needed for navigation.

Anchorage.—Anchorage can be obtained, in 20m, in the bay about 1 mile E of Tanjung Fatujuring and E of a jetty on the W side of the bay. Enter the bay with the E end of Pulau Babi bearing 000° astern and a rock at the head of the bay bearing 180° ahead. When the white house on the jetty bears 258° steer for it on that bearing and anchor when Tanjung Fatujuring bears 323°. There is a reef off the W side of the bay about 1 mile SSE of Tanjung Fatujuring which is marked by a beacon. A 2.7m shoal is 1.5 miles NW of Tanjung Fatujuring. A 1.8m shoal lies 1.75 miles E of Tanjung Fatujuring.

4.42 Sungi Manumbai (6°01'S., 134°17'E.) is the most important of the channels through the Kepulauan Aru group. It is 28 miles long and has a least depth of 5.5m. Because the E part of the channel has not been surveyed, local knowledge is necessary for its navigation.

The flood tidal currents set into the channel at both the E and W ends and the ebb current sets outward. The average velocity of the currents through the mouths is 1.5 to 2.5 knots.

In the approach to the W entrance to Sungi Manumbai there is a bank with a least depth of 4.5m, but there is a channel N and E with a least depth of 5.8m leading to the entrance. A drying reef, extending from Tanjung Belingaratu, the N entrance point of Sungi Manumbai, should be given a wide berth. The village of Kampung Manumbai, on the S side of the entrance and off which there is a rock covered with light-green vegetation, is a good mark and can be passed close aboard. A conspicuous white rocky patch is close E of the village. The shore is rock bound in this vicinity. About 3 miles E of the village there is a bight on the S side. Two islets in the bight are thickly covered with vegetation.

Directions.—After entering Sungi Manumbai, steer a midchannel course as far as the above-mentioned bight, then the best water, from 9.1 to 10m, is close to the N shore until past the mouth of Sungi Marirremaar, about 4 miles E of the village of Kampung Manumbai. Elsewhere, except at the entrance, the depths are over 10m and the channel is free of dangers. A waterfall is on the N shore about 3 miles farther E, past the entrance of Sungi Marirremaar. Near the entrance of Sungi Api Api, on the S shore, about 4 miles E of Sungi Marirremaar, there is a noticeable hillock. There is another hillock, with a conspicuous tree and vegetation, on a point on the S shore, close W of the position where the river trends E for a short distance. Rocks are close to both shores in places.

About 1.5 miles W of the mouth of Sungi Dosi, in which there are some islets and which is about 9 miles ENE of Sungi Api Api, there is a drying rock which must be passed on the N side. Beyond the mouth of Sungi Feraun, on the N shore about 2 miles ENE of Sungi Dosi, the N shore should be hugged, but thereafter the S shore should be closed by crossing between drying mud banks in a least depth of 5.5m.

4.43 Sungi Workai (6°03'S., 134°15'E.), separating Pulau Koboor and Pulau Maikoor, can be used by vessels of moderate draft as far as Pulau Nyamuk (Njamoek), about 4 miles above the W entrance. The depths are about 4.9m to the E entrance, but at this E entrance there is a least depth of 1.8m, which limits through passage to small boats. Local knowledge is essential.

Pulau Maikoor (6°13'S., 134°15'E.), long and narrow, is be-

tween Sungi Workai on the NE and Sungi Maikoor on the SW. The island is flat and thickly wooded. The W coast of the island between T**anjung Fatujuring** (6°00'S., 134°08'E.) and the entrance to Sungi Maikoor, 8 miles to the S, is fronted by a sandy beach. Sungi Beloide, an unimportant stream discharging into the sea 4 miles S of Tanjung Fatujuring, dries at LW. A bank extending out from the mouth of the stream has depths of 0.9m.

A bank, which dries in places, extends about 1.5 miles W of the W shore of Pulau Maikoor and detached shoals with depths of 6.9 to 9.1m are within a mile farther seaward.

Sungi Maikoor (6°09'S., 134°06'E.) has a broad, deep entrance and can safely be navigated on soundings at least as far as the village of Taberfane, 2.5 miles above **Tanjung Ngoni** (6°10'S., 134°05'E.), the S entrance point to the channel. Vessels occasionally call at the village. A large and very steep rock which uncovers at LW springs is in mid-channel abreast of the village. The channel above the village appears to be deep, but is too narrow for vessels.

Pulau Trangan is the southernmost of the large islands of the Kepulauan Aru group. The W side of the island is low and a relatively-wide band of soundings with irregular depths is off it. The N part of the coast is wooded. Between Tanjung Ngoni and the entrance to Sungi Serwatu, about 17 miles S, are the mouths of three small rivers, Sungi Hokmar, Sungi Lutur, and Sungi Rebi. A light is shown about 2 miles W of Sungi Rebi. On the shore reef just N of Sungi Rebi are two small islets which are seen clear of the land when approaching from the S, but are hard to distinguish from the N approach.

Batavia Reefs (6°19'S., 134°00'E.), 10.5 miles SSW of the entrance to Sungi Maikoor and about 4.5 miles offshore, are several shoals with depths of 4.5 to 6.7m. There are two patches here with least depths of 5.5m and 6.8m. These shoals cannot be distinguished by discoloration.

There are several 9.1 to 10m shoals W and SW of the entrance to Sungi Serwatu; the outermost is 6.5 miles offshore. Soundings give warning of approach to these shoals.

4.44 Sungi Serwatu (6°26'S., 134°06'E.), which divides Pulau Trangan into two parts has been surveyed only as far as the mouth of Sungi Loloor, a small tributary about 7.5 miles above the mouth. The entrance is about 1 mile wide, but it is fronted by a large bank with depths of 0.3 to 2.4m. A 0.2 mile wide channel, marked by lighted buoys, having a least depth of 4.9m leads over this bank. The monsoons are reported to cause this channel to shift. Inside the bar the channel is wider and deeper, but entering vessels should favor the W shore to avoid a drying reef projecting from the shore opposite Tanjung Derehi. The shores are alternately limestone rocks and low mangrove-covered land. The river affords sheltered anchorage for small craft.

The W coast of Pulau Trangan S of the entrance to Sungi Serwatu as far as the village of Kampung Ngaibor, 16 miles to the S, is low with a sandy beach about 91m wide and a wide bank of irregular soundings off of it. The coast is backed by gently sloping land covered with tall grass and shrubs.

Kampung Ngaibor (6°43'S., 134°04'E.), situated on a small plateau, is the largest village on the W side of Pulau Trangan and is a good landmark. Sungi Ngaibor, the largest freshwater river in the Kepulauan Aru group, discharges into the sea about 0.75 mile N of the village.

The coast S of Kampung Ngaibor is low and rocky as far as **Tanjung Lelar** (6°46'S., 134°02'E.), the SW point of Kepulauan Aru. From this last point to Tanjung Ngabordamlu, the S extremity of Pulau Trangan, the coast is rocky and somewhat higher than to the N. Because it rises steeply from the sea, the points along it are rather easily recognized. Among the landmarks along this stretch of coast are the mouth of the river Sungi Tafermaar and Bain Hill, which, although 89m high, rises only slightly above the other land in the vicinity.

Tanjung Bain (6°51'S., 134°05'E.) is a good radar target at a distance of 25 miles.

Caution.—There are numerous shoals with depths of 2.1 to 10.9m on the bank of soundings between the entrance to Sungi Serwatu and Tanjung Ngabordamlu. Caution must be exercised by vessels proceeding inside the 20m curve. Careful soundings should be taken because they give a fair indication of the approach to the shoal areas. A 5.8m shoal is about 2.5 miles WSW of Tanjung Bain, midway between that point and a large 3.6m shoal off the SE end of Blackburn Bank. This shoal is directly in the path of vessels coming from N and proceeding inshore of Blackburn Bank.

The strong tidal currents, especially those during the ebb, further add to the difficulty of inshore navigation along the W and SW coasts of Pulau Trangan because of the unpredictable manner in which they change direction among the shoals and reefs.

A 9.1m shoal, 183m wide, is about 38 miles W of Pulau Trangan.

4.45 Tanjung Ngabordamlu (6°57'S., 134°11'E.) is a relatively low rocky point at the S end of Pulau Trangan. On the drying reef that extends SE from it is a small islet about the same height as the point. Batu Goyang, a large bare, grayrock, 10m high, is on the shore bank 0.5 mile S of the point. Close E of this rock is a rock awash. A 2.1m shoal is 1.1 miles SE of Batu Goyang, and there are several other shoals around Tanjung Ngabordamlu. A 1.4m shoal is reported approximately 1.25 miles S of Tanjung Ngabordamlu. There are usually strong currents, rips, and high seas over the irregular depths on the bank of soundings in the vicinity of the point.

Tanjung Ngabordamlu is a good radar target at a distance of 23 miles.

Blackburn Bank (6°52'S., 133°56'E.), about 8 miles off the SW end of Pulau Trangan, consists of several detached shoals with depths of 2.1 to 6.7m with relatively deep water in between. The shallowest part of these detached patches occasionally break. The bank extends, within the 10m curve, for about 5 miles in a NW-SE direction. An extensive 3.6m shoal is about 3 miles E of the SE end of Blackburn Bank. There are other charted shoals between these last two banks and Tanjung Ngabordamlu, and several 9.1m shoal patches are 4 to 8 miles S of the shallowest part of Blackburn Bank.

Because the SW coast of Pulau Trangan has few landmarks and is frequently obscured, no marks can be given for clearing the numerous off-lying dangers. The tidal currents are very strong in the vicinity of the bank and the shoals in the area. It is also quite probable that the currents cause the shoals to shift considerably. Accordingly, vessels should give the bank and the adjacent shoal areas a wide berth.

4.46 East side of Kepulauan Aru.—Except for **Pulau Karaira-besar** (Groot Karaweira Island) (5°58'S., 134°50'E.), which can be recognized with local knowledge at a distance of 20 miles, there are no good landmarks on the E side of Kepulauan Aru. The remaining coast appears as one uniform stretch of land, and the off-lying islands are difficult to identify from a distance.

Caution.—Because of strong currents along this coast, it is advisable to keep outside the 20m curve.

The E side of Pulau Kola is rocky but thickly wooded. **Kampung Marlassi** (5°29'S., 134°39'E.) and Kampung Masidan, built on a rock 3 miles farther S, are on this coast; from seaward these villages appear as light red spots. A wide reef off Pulau Kulur, as well as the islets to the S, prevents vessels approaching closer than 6 miles unless through one of the narrow channels that cut through the reef. On the reef in many places there are small clumps of trees and some islets such as Pulau Binaar, located N of the E entrance to Sungi Sisirwatu. Two prominent trees are reported about 1.5 miles S of **Tanjung Leitin** (5°31'S., 134°41'E.).

Pulau Konan (5°34'S., 134°46'E.), 5.5 miles SE of Tanjung Leitin, is an uninhabited, sandy, heavily-wooded, and atoll-shaped islet, the highest point of which is a small tree on the NW side. The islet is on the SE part of a large 4.5 mile long reef. On the reef close off the S and N end of the islets are two rocks. On a clear day the islet can be seen for a distance of 13 miles and appears as two small trees showing above the horizon.

4.47 Pulau Arar Kula (5°36'S., 134°46'E.), on an extensive reef 2 miles S of Pulau Konan, is a coral and mud bank dry at all stages of the tide, although it has been reported that the above-water part of the bank could not be seen either visually or on radar. There are a few isolated trees on this bank. The reef on which Pulau Arar Kula stands is separated from the one extending S from Pulau Kola by a narrow winding channel, and from Pulau Wokam by a rather wide channel with depths of 5.8m. The S entrance to the latter channel is foul. The channels N and S of Pulau Arar Kula are used by small craft proceeding to Sungi Serwatu, which has already been previously described in paragraph 4.44.

The E coast of Pulau Wokam, like that of Pulau Kola, is thickly wooded and rocky. Of the several villages along this coast the most important is Moha, W of Pulau Arar Kula. These villages are similar to the others on the coast in that they are built on rocks and appear from seaward as red patches.

A projecting point, S of **Tanjung Komfane** (5°39'S., 134°45'E.), can be seen for a considerable distance N or S; because of the gaps in the trees on the point, it appears as several separate islands. A group of trees on the point, the tallest of which has a conspicuous hammer-shaped top, can be seen from E or SE for a distance of 15 miles. South of this point is a wooded islet and two islands named Wodinhun and Wahalaulau, which are thickly wooded. Beyond these islands, the coast turns W and S and has no recognizable points.

The remainder of the E coast of Pulau Wokam is divided by numerous rivers into several islands, the principal being Aranlau and Sewer. Most of this section of the coast is obscured from seaward by the off-lying islands of Kepulauan Watuli and Kepulauan Jurisan.

Caution.—A 3m shoal is 3.75 miles E of Pulau Arar Kula and a 4.9m shoal is 5.5 miles E of Wodinhun Island.

4.48 Kepulauan Watulai (5°49'S., 134°46'E.) is a large number of rocky islands on a very extensive reef through which a few narrow but more or less deep channels give access to the islands' villages and coastal villages. Pulau Jursian and the islets near it may be considered belonging to Kepulauan Watulai. Pulau Aduar, Pulau Kumul, Pulau Watulai, and Pulau Jursian are inhabited.

Rewan (5°43'S., 134°48'E.), the northernmost of the group, is actually three small wooded islets close together; the southwesternmost is the highest, with the others nothing more than wooded rocks. These islets are difficult to make out until they are open of Pulau Aduar and Manien. South of Rewan there is another large rock.

Manien (5°43'S., 134°47'E.) is thickly wooded and may be seen from the N for a distance of 17 miles. The W side, rocky and higher than the rest of the islet, looks like a point when seen from N. On the E side there is a sandy beach.

Pulau Aduar (5°45'S., 134°47'E.), the highest and largest of the Kepulauan Watulai islands, is covered with tall trees. A small wooded hill is on the S side of the island. A narrow 2.8m channel leads to the villages on the island. Ilmamui Island, close S of Pulau Aduar, is lower than that island, but is thickly wooded. Ngoab Islet about 0.75 mile SE of Ilmamui Island, is rocky and covered with low trees; two isolated coconut palms are conspicuous. There is a flagstaff at the villages of Kabalasiang and Bendjoering.

4.49 Kumul Island (5°47'S., 134°46'E.), 1.5 miles S of Pulau Aduar, is thickly wooded and slightly elevated at the center. The SE extremity of the island is a narrow, rocky tongue of land with a remarkable bare spot with a small clump of coconut trees. The village of Kampung Kumul, on the SE side of the island, is reached by a passage through the reef. A flagstaff is at the village. Mangan Island and some small islets are close S of Kumul Island.

Watulai Island (5°49'S., 134°47'E.), about 1 mile long, has a bare patch on its N point similar to that on Kumul Island. The village, with a flagstaff, is on the E side of the island. A conspicuous clump of trees about 45m high is NW of the village and forms a mark for navigating the channel through the reef to the villages of Kampung Kumul and Kampung Watulai. The N point of the island can be approached by small vessels at LW.

Pulau Tabar (5°49'S., 134°46'E.), thickly wooded and flat, is separated from W side of Watulai Island by a narrow channel. Elel Menalau and Mentai, on an extensive reef SE of Watulai Island, are rocky islets covered with vegetation. A group of coconut trees is near a village on the NE side of Menlau. The village is hard to distinguish from seaward. The trees on Mentai give the island the appearance of a plume. Ramje, Waria, and other rocky and wooded islets partly close the entrance to a bay W of Pulau Tabar. A village on the NE point of Waria is visible from seaward and is reached by a winding channel leading through the reefs S of Mentai.

Pulau Jursian (Djoersian) (5°54'S., 134°46'E.), several rocky wooded islands with several small inlets, are close of the coast of Pulau Wokam. Only the N part of Pulau Jursian can be

seen from seaward and it is recognized by Kampung Jursian, built on a rock nearby. Other small islands are off the N part of the island.

4.50 Channel to Kumul Island and Pulau Watulai.— About 2.5 miles NE of Watulai Island is the entrance to a narrow but fairly deep channel leading SW and W toward Kampung Kumul and Kampung Watulai. The outer edge of the reef can be approached by soundings. The best anchorage off the mouth of the channel is in about 5.9m, with the N point of Kumul Island in range with Ngoab, bearing about 267°, and the W of the two small **Maar Islets** (5°57'S., 134°47'E.) in range with the E extremity of Menalau, bearing 194°. Beyond the anchorage mentioned above, local knowledge is necessary for navigating the channel. The channel is only about 137m wide in places and has a least depth of 4m. The ebb current runs outward with great strength at springs.

Kepulauan Karawaira (5°59'S., 134°51'E.) consists of 13 islands and may be divided into two parts, Karawaira-Watulai and Karawaira-Mariri. To the former belong Pulau Karawaira-besar (Groot Karawaira) and Sabir, lying on a drying reef. The Karawaira-Marira group is 2 miles S. The southernmost of this latter group is called Pulau Dorlau, but the others are unnamed. All of these islands are uninhabited and unhealthy.

4.51 Pulau Karawaira-besar (Groot Karawaira) (5°58'S., 134°50'E.), the highest land on the E side of the Kepulauan Aru group, is visible for a distance of 20 miles. It is rocky, thickly wooded and has several large rocks close to the shore. The highest tree in the middle of the island has a top like a cross and is very conspicuous when seen from E to NE. Sabir Islet, near the edge of the reef 0.75 mile E of Pulau Karawaira-besar, is small and lower than that island, and because it is nearly divided by a depression, it appears from some directions as two islets. Near the SE point of the islet, a rock above water has the appearance from NE of a lion lying down. The reef on which both islands are located, and which extends to Pulau Maar on the W, projects 3.5 miles N from Pulau Karawaira-besar, and has on it some sand banks that dry at half tide.

The islands of the Karawaira-Mariri group extend N and S about 4.5 miles. Pulau Dorlau, the southernmost island, is covered with vegetation and has two high trees on it. East of the reef of Karawaira-Mariri, a black coral reef that dries at LW, has its center 1.5 miles from the E edge of the reef. Some low isolated trees are on the S part of the reef surrounding Karawaira Mariri.

Pulau Maar (5°57'S., 134°47'E.) is actually two small rocky islets, of which the W is the higher. The E islet when seen from NE appears as two, but the two parts are connected by a natural stone bridge.

East of the reef of Pulau Karawaira-besar and separated from it by a channel with depths of 5.5 to 6.8m is a reef 8 miles long in a N-S direction, and 2.5 miles wide at its S end abreast of Pulau Karawaira-besar, then tapering to a point at its N end with depths of 2.7 to 4.9m. Off the S part is a small detached 2.1m shoal. The outer edge of the reef is 4.75 miles NE and 4 miles E of Pulau Karawaira-besar and its N end is 4 miles E of Watulai Island. It may be approached by soundings.

Batu Kapal (6°04'S., 134°50'E.), about 2.5 miles SSW of Pulau Dorlau and 4 miles off the coast of Pulau Kobroor, is a high, partly-wooded rock, which when open of the Pulau Kobroor coast, is a good mark. It is considered sacred by the natives. The channel N and E of this rock is foul; a 4.5m shoal is 0.8 mile E. A reef with a small sand bank which is dry at HW is 3 miles ESE of Pulau Dorlau.

4.52 Channels to Sungi Monumbai.—Small local craft bound for Sungi Monumbai usually take the channel that leads N and W of the reef on which Pulau Karawaira-besar is located, past Pulau Maar, then in a SW direction to the channel entrance. Another approach leads either N or S of the drying reef SSE of Pulau Dorlau, S of Batu Kapal, then to the channel. There is good anchorage S of Batu Kapal. Sungi Monumbai has been previously described in paragraph 4.42.

Kepulauan Mariri (6°11'S., 134°51'E.) consists of Pulau Mariri, Pulau Leer, and several smaller islands, of which Lola is the southernmost and most important. The group is about 5 miles off the coast of Pulau Kobroor along a NNE-SSW line and are in great part overgrown with coconut trees. The area between these islands and Pulau Kobroor is almost entirely occupied by sand banks and reefs. There are often heavy tide rips on the shoals between Kepulauan Karawairi and Kepulauan Mariri. On the N side of Pulau Mariri, the N island, there are two conspicuous coconut trees that can be seen for about 15 miles. Two rocks are off the N end and two are off the W coast of Pulau Mariri and two more are off the SE point of the island. The village of Kampung Mariri, easily seen from seaward, is on one of the latter rocks. A reef with two high sand banks extends 1 mile W and NW from Pulau Mariri. On the E side of the island, the reef is comparatively close to the shore; depths decrease gradually from seaward. This reef is separated from the rest of Pulau Mariri by a channel with a depth of 3.9m. Anchorage can be taken, in 6.7m, with Kampung Mariri bearing 268°, about 0.75 mile offshore. There is a 4.6m shoal 0.75 mile SE of Kampung Mariri. Wadidjili Islet and Sedja Islet, which is in two parts, are on the reef NE of Pulau Leer.

Pulau Leer (6°12'S., 134°51'E.), 1.5 miles S of Pulau Mariri, is heavily wooded and may be recognized by its many dead trees. When coming from SE, Pulau Leer and the highest point of Pulau Mariri are sighted first. Five small, rocky islets are on the reef off the S point of Pulau Leer. Kampung Lola is on Lola Islet, the southernmost and largest islet; a clump of coconut trees is on a point of land just S of the village. Lola Islet, is surrounded on the E and S by a reef with a least depth of 4.5m. Small vessels can approach the village to within about 183m.

Epar (6°11'S., 134°49'E.), on a separate reef W of Pulau Leer, is rocky and overgrown and is actually two islets that appear as one from seaward.

4.53 East coast of Pulau Kobroor.—From Tanjung Balatanjuring (6°05'S., 134°45'E.), the NE point of Pulau Kobroor, the coast trends NW forming the S bank of Sungi Manumbai. From the same point it stretches S and SW for about 20 miles to the SE point of the island. Laklakar Island, 1.5 miles SE of Tanjung Balatanjuring is rocky, wooded and surrounded by seven detached rocks covered with vegetation. About 3 miles S of Laklaklar is the mouth of the river Sungi Warloi. Leliling Island, with the village of Warloi on its E side, is in the river entrance channel. North of the village is a tree with a conspicuous white bare trunk. There are several villages on the coast of Pu-

lau Kobroor; Kampung Kobroor is at the mouth of the river of the same name and Kampung Pono is on the rocky SE extremity of the island at the entrance to the river Sungi Workai. The coast reef extends out in some places up to 2 miles, but it has not been fully examined. On this reef are Waria Islet, Kokwana Islet, Kuling Islet, and two rocks.

Pulau Penambulai, Pulau Barakan, and Pulau Workai are three relatively large islands lying, respectively, off the SE part of Pulau Kobroor, the E side of Pulau Maikoor, and the NE part of Pulau Trangan. Except for a few places where the coast is rocky, these three islands are low but covered with high trees. However, the NE side of Pulau Penambulai has been reported as being radar conspicuous. Since the area W of the outer string of islands has not yet been surveyed, little is known about Pulau Mimien, Kool Mimien, Pulau Lelamtuti, Pulau Wolvat, and Pulau Baun between the three off-lying islands and the shores of the main islands mentioned above.

Among the landmarks on the E side of Pulau Penambuli are: **Tanjung Uafa Fenjuring** (6°19'S., 134°53'E.), a conspicuous point with high trees and a sandy beach, about 2.25 miles SE of the N end of the island; a clump of trees about 49m high just N of Kampung Rabal, about 3 miles S of the above point; and a conspicuous tree with a bare straight trunk and a thick top on Tanjung Ki, 5 miles SSW of Kampung Rabal.

The rocky NE point of Pulau Barakan is a good landmark visible at a distance of 14 miles. About midway on the E side of the island the trees are conspicuously higher than they are elsewhere on the island.

On the extensive reef surrounding Pulau Workai there are a number of smaller islands. One of these, **Pulau Turturjuring** (Toertoer Djoering) (6°38'S., 134°45'E.), separated from the N part of Pulau Workai by a very narrow, drying channel, is thickly wooded and somewhat higher than the land in back of it, and because of that looks like a small hill when seen from N. On the reef about 3 miles S of the E extremity of Pulau Turturjuring are Kultubai Utara (Koeltoebai Noord), three low, wooded, and atoll-shaped sandy islets, of which the easternmost is the largest. These islets are easily distinguished from N, but from the S they merge with the higher Tanjung Turturjuring. Between these islets and Tanjung Turturjuring, about 0.75 mile S of the latter, is a sandbank, part of which remains dry at all stages of the tide.

There is a convenient roadstead S of Kultuba Utura in the inlet in the extensive reef. A beacon is on the edge of a drying reef about 5 miles N of Kultubai Selatan (Koeltoebai Zuid), the easternmost island of Kepulauan Jin (Djoeedin Eilanden). Depths of about 7.3m will be found in the E part of the roadstead; bottom is sand and mud.

4.54 Northeast approach to Sungi Workai.—The SE entrance to Sungi Workai at the S end of Pulau Kobroor is approached by a channel from NE with very irregular depths leading between Lola and the N end of Pulau Penambulai.

Approach this channel steering for the sandy E entrance point of **Sungi Kangurma** (6°17'S., 134°51'E.), at the N end of Pulau Penamumbai, bearing 210°, until the SW end of Pulau Mariri is in line with Sedja Islet, the S of the two islets close off the NE of Pulau Leer bearing about 344°. **Djarang** (6°12'S., 134°46'E.), an islet about 1.5 miles off the coast of Pulau Kobroor and about 3 miles S of Leliling, will then be open SW of Lola, bearing about 296°. The velocity of current here is sometimes 3 knots setting offshore with a falling tide and S with a rising tide. Then steer 242° until Epar, the double islet 1.75 miles W of the N end of Pulau Leer, is open SW of Lola, bearing about 330°; then steer 269°, which will lead to an anchorage about 2 miles S of Kampung Lola, where there are depths of 10 to 10.9m, sand, mud, and coral.

Sungi Workai (6°03'S., 134°15'E.) is one of the channels connecting the E and W coasts of Kepulauan Aru. It is used, however, only by small craft with local knowledge. The W approach to the river has been previously discussed beginning in paragraph 4.43. The E entrance is about 11 miles W of the SW side of Pulau Penambulai.

4.55 Southeast side of Kepulauan Aru.—Kepulauan Jin (Djoeedin Eilanden), on the S side of an extensive reef almost touching the S end of Pulau Wokai, are six low sparsely-populated islands.

Kultubai Selatan (Koeltoebai Zuid) (6°52'S., 134°43'E.), the easternmost of Kepulauan Jin, is wooded, but a gap in the woods makes the island appear as two when seen from S. Two conspicuous trees stand close together near the W end of the island and are visible except between 203° and 338°. There are shrubs on the reef N of this island.

Maardjinjin (6°52'S., 134°41'E.), close W of Kultubai Selatan and with narrow Wadidin Islet between, has a tree with a V-shaped top on its S side.

Pulau Juedin (Pulau Djoeedin) (6°52'S., 134°37'E.), the westernmost and largest of the islands of the Kepulauan Jin group, is tree covered with the highest on the E side of the island. A tall tree, with a top that resembles a church with a steeple when seen from S, is on the SE side of the island. A reef, with a dry sandy cay near its outer edge, projects 0.75 mile S from the SW end of the island. Anchorage can be taken during the Southeast Monsoon, in 15m, off the W end of the island. Local knowledge is necessary. The flood tidal currents set N at a rate of 1.75 knots and the ebb currents set S at a rate of 2 knots in the vicinity of the anchorage.

Caution.—A 4.9m reef is located about 3.5 miles SSW of the conspicuous tree on the S side of Maarjinjin and a 3.5m shoal is 6.5 miles S of the W end of Kultubai Selatan and 3.75 miles NE of Pulau Karang's N end.

A wreck has been reported in a position about 5 miles E of the northernmost point of Pulau Jeudin or about 1.75 miles N of Pulau Kultubai, which is located close E of Maardjinjin.

4.56 Pulau Mar (6°54'S., 134°31'E.) and Pulau Jeh (Pulau Djeh), about 2.75 and 5 miles, respectively, SW of the W end of Pulau Jeudin, are low and uninhabited. The islands are heavily wooded except for the SE part of Pulau Jeh, which has a few isolated trees. A narrow but clear 6.7m channel separates the islands. Tidal currents are strong in this channel. Pulau Mar is near the SE end of a very extensive reef.

Pulau Penjuring (6°44'S., 134°29'E.), on the broad reef N of Pulau Mar and between Pulau Workai and Pulau Trangan, consists of several small heavily-wooded islets that appear as one island. Between the Pulau Penjuring reef and Pulau Trangan there is a deep channel which provides access to the villages of Krei-baru (Niew Krei) and Krei-lama (Oud Krei) on the shore of Pulau Trangan.

Pulau Enu (7°05'S., 134°29'E.), 18.5 miles ESE of Tanjung Ngabordamlu, the S end of Pulau Trangan, is the southernmost island of the Kepulauan Aru group. It is low, uninhabited, and surrounded by a narrow coral reef. A 4.9m shoal is 2.5 miles SSW of the W end of the island. The island is a good radar target at a distance of 14 miles.

Pulau Karang (7°01'S., 134°39'E.), about 8.5 miles ENE of Pulau Enu and the same distance SSW of the W end of Kultubai Selatan, is a low wooded island surrounded by a coral reef. The tidal flood currents set NE at a rate of 1.75 knots; the ebb sets between SW and WSW at the same rate off the NW side of the island. Vessels navigating in the vicinity of the island must exercise care to avoid the 3m shoal 3.75 miles NE of the N end of the island.

4.57 Southeast coast of Pulau Trangan.—The N part of this coast is low, but the S part, consisting of low hills covered with vegetation, is relatively steep. Northeast of Tanjung Ngabordamlu are some low red cliffs. Between the last-named point and a point 4 miles SW of **Tanjung Goldjuring** (6°49'S., 134°22'E.) there are two large trees near the shore and vessels can approach the shore to within a relatively short distance of them. Anchorage can be taken during the Northwest Monsoon off this stretch of coast. Farther NE the coast is fronted by extensive drying banks with several reefs and small islets; two reefs are marked by beacons. Sungi Laelaemaar, entered close NW of Tanjung Goldjuring, is navigable only by small craft.

Caution.—A 2.7m shoal is 3 miles ESE of Tanjung Ngabordamlu. Shoals, with depths of 4.5m and 4.9m, lie 7.5 and 9 miles S, repectively, of Tanjung Goljuring. Two drying reefs are, respectively, 1.5 miles SSE and 2.5 miles SE of Tanjung Goldjuring. A small hut on pilings on each of these reefs are good landmarks.

4.58 Krei-lama (Oud Krei) (6°45'S., 134°23'E.), the principal village in the S part of the Kepulauan Aru group, is on the Pulau Trangan shore about 4 miles N of Tanjung Goldjuring. Krei-baru (Nieuw Krei), another village, is 2.5 miles farther N.

Two channels lead to Krei-lama. The W channel, with a least depth of 5.5m, runs close along the shore of Pulau Trangan. It is narrow but navigable at all stages of the tide. Vessels may pass through this channel by eye provided soundings are constantly taken. North of Tanjung Goldjuring the W side of the channel should be favored to avoid a small drying reef off the village of Kampung Biltubur.

The E channel is wider than the other but it is more difficult to navigate. It is practicable only after high tide when the reefs are visible.

Directions.—The W side of the small islet S of Kumnaar and 1 mile NE of Krei-lama in range with the E side of Pulau Karwai, bearing 349° should be an excellent mark. If the first-named islet is not visible at a sufficient distance, the E side of Pulau Karwai should be steered for on that same bearing. This course is difficult to make good because of frequently strong tidal currents in this vicinity, and, being influenced by the openings in the extensive drying reef around Pulau Penjuring, does not always set along the axis of the channel. Care is necessary to avoid the 1.8m shoal extending from this reef to Wolil Island because this shoal is steep-to on the channel side and soundings give no warning of the approach to it. After passing this shoal and the reef marked by a beacon standing 4 miles W of Wolil, steer between Pulau Karwai and the drying reef SSW of it, then N toward the small islet about 0.5 mile of Krei-lama. There are depths of 2.3 to 11.9m off the village.

Kepulauan Sermata

4.59 The Kepulauan Sermata group comprise a long chain of islands extending from off the E extremity of Timor to within about 55 miles of the Kepulauan Tanimbar group. The islands of Kepulauaun Sermata are mostly of volcanic origin and, because they rise steeply from the sea, they afford only a few good anchorages. These islands may be considered as belonging to two chains that diverge slightly to the E. The principal island in the N chain is Pulau Wetar (See Pub. 163, Sailing Directions (Enroute) Borneo, Jawa, Sulawesi, and Nusa Tenggara). The S chain consists of Pulau Kisar, Pulau Leti, Pulau Moa, Pulau Lakor, Pulau Sermata, and Pulau Babar.

Kepulauan Romang

4.60 The Kepulauan Romang group, about 45 miles NNE of the E extremity of Timor, consists of several hilly islands. The most prominent peaks are on Pulau Romang, Pulau Nyata, Pulau Tellang, and Pulau Maopora. The channels between Pulau Romang and the adjacent islands as well as the channel between Pulau Kital and Pulau Maopora are deep and clear of dangers.

Tides—Currents.—Generally the flood currents set to the N and the ebb currents to the S. The maximum rate of current in the narrow channels is about 2.5 knots, and in the wider channels about 1.5 knots.

Pulau Romang (7°35'S., 127°25'E.), the principal island of the group, is about 11.5 miles long NE-SW, 7.5 miles wide, and is surrounded by a steep-to reef. The 20m curve passes along the edge of this reef. The only shoal spot is a detached 8.8m reef about 0.75 mile off the N side of the island.

The S and SW coasts of Pulau Romang are rocky and closely-backed by a rather high plateau which is separated from the higher NE part by a swampy section. Anchorage can be taken off the S side of the island, in depths of 29 to 35m, sand and stone, opposite a sandy beach near a deserted village W of the S extremity of the island. The preferred anchorage with the S extremity of the island bearing 094° and small conspicuous house on the beach, between the S and SW extremity of the island, bearing 004°.

The W coast of Pulau Romang is rocky except in a bight about 4 miles N of the S end of the island. The deserted village of Hila is at the head of this bight. Anchorage can be taken during the Southeast Monsoon, in 35m, stone, 0.13 mile off the coastal reef abreast the N entrance point of the bight with the outermost houses of Hila bearing 150°.

The 747m summit of the island is near the W side, about 2.75 miles S of the N extremity of the island.

The N coast of Pulau Romang consists of rocky stretches alternating with small sandy beaches. Anchorage can be taken in **Teluk Zwaan** (7°30'S., 127°24'E.) and in the coves to the E. The anchorage in Teluk Zwaan, S of the detached reef that uncovers near the middle of the bay, has about 183m of swinging room with good holding ground. The bay should be entered

only when the reefs are clearly showing. Local knowledge is necessary.

The E coast of Pulau Romang is generally quite steep, except in Teluk Rumahkuda, which has a long sandy beach. During the Northwest Monsoon anchorage can be taken, in 65m, about 0.15 mile off the coastal reef in the S entrance to the channel between Pulau Romang and Pulau Tellang with the two points to the N in range and the conspicuous house on the heights of Pulau Romang bearing 281°. Currents attain a rate of 1.5 knots.

4.61 Teluk Rumahkuda (Roemahkoeda Bai) (7°37'S., 127°25'E.), an indentation in the SE coast 4 miles NE of the S extremity of Pulau Romang, affords excellent anchorage 0.15 mile off the coastal reef, in 61 to 70m, with the mouth of the small river at the head of the bay bearing 315° and the village of Kampung Rumahkuda bearing 022°. This anchorage can accommodate one vessel and has about 0.15 mile of swinging room. The coastal reef is marked by discolored water.

Caution.—The coastal reef has extended further seaward than is charted off Hoewai, El Madang, and Meti Akwalu.

4.62 Pulau Mitan (7°38'S., 127°26'E.), 2 miles SSE of Kampung Rumakhuda, is about 93m high and covered with gray coral lime.

Pulau Nyata (Njata) (7°31'S., 127°18'E.), 3.5 miles W of the NW part of Pulau Romang, is surrounded by a steep-to reef outside of which there are no dangers. There is no anchorage in the vicinity of the island.

Pulau Tellang (7°32'S., 127°33'E.) and Pulau Limtutu are two small islands on the same reef 3 miles E of the NE extremity of Pulau Romang.

Pulau Laut (7°32'S., 127°33'E.), a mass of rocks 56m high, is about 0.5 mile NE of the N end of Pulau Tellang. Pulau Kital, a cone-shaped island 65m high, is nearly 1 mile E of the S end of Pulau Tellang. It is separated from Pulau Tellang and Pulau Limtutu by a deep and clear channel in which anchorage can be taken, with local knowledge, in about 21.9m, sand and stones. Currents set through this channel with a maximum velocity of 2.5 knots.

4.63 Pulau Maopora (7°35'S., 127°36'E.), about 6 miles E of Pulau Romang, is 310m high near its N end. There is a sandy beach along the W side of the island but there is no anchorage off of it. A 35m bank projects 2 miles from the N end of the island. Anchorage can be taken over a 10.9m shoal on this bank about 0.5 mile E of the N end of the island. There are strong tide rips, however, over this bank. The N coast of the island is rocky and steep. The E shore especially near the S end is marsh. Pulau Juha (Djoeha), 1 mile E of the SE point of Pulau Maopora, is a sand bank covered with vegetation, dry at all stages of the tide. It is surrounded by a very steep-to reef. Anchorage can be taken in the channel between Pulau Juha and the coastal reef of Pulau Maopora. This channel has a depth of 50m and is about 183m wide. The channel is easily navigated when the reefs are showing clearly. Two small islets, covered with vegetation, are on the reef off the SE end of Pulau Juha. They are easily distinguished. The maximum strength of the tidal currents through this channel is 2 knots.

Pulau Gunungapi (Goenoeng Api) (6°39'S., 126°40'E.), an isolated island about 67 miles NW of Pulau Romang, is an uninhabited volcanic island, 282m high, with the shape of a truncated cone and with almost bare slopes. There is occasional volcanic action. The W edge of the volcanic crater is considerably lower than the remaining edge. A coastal reef extends up to 0.13 mile off the island. With light SE winds, a small vessel with local knowledge can anchor on a bank off the N side of the island 0.15 mile offshore.

Kepulauan Damar

4.64 The Kepulauan Damar group of islands, ranging from 75 to 100 miles NE of Pulau Romang, consists of Pulau Damar, Pulau Teun, Pula Nila and several smaller islands. These islands are high, and, rising from the sea, make good landmarks. Pulau Damar, Pulau Teun, and Pulau Nila are inhabited.

Pulau Damar (7°08'S., 128°36'E.), the largest island of the group, is roughly rectangular, about 9 miles long and 7.5 miles wide. The island has several peaks, of which the highest named Wuwarlali, is 868m high and is on the NE corner of the island. There is some volcanic activity on the island, but no eruptions have been reported. Earthquakes, accompanied by sea disturbances are, however, frequent. The W side of the island is low in places, but the other coasts are steep-to. The island is very fertile and has several small streams.

4.65 Teluk Solat (7°09'S., 128°41'E.), on the E side of Pulau Damar, is a deep bay penetrating the island for 2.5 miles; it is surrounded by high and very steep volcanic hills that are wooded to the water's edge. The village of Kampung Wulur is on the SW side of the bay; the villages of Kampung Solat and Kampung Kehli are on the N shore opposite. A pier for small craft projects from a peninsula near Kampung Solat. The head of the bay is filled by a large drying reef extending as far E as Kampung Kehli. This reef shows by discoloration between Kampung Kehli and Kampung Solat, but does not show well elsewhere. There are some hot springs at Kampung Kehli.

Tides—Currents.—In Teluk Solat the maximum fall of tide that can be expected is 1.2m and this occurs in June and December. The maximum rise of 0.7m occurs at all semidiurnal spring tides.

Anchorage.—During the Northwest Monsoon Teluk Solat affords good anchorage, in about 50m, with a house at the mouth of a small stream 0.4 mile NW of Kampung Wulur, bearing 294° and the pier at Kampung Solat bearing 000°. During the Southeast Monsoon, a heavy swell sets into the bay.

Directions.—Because there are no detached dangers in Teluk Solat it is easily entered. The reefs and both sides of the bay are not more than 183m wide, however, because the prevailing winds push rollers onto the N shore and the currents set in the same direction, care should be taken to avoid approaching the N shore too closely. In entering the bay steer for the house, at the mouth of a small stream 0.45 mile NW of Kampung Wulur, bearing 294°.

4.66 Teluk Wilhelmus (7°06'S., 128°39'E.), on the N shore of Pulau Damar affords anchorage sheltered against the Southeast Monsoon; however, the holding ground is poor and the bottom rises rather sharply. Vessels proceeding to this anchorage enter on a southwesterly course, steering toward the mouth of the small stream that empties into the head of the bay.

This anchorage is not safe during the Northwest Monsoon. Local knowledge is necessary.

Anchorage can be taken off the S coast near **Tanjung Paran** (7°13'S., 128°38'E.). Vessels approach with the tangent of the SE extremity of Terbang Utara (North Terbang) astern, bearing 210°, and anchor on that line in any desired depth clear of the coast reef.

4.67 The **Terbang Islands** (7°20'S., 128°33'E.), composed of Terbang Utura (North Terbang), 142m high, and Terbang Selatan (South Terbang), 122m high, are located, respectively, 5.5 and 9.5 miles S of Pulau Damar; both islands are uninhabited. The highest part of Terban Selatan is a plateau that is steep on the N side and moderately sloping on the S. Temporary anchorage can be taken near the S end of Terbang Utara, in a depth of about 73m, with the 463m elevation at the SE end of Pulau Damar lying midway between the SE point of Pulau Damar and Terbang Utara. Depths increase rapidly just outside this position. There is sometimes a very strong current in the channel between Terbang Utara and Terbang Selatan.

Nus Leur (Noes Leoer) (7°14'S., 128°23'E.) consists of two small islands, 46m and 30m high, respectively, on an extensive coral reef 8.5 miles SW of the W extremity of Pulau Damar. The reef is too steep-to for anchorage here.

Pulau Teun (Teoen) (6°58'S., 129°08'E.), 26.5 miles ENE of Pulau Damar, consists principally of an active volcano, 655m high, with a crater that is visible from N but not from S. Eruptions from this volcano have been known to occur.

There are several villages on the island. Vessels may obtain anchorage with local knowledge off the village of **Lajoni** (7°00'S., 129°07'E.), off the SW coast, in a depth of 13m, with the flagstaff of the village bearing 050° and the N entrance point of the small bay in which the village stands bearing 332°. The bottom is very steep-to. The flagstaff is clearly visible and there is a church which is partially obscured by a large tree.

4.68 **Pulau Nila** (6°44'S., 129°30'E.), 23 miles NE of Pulau Teun, is a steep volcanic island, 781m high, with a few scattered patches of trees and shrubs. The only eruption on record occurred in 1932, but steam, sulphur vapor, and hot springs are observed regularly on the E side. The N half of the island is fringed by a steep-to coastal reef which dries. A ridge with a depth of 3m is off the NW edge.

Pulau Kari (Nika Islet) (6°42'S., 129°31'E.), an islet 47m high, is on a reef that extends 1.25 miles N from the N side of Pulau Nila. Vessels should not approach the N side of Pulau Nila within the 200m curve unless seeking anchorage in the channel that penetrates the reef W of Pulau Kari. There are some coconut plantations on this side of the island.

Anchorage.—Vessels anchor 0.4 to 0.5 mile W of the N side of Pula Kari, in depths of 29 to 40m, in a channel between the reefs N of Pulau Nila. This channel has a navigable width of about 183m between rocks bordering the reefs on each side, with a least mid-channel depth of 7.6m. The summit of Pulau Nila bearing 190° leads into the channel, but caution is necessary because of the currents which sometimes set diagonally across the entrance. The small islet of Nusafnu, close off the middle point of the N coast of Pulau Nila, is a useful mark but it is difficult to make out from the entrance. About 0.5 mile SW of the anchorage is a small drying reef. Because of the volcanic activity in this vicinity, it is advisable to send a boat ahead for soundings and to mark the reefs along the channel before attempting to proceed to the anchorage. This anchorage can also be approached from the W by keeping the S side of Pulau Kari bearing 093°, but caution should be exercised because this course leads only about 0.4 mile N of the detached reef referred to above.

4.69 **Wotai Road** (6°45'S., 129°29'E.), on the S side of Pula Nila, is open to the S and is exposed to wind and sea during the Southeast Monsoon. In the NW part of the road is Teluk Solat, a narrow bay that penetrates the coast for a distance of 1 mile. In the middle part of the bay there is an average depth of 37m, but drying reefs fill the N part and cut off the entrance to the bay. The village of Wotai, with a flagstaff, is on the N shore of the roadstead. In the road, outside the shore reef, the depths are irregular. To insure against uncharted risings of the bottom as a result of volcanic activity, it is advisable to send a boat ahead to make soundings and to mark the reefs before proceeding to the anchorage. The recommended anchorage is in depths of 46 to 61m, with Wotai village bearing 342°.

Doesborgh Reef (6°40'S., 129°25'E.), 4.5 miles NW of Pulau Nila, is a drying, rock, atoll-shaped formation 2.25 miles long NE-SW and 1 mile wide.

Nil Desperandum (Griffen Reef) (6°37'S., 129°47'E.), about 17 miles ENE of Pulau Nila, is about 0.75 miles long E-W and 0.5 mile wide. It is composed of sand and coral and dries 1.8m.

Pulau Serua (Seroea) (6°19'S., 130°01'E.), about 37 miles NE of Pulau Nila, has a 641m truncated conical volcanic peak near its center. On the NW side is a lesser peak 244m high. The last eruption occurred in 1844. The coasts of the island are clear except for a few narrow coastal reefs which do not exceed 183m wide. Kekeh Besar, 193m high, is on a bank of soundings extending almost 1.5 miles W of the W end of Pulau Serua. Kekeh Ketjil, a much smaller island, is about 183m E of Kekeh Besar. The passage between Pulau Serua and the reef on which these last two islands lie is deep and clear of dangers.

Anchorage can be taken, in depths of 61 to 70m, in the channel between Kekeh Ketjil and Pulau Serua. There is also anchorage, in depths of 70 to 82m, off a small sandy beach on the N side of the island. Some conspicuous boat sheds are on this beach. Vessels approach and anchor with these sheds in range with Lesluru (Lesloeroe) village bearing 186° and 0.18 mile N of the drying reef. The village is in a saddle-like depression between the two main peaks of the island.

Kepulauan Sermata—Southern Chain

4.70 The E end of Timor (See Pub. 163, Sailing Directions (Enroute) Borneo, Jawa, Sulawesi, and Nusa Tenggara) is high and the coast is steep-to. A range of mountains, 435 to 1,219m high, extends in a SW direction from this point, paralleling the coast a distance of about 2 miles.

Jaco Island (Jako) (8°26'S., 127°20'E.), off the E extremity of Timor, is a small flat, uninhabited island, 81m high, covered with trees. It appears as a part of Timor except when seen open of that island. Jaco Island is fringed by a reef varying in width from a few meters on the W side to about 0.2 mile on the N and S sides of the island.

Selat Jaco (Jako Strait) is a deep clear channel, 0.3 mile wide between Jaco Island and Timor. The strait can be safely navigated at mid-channel.

Tides—Currents.—The tidal currents set directly through the strait at a rate up to 4 knots. The N current is of greater duration than that setting S. Tide rips occur at each entrance. Heavy seas prevail off the S entrance during the Southeast Monsoon.

Pulau Kisar (8°04'S., 127°11'E.), about 18 miles NNW of the E end of Timor, has a number of rocky hills, the highest of which is 240m high. The coasts, rising steeply from the sea, are gray terraced walls of bare coral lime broken in only a few places where small streams empty into the sea. The inland hills, seen through the breaks in the cliffs, are also gray and are sparsely wooded.

4.71 Pantai Wonreli Road (8°05'S., 127°09'E.) is an open roadstead on the W side of Pulau Kisar. A light is shown close N of Pantai Wonreli Road. A narrow drying reef, with deep water behind it, is about 91m offshore and acts as a natural breakwater. A shallow channel, used by flat-bottomed boats at LW and by loading proas above half-tide level gives access to the area behind the reef. The shore of the bight is a sandy beach with a few sheds. A conspicuous white pyramid is on the S shore of the bight.

Anchorage is available, in 29 to 40m, coral and stones, about 137m WNW of the above-mentioned white pyramid. Farther offshore, the bottom is so steep there is the danger of dragging anchor. It is customary to run a hawser to the shore, but with an offshore wind or at the change of the monsoon and during the Southeast Monsoon, when the tidal currents set along the shore in a NNE and SSW direction, it is very improbable that even a very strong hawser would hold a vessel in position. During an onshore wind, this anchorage cannot be used.

Winds—Weather.—During some months of the year cyclonic of "Valwinden" winds make the anchorage untenable. The Northwest Monsoon not only makes anchorage impossible but also prevents boats from approaching the shore. During that season contact with the island is made on the E side at Pura Pura, which will be discussed later, where vessels heave-to and send boats ashore.

Tides—Currents.—At Pantai Wonreli Road, the maximum rise of tide, occurring in March and September, is 0.9m above mean sea level. The lowest LW, 0.85m below mean sea level, occurs between January and March and between July and September at semidiurnal spring tides.

4.72 Pantai Wonreli (8°05'S., 127°09'E.), some distance inland, is the only village any importance on Pulau Kisar. It is the headquarters of a government official and there is a large church in the village. Vessels call regularly at the village except during the Northwest Monsoon, when the port of call is at Pura Pura on the E coast.

Rain is very uncertain on Pulau Kisar. Frequently a whole year will pass without rain. On such occasions the entire population moves temporarily to Pulau Romang.

Kepulauan Leti

4.73 Kepulauan Leti (8°11'S., 127°55'E.), a group of islands ENE of the E extremity of Timor, includes Pulau Leti, Pulau Moa, and Pulau Lakor. Pulau Leti and Pulau Mao are fairly hilly, but Pulau Lakor is rather low however, since the trees on the latter island reach heights of more than 49m, the island can be seen more than 15 miles.

Destructive cyclonic storms sometimes occur in these islands, particularly in the spring at the change of the monsoon.

Pulau Leti (8°12'S., 127°42'E.), the westernmost island of the Leti group, is about 22 miles ENE of the E end of Timor. Along the middle of the island is a chain of rounded hills the highest of which is 406m high. The hills in the central part of this chain are not wooded but are sparsely covered with tall grass. The low hills at the E end of the chain are covered with trees. On the low parts of the island there are many coconut palms. At the base of the hills and extending to the shore is flat land that forms a sort of terrace 7.6 to 18.3m high. On the S side of the island there is a separate plain which rises steeply from the sea, where it is undermined by the action of the breakers. A reef skirts the E side of the island.

A light, from which a racon transmits, is shown from from a white framework tower near **Tanjung Tutpateh** (8°13'S., 127°36'E.), the W point of Leti.

The inhabitants of Pulau Leti dwell on the flat land, usually near the shore. The villages are mostly built on coral reefs 9.1 to 12.2m high. Water Buffalo, goats, and pigs are plentiful, however, the island is subject to drought and famine, at which times the inhabitants migrate temporarily to Pulau Moa.

Anchorage.—During the Southeast Monsoon vessels can anchor off the village of Kampung Serwaru lying on a bare strip of land fronted by a sandy beach on the N side of Pulau Leti. The coast is low for a short distance E of the village, but beyond this it becomes steep with cliffs and trends NE for a short distance forming a small bight protected on its W side by short coral stone mole. Because of a detached offshore drying reef, loading and unloading can only be carried on at HW and even then it is difficult if there is any sea. Anchorage can be taken in 26 to 29m, coral and stones, poor holding ground, with the N extremity of Pulau Leti, near Tutukai village bearing 101° and Waurlawan, the highest hill on the island, bearing 180°. This anchorage is dangerous during the Northwest Monsoon.

There is anchorage, in 37 to 73m, on the S side of the island in front of the village of Luhulele, about 2.75 miles from the E end of the island. Vessels can anchor anywhere between the crescent-shaped drying reef S of the E end of the village and a sandy bank projecting 1 mile in a SW direction from the shore 1.5 miles W of the village. Swinging room is limited and there is a least depth of 7.9m in the entrance, which is about 137m wide. Local knowledge is recommended for both of the above anchorages.

4.74 Selat Moa (8°10'S., 127°45'E.), a deep clear passage between Pulau Leti and Pulau Moa, is about 2 miles wide. Tidal currents in the strait are strong and sometimes cause a very choppy sea when setting against the wind.

Pulau Moa (8°12'S., 128°00'E.), E of Pulau Leti, is a coral lime plateau with two groups of hills. The W group of hills has a maximum elevation of 289m 5.5 miles E of the W end of the island, and the E group has a maximum elevation of 375m 2 to 4 miles E of the island's center. A few of the hills are wooded,

but most of them are bare. The main part of the island is fertile, but it is marshy in spots. The inhabitants live in several villages, of which **Kampung Pati** (8°13'S., 127°52'E.), on the S coast, is the most important.

Anchorage.—Because the coasts of Pulau Mao are steep-to there are not safe anchorages except during the change of the monsoons and at the beginning of the South Monsoon, anchorage can be taken almost anywhere off the S coast of the island. It is customary to anchor, in a depth of 40m, sand, about 183m from the coast reef. Currents set along this coast at a rate as high as 2 to 3 knots.

Small vessels can anchor in deep water off Kampung Pati on the S coast of Pulau Moa, during calm weather, but the sea is usually too heavy.

In the absence of strong winds and currents, temporary anchorage may be taken off **Kampung Klis** (8°13'S., 127°57'E.) at the bend of the S coast 5.5 miles E of Kampung Pati. The anchorage is 0.15 mile from the drying shore reef in 62m, sand, with the village flagstaff bearing 047° and **Tanjung Tutnei** (Toet Nei) (8°15'S., 127°58'E.) bearing 151°.

4.75 Selat Lakor (8°14'S., 128°04'E.), a strait between Pulau Moa and Pulau Lakor, has a least width of 1 mile and is clear of dangers. Eddies and strong tide rips are frequently encountered off Kampung Moanga, a village on the E coast of Pulau Moa, and off the NW end of Pulau Lakor. The tidal currents set through this strait at a rate of 4 knots or more.

Pulau Lakor (8°15'S., 128°10'E.), E of Pulau Moa, is low and flat, but its tall trees make it a good landmark. The generally rocky shores are broken in places by short stretches of sandy beaches. There are several villages on the island. **Kampung Warwawang** (8°13'S., 128°09'E.), on a rocky cliff on the N side of the island, is conspicuous.

Kepulauan Babar

4.76 This group of islands consists of Meatiy Miarang, Pulau Sermata, and Pulau Babar, together with the smaller islands adjacent to them. Except for Meatiy Miarang, these islands are hilly and are good landmarks; furthermore, they can be approached closely.

Meatiy Miarang (Meatimiarang) (8°20'S., 128°30'E.), a small, flat, and densely-wooded island, is 16 miles ESE of the SE end of Pulau Lakor and near the E end of a drying reef 12.5 miles long NNW-SSE and about 5 miles wide. On the reef about 0.5 mile W of Meatiy Miarang is Morau, a low wooded islet; close off the SE end are Djagat Tutun, two small rocky islets. On the NW end of the reef are Armortun and Meaterialam, two low wooded islets, the latter with a conspicuous tree on its W side. The sides of the reef are so steep-to that anchorage outside is impossible. The reef encloses a lagoon which can be reached from the E side through a channel 137m wide, with a least depth of 5.5m in the fairway.

The entrance is marked, entering, on the starboard side by a white conical buoy, and on the port side by a black can buoy. A course of 222° leads into the lagoon. Inside there are numerous reefs, some of which may be marked by beacons. There is anchorage in the S part of the lagoon N of Meatiy Miarang, but local knowledge is essential. Strong tidal currents can be expected in the entrance channel. Meatiy Miarang is the only inhabited island on the reef; a light, from which a racon transmits, is shown from its W side. The island is reported to be a good radar target at a distance of 20 miles.

4.77 Luang Island (Loeang) (8°11'S., 128°42'E.) and Kalapa Island, 14 and 18 miles, respectively, NE of Meatiy Miarang, are on a drying reef about 15 miles long on which there are several smaller islets. Luang Island, almost barren, has two conspicuous hills the highest of which is 260m high. The island is reported to be a good radar target at a distance of 26 miles. Kalapa Island the easternmost and largest island on the reef, is generally low but covered with tall trees. Metutun (Metoetoen) Island, 1.75 miles E of the W end of the reef is covered with high coconut palms. Small craft sometimes anchor at the W end of the reef. Luang Island is the only inhabited place of the group.

Pulau Sermata (8°12'S., 128°55'E.), close E of Kalapa Island, is a long narrow island with a chain of small, round, grass-covered hills running down its middle. The highest point on the island, 392m, is covered with trees. There are a number of villages on the island surrounded by high stone walls.

Anchorage can be taken in Lelang Bay on the S side of the island during the change of the monsoons and during the Northwest Monsoon, but the bottom rises steeply and during the Northwest Monsoon the anchorage is frequently made unsafe by sudden violent squalls. Because the bottom rises steeply elsewhere in the vicinity of Pulau Sermata, there are no other anchorages. Local knowledge is necessary.

4.78 Pulau Babar (7°55'S., 129°45'E.), 40 miles ENE of Pulau Sermata, is fertile and covered with forests. There are several hills, the highest of which is 826m high and near the center of the island, but is not particularly conspicuous. More conspicuous from NW or SE is a group of hills in the NE part of the island. The coasts, sloping down from the hills, are fringed in places by a drying reef 0.1 to 0.15 mile wide. The water from the rivers of the island, as well as from those of Pulau Wetan, discolor the sea for a great distance.

Pulau Wetan (7°55'S., 129°32'E.) is 349m high at its S end and 137m high at its N end with a coral lime terrace between.

Selat Wetan, a strait separating Pulau Babar and Pulau Wetan, is deep in the fairway and about 1 mile wide in its narrowest part. A 6.7m shoal is on the W side of the S part of the strait about 0.5 mile off the shore of Pulau Wetan, 2.5 miles NE of the S part of that island. A 5.9m shoal is on the E side of the S part of the strait about 1.25 miles NE of the shoal just mentioned.

Currents, which are sometimes accompanied by a heavy swell, set N and S through the strait.

4.79 Herlei Road (7°53'S., 129°33'E.), on the E side of Pulau Wetan, affords comparatively safe anchorage, in 50m. Vessels bound for Tepa during the Northwest Monsoon frequently anchor here awaiting the opportunity to work cargo at Tepa. Swells coming in from the open Selat Wetan are frequently troublesome in this road.

Tepa Road (7°52'S., 129°35'E.), on the W coast of Pulau Babar, affords the best anchorage in the vicinity during the Southeast Monsoon. With NW winds there is sometimes considerable sea and surf on the coast, but there is no danger of dragging unless the wind blows hard. There is room for several vessels in the road. During the Northwest Monsoon, however,

it is better to anchor in Herlei Roads.

A reef, with of depth of 1.8m, lies about 0.25 mile NW of the flagstaff at the village of Kampung Tepa.

Tides—Currents.—At Tepa Road, the lowest water level, occurring in July, August and September, is 0.2m below mean sea level; the maximum rise is about 2.5m above mean sea level.

Directions.—Vessels should approach Tepa Road anchorage with the flagstaff at Kampung Tepa bearing 090° and anchor in the desired depth. Allowance should be made for tidal currents which set N and S. When nearing the roadstead the depths decrease suddenly. It is recommended to lower the anchor with about 50m of cable out and to approach as slowly as possible. During the Northwest Monsoon, 81m of cable should be veered out.

Kampung Tepa (7°52'S., 129°36'E.) is at the S part of the bight abreast Tepa Road.

A blue flag at the flagstaff signifies cargo cannot be worked at Tepa. Vessels then ordinarily proceed to Herlei Road on the opposite side of Selat Wetan to await favorable conditions.

4.80 Southwest coast of Pulau Babar.—The SW coast of Pulau Babar is fringed by a narrow, rocky, and steep-to reef. A detached reef, 0.15 mile wide and with a least depth of 4.9m, is 1.5 miles offshore and 5.25 miles WNW of the S end of Pulau Babar. This reef seldom discolors. Anchorage can be taken, in a depth of 50m, almost anywhere along this coast. The recommended method of anchoring is to approach the coast slowly with about 73m of chain veered out.

4.81 South and E coasts of Pulau Babar.—Several detached reefs with depths of 4.9 to 7.6m are close off the coast between the villages of Kampung Ahanari and Kampung Wakpapapi, 4.75 and 6 miles, respectively, NE of the S end of Pulau Babar. A 6.8m reef lies next to the coast 4 miles SSE of Kampung Ahanari. These reefs do not discolor. Another reef, 1.5 miles long and 91m wide, is 0.35 mile offshore from the village of Kampung Letwurong and has a least depth of 6.7m. This reef discolors and the passage between it and the coast is clear. Anchorage can be taken close to the shore anywhere along these coasts except in the bight in the N part of the E coast.

4.82 North coast of Pulau Babar.—With SE winds, anchorage can be taken N of the village of Kampung Jatoke near the N extremity of Pulau Babar. For a distance of 4 miles W of this anchorage the coastal reef is so narrow and steep-to that it affords no anchorage, but beyond that and as far as the village of Kampung Manuwui, the northernmost point of the island, anchorage can be taken almost anywhere. Vessels should approach slowly with the anchor veered out 55m.

Off-lying Islands off Pulau Babar

4.83 Pulau Dai (7°34'S., 129°41'E.), about 12.75 miles N of Pulau Babar, is about 4 miles long and ranges from 0.75 mile to 1.5 miles wide. It has three summits of which the easternmost and highest is 651m high. Anchorage can be taken in the bight on the N coast opposite the village of Kampung Lewa. The anchorage should be approached slowly with the anchor veered out about 70m. The coast reef, however, is narrow and vessels are exposed to dangerous squalls, particularly during the Southeast Monsoon. Boats can land near the village during calm weather.

Pulau Daweloor (7°46'S., 130°04'E.) and Pulau Dawera, about 10.5 miles NE of Pulau Babar, are about 7.5 miles long in a NW-SE direction. The maximum elevations of the two islands are, respectively, 293m and 334m. Both islands are inhabited. They are separated by a narrow reef-bordered strait with a least depth of 2.7m. Three detached shoals with depths of 2.8 to 4.9m are about 0.5 mile S of the S end of Pulau Dawera. A coastal reef with a depth of 1.8m near its outer end projects more than 1 mile W from the SW end of Pulau Dawera. Coast reefs extend into the channel from the SE extremity of Pulau Dawera and Pulau Daweloor.

Anchorage can be taken, in a depth of 55m, during the Southeast Monsoon in a bight on the W side of Pulau Dawera opposite the village of **Kampung Ilmarang** (7°44'S., 131°00'E.). Approach on a SE course along the shore of the island. The reef tongue projecting out from the SW extremity of the island can be readily made out in good visibility.

Anchorage can also be taken, in 28 to 37m, in **Watuwai Road** (7°46'S., 130°02'E.) in an opening in the shore reef at the W end of Pulau Daweloor. The tongue of the reef is marked by discoloration.

4.84 Pulau Masela (8°09'S., 129°52'E.), 6.5 miles SE of Pulau Babar, is 9.5 miles long and 1 to 1.75 miles wide. It has three summits the highest of which, near the center of the island, is 199m high. The island is surrounded by a reef which dries in most places and extends about 1.75 miles E from the S end of the island. A detached 12.8m shoal is 1.25 miles offshore about midway along the E side of the island. There are several detached reefs and shoals closer inshore on both the E and W sides of the island. The reefs on the E side, especially those less than 9.1m, are not as well marked by discoloration as those on the W side.

Anchorage can be taken anywhere around the island, in depths of 55 to 70m. Vessels sometimes anchor in an opening in the reef on the SE side off the village of **Kampung Telalora** (8°12'S., 129°50'E.) when the reefs are marked by discolored water. During the Southeast Monsoon, however, entry is not possible because there is too much sea at the entrance to the opening. Anchorage can also be had in Lawawang Road, on the W side of the island, in depths of 7.6 to 10.6m, on a narrow bank which trends parallel to the shore and about 0.5 mile offshore. The coastal reef extends about 0.2 mile offshore, with occasional large rocks above water. The village of Kampung Lawawang, surrounded by a wall and standing on a hill 24m high, was formerly reported as visible above the coconut trees SE of the anchorage.

Kepulauan Tanimbar

4.85 This group of islands, E of Kepulauan Sermata and SE of Kepulauan Aru, consists of Pulau Yamdena (Jamdena), and about 66 smaller islands fringed by steep coral bluffs. Except for Pulau Molu, Pulau Maru, Pulau Fordate, Pulau Laibobar, and the larger islands off the W coast of Pulau Yamdena, the islands are low and flat. The S part of Pulau Yamdena, N

and W of Teluk Saumlaki, at the SE end of the island, is hilly, but none of these hills are conspicuous. The points of Pulau Yamdena as well as the numerous islands around it, however, are useful in fixing position in this area.

Because discolored patches are frequently encountered in relatively deep water in the vicinity of the islands and because the reefs on the W side of Pulau Yamdena and Pulau Selaru and in Selat Egeron seldom discolor, it is imperative to keep a constant check on position and to pass close to the islands only when the reefs can be sighted readily. Cyclonic storms occasionally occur in these islands.

All of the larger islands are lightly inhabited, but the density of population varies considerably and is affected by the migrations of the inhabitants. Good pilots can be obtained in many of the villages. There are numerous coconut plantations and untouched oil fields are believed to be in the interior of Pulau Yamdena.

The islands are good radar targets at a distance of 18 miles.

Pulau Yamdena

4.86 **Pulau Yamdena** (Jamdena) (7°30'S., 131°30'E.), the principal island of the Kepulauan Tanimbar group, is 64 miles long in a NNE-SSE direction and about 24 miles wide in its middle part. It is a relatively flat island of coral formation. The low W coast is fronted by islets and reefs. The E coast, indented with several small bays and fringed by reefs, is closely backed by a number of small hills, the highest of which is 240m high and is about at the midway point of the E coast.

Islands North of Pulau Yamdena

4.87 **Pulau Molu** (6°45'S., 131°32'E.) and Pulau Maru, 4 miles S, are at the N end of Kepulauan Tanimbar. A hill, 274m high, is near the NW extremity of Pulau Molu, and another named Keljobar Wahan, 197m high, is near the SE extremity of the island. Lubwaan, the highest point of Pulau Maru, near the center of the island, is a conspicuous hill, 268m high. The islet, Pulau Kalbur, 0.75 mile N of Pulau Molu is uninhabited. The channel separating these two islands is clear of dangers, but there is sometimes a heavy sea on it. A lighthouse, 40m in height, has been established (2003) on **Pulau Kalbur** (6°39'S., 131°35'E.). Pulau Wayangan is at the SSW end of a shore reef that projects out 2 miles from the S end of Pulau Molu.

There are villages around Teluk Loka and the W coast of Pulau Molu. Coconut plantations are on both Pulau Molu and Pulau Maru. There are many fishermen on the reef that projects W from the SW end of Pulau Maru during favorable weather.

Anchorage can be taken during the Northwest Monsoon in Teluk Loka, a bight on the E coast of Pulau Molu. The reef that juts out from the N entrance is well marked by discoloration and vessels can pass it closely. Vessels can also anchor, in 40m, 0.55 mile NW of Kampung Adodo. There is good anchorage everywhere off the E coast of Pulau Maru, in a depth of 44m, except off the coconut plantations on the SE point of the island. Local knowledge is necessary.

The channel between Pulau Wayagan and Pulau Maru affords the best route for vessels coming from NW and bound for Ritabel Bay, which is discussed in paragraph 4.89, particularly during the Southeast Monsoon. After this passage, shelter is also afforded by Pulau Fordate and Pulau Larat. Choppy seas are encountered frequently in this vicinity when the wind is blowing in a direction opposite to that of the tidal currents.

4.88 **Nus Lima** (6°58'S., 131°35'E.) is a group of islets on a reef 2.5 miles long and 2 miles wide, 6 miles SE of the S end of Pulau Maru. The reef discolors well but the shoals do not. Only Wermatan, the largest of the islets, is inhabited, and then only occasionally by natives working the coconut plantations. The channel between Wermatan and the small islet Pulau Kyabrengan, about 1 mile NW of the main body of the reef, is unusable. A 2.7m shoal is close S of Pulau Kyabrengan.

Pulau Frinun (7°03'S., 131°34'E.) and a conspicuous rock are on a reef 1.5 miles long and 1 mile wide 3.5 miles S of Wermatan. This island is low, very sparsely wooded, and uninhabited. The reef is well marked by discoloration. An isolated 5.8m shoal that does not discolor is 2 miles SE of the island.

Pulau Farnusan (7°05'S., 131°39'E.) is an elongated islet surrounded by a reef which discolors 1.5 miles off the N coast of Pulau Yamdena and 5.5 miles SE of Pulau Frinun. Temporary huts on the island are used at times by coconut plantation workers.

Metirotton, close off the N coast of Pulau Yamdena, is a roughly circular reef 1.5 miles in diameter, which is usually well marked by discolored water.

Pulau Larat (7°09'S., 131°51'E.), the W end of which is separated from Pulau Yamdena by a narrow channel which can only be used by small boats, is low and wooded. The island is skirted in most places by a reef. On the reef off the N side, 2.5 miles E from the W end of the island, is **Vatsori** (7°06.5'S., 131°45.0'E.) a rock which from the W has the appearance of a native canoe without masts and is a good landmark. Off the SW side of the island is Sari Karmut, a large reef. Smaller reefs and shoals extend 1.5 miles NW and 2.5 miles W from this reef. The channel between this detached reef and Pulau Larat is clear and can be navigated when the reefs can be seen.

Close off the W end of Pulau Larat is low, flat Pulau Lutur, connected to Pulau Yamdena by a 0.4 mile wide reef extending around the W end and along the N side of the island. **Watmomal** (7°08.4'S., 131°42.8'E.) is a very conspicuous rock close of the NE extremity of Pulau Lutur.

4.89 **Ritabel Bay** (7°09'S., 131°43'E.), between Pulau Lutur and Pulau Larat, is a well-sheltered rectangular area almost 1.5 miles long and ranging from 0.27 to 0.45 mile wide. The houses of the village of Kampung Ritabel can be seen for a distance of 8 miles on a clear day. The village of Kampung Watidal is on a hill on the W side of the bay 1.25 miles NE of Kampung Ritabel and the village of Kampung Lelinglun is opposite Kampung Ritabel on the E end of Pulau Lutur.

Beacons, one on the edge of the reef extending from the NE end of Pulau Lutur and the other on the edge of the reef extending NW from Kampung Watidal, mark the channel leading to Ritabel Bay. There is a 3.2m shoal 1.5 miles offshore N of Kampung Watidal.

Tides—Currents.—At Ritabel Bay, the highest water level occurs in February and March; the lowest occurs in July, August, and September. The maximums that can be expected are, respectively, 2.5m above and 0.2m below mean sea level.

Anchorage.—Anchorage is available, in 15m, mud, in Rita-

bel Bay, about midway between Kampung Ritabel and the opposite shore of Pulau Lutur. Strong N winds send a heavy swell into this anchorage.

The S approach to Ritabel, between Larat and Yamdena, is only navigable by small local craft. There is a least depth of 0.6m in the fairway.

4.90 **Kampung Ritabel** (7°09'S., 131°43'E.) (World Port Index No. 52860) is on the W side of Pulau Larat and on the E side of Ritabel Bay. A pier, from which a light is shown, projects out to the edge of the reef from the shore abreast of the village.

Selat Orafruan (7°05'S., 131°55'E.), a strait between Pulau Larat and Pulau Fordate, is clear of dangers; the shore reefs on either side are well marked by discoloration.

Pulau Fordate (7°02'S., 131°58'E.) is very hilly, with several conspicuous peaks. Villages are on the W coast and the S side of the island. At the village of Kampung Aweer on the W coast near the S end of the island is a small conspicuous church. A rocky stretch is on the W coast between the villages of Kampung Sufanin and Kampung Adodo. A lighthouse, 40m in height, has been established (2003) on **Tanjung Waarlangier** (6°59'S., 132°00'E.), the NE tip of the island. Anchorage is available, in 49m, on both the E and W coasts, except off the rocky area mentioned above. Local knowledge is necessary.

Caution.—A shoal with two 8.2m depths and with a radius of 1.5 miles has its center about 5.75 miles E of the NE end of Pulau Fordate.

Pulau Nukaha (7°05'S., 131°59'E.), about 2 miles SE of Pulau Fordate, is an islet 39m high near the W end of a drying reef 3.5 miles long E-W and 2.75 miles wide at its E end. The reef is well marked by discoloration.

A stranded wreck is on the N side of the reef surrounding Pulau Nukaha.

Directions for the East Coast of Pulau Yamdena

4.91 Between September and March, the period when the Northwest Monsoon blows hardest, it is advisable for vessels proceeding from Selat Orafruan around Pulau Larat and the S to Selat Egeron to pass fairly close along the E coast of Pulau Yamdena. From the S end of Pulau Larat set course to pass E of the Sari Karmut and Sari Karmuta, the extensive reefs S of the middle part of Pulau Larat, and then pass at least 1 mile off the conspicuous point on which the village of Kampung Watamuri is situated, then keep about 2 miles offshore as far as Selat Egeron. This course leads considerably to the W of Sari Batsir, Sari Waturi, and Sari Kilmasa, which are parts of an off-lying chain of reefs paralleling the Pulau Yamdena coast at a distance of 6 to 7 miles. The northernmost reef is 7 miles SE of Kampung Watmuri and the southernmost is 11.5 miles farther SSW. In this chain there are drying reefs and reefs with depths of 1.8 to 9.1m. The only dangers between these reefs and the Pulau Yamdena coast are 4.9m and 3.9m shoals, respectively, 8.75 and 12.5 miles S of Kampung Watmuri; these are seldom marked by discoloration. A depth of 10m is between these last two shoals. A broad reef projects from the E side of Asutuban, an island off the SE end of Pulau Yamdena and on the N side of the E entrance to Selat Egeron.

Vessels with local knowledge can obtain anchorage off several of the villages between the villages of Kampung Watmuri and Kampung Tumbur, 33 miles farther S.

The river **Wari Tambrian** (7°47'S., 131°27'E.), discharges a stream of muddy water into an inlet about 20 miles NNE of Asutubun Island. Much of this water flows through the channel between Pulau Yamdena and **Pulau Mes** (7°50'S., 131°26'E.), 4 miles S of the river. Therefore, this channel should only be used when the water is clear and the reefs are plainly visible.

Caution.—A deposit of iron ore which causes a local magnetic disturbance is on the E coast of Pulau Yamdena, nearly abreast of the reef **Sari Kilmasa** (7°39'S., 131°44'E.).

An 11.9m shoal lies about 2.5 miles E of Kampung Alusi.

4.92 Selat Egeron, a strait separating Pulau Selaru from Pulau Yamdena, presents no navigational difficulties. Several islands and points of land are useful in passing through the strait. To vessels approaching from the W the hill at the S end of Nusa Anggarmasa, at the W end of the strait, is conspicuous.

To vessels approaching the strait from E, the low Matkus Island, 2 miles within the E entrance, seems at first to be a part of Pulau Yamdena. It does not appear as an island until within 5 miles of the strait. There is a coconut plantation on Matkus Island; due to the felling of coconut palms the aspect of the island is continually changing. Vessels coming from W approach with the N end of Nusa Anggarmas bearing 090°; when the hill on the S end of the island is made out, steer a S course until the hill bears 090°, then steer for it until it is about 3 miles off; course should then be changed to pass through the middle of the channel.

Nustabun (8°02'S., 131°12'E.), a small islet 1.25 miles NW of Matkus, is on a bank extending SSW 1.5 miles and NNE 0.25 mile. This bank is seldom marked by discolored water. **Battjawat** (8°02.7'S., 131°11.1'E.) is a rock near the S end of this bank. Vessels crossing the strait between Saumlaki Bay and Adaut Road should take the channel between Matkus and Battjawat.

Saumlaki Bay (7°58'S., 131°17'E.), near the E end of Selat Egeron, is a marked indentation in the S coast of Pulau Yamdena. Saumlaki Road, on the E side of the bay, affords safe anchorage year-round.

Saumlaki Light is shown at an elevation of 9m from a white framework tower at the pier head.

4.93 **Kampung Saumlaki** (7°59'S., 131°18'E.) (World Port Index No. 52870) is on the E side of Saumlaki Bay. A concrete pier, with a depth of 4.9m alongside its head, projects out from the shores of the village. Fresh water can be obtained from a pipe at the pier head. A beacon marks the edge of the coastal reef 0.2 mile SW of the stone pier; about 0.75 mile S of the same pier at the oil depot, another pier projects 60m and has a berth at its head 20m long, with a depth of 5m alongside. The zinc roof of a church forms a good landmark.

A light shows from the SW extremity of **Astubun** (8°03'S., 131°16'E.). A yellow mast lattice mast was reported about 0.5 mile N of the light.

Adaut Road (8°08'S., 131°06'E.), on the S side of Selat Egeron and at the N end of Pulau Selaru, affords safe anchorage year-round. The preferred anchorage is near the pier at the village of Kampung Adaut. A shed with a galvanized iron roof

Saumlaki—Auto-Tide Station

at the head of the pier is a good mark for entering and anchoring. A shoal, with a least depth of 7.9m, is in the NW approach to the roadstead, about 1 mile SE of Nuyanat; a shoal, with a least known depth of 8.5m, is in the middle of the entrance of the roadstead inlet.

Kampung Adaut (8°08'S., 131°07'E.) (World Port Index No. 52880) is on the E side of Adaut Road. A stone pier juts out to the edge of the shore reef just N of the village.

4.94 Pulau Selaru (8°12'S., 130°58'E.), the N shore of which forms the S shore of Selat Egeron, is generally low. Near the S end of the island, however, there is a hilly ridge with a maximum elevation of 72m, and on the NW coast near **Tanjung Watatutu** (8°08'S., 130°56'E.), there are some inconspicuous hills.

A light is shown on the coast about 2 miles S of the hilly ridge.

Anchorage.—In addition to Adaut Roads, which has been previously described in paragraph 4.93, suitable anchorage is afforded by Labuan Lemian and Labuan Olendir, two bights on the NW side of Pulau Selaru, respectively, 12 and 18 miles NE of the SW extremity of the island. Local knowledge is necessary. The anchorage in Labuan Olendir, off the village of Kampung Namtabung and E of **Tanjung Watatutu** (8°08'S., 130°56'E.) and the reef extending 1 mile N from that point, is particularly sheltered against W and SW winds. The coast reefs are usually well marked by discoloration.

Directions.—Vessels coming from E and bound NW along the W side of the Kepulauan Tanimbar group may round the SW end of Pulau Selaru at a distance of 1 mile off and then set a course to pass close S of the S end of Pulau Riama. This course avoids the 10m shoal 3 miles SW of the S end of Pulau Riama. There is a 5.9m shoal 0.5 mile NE of the N end of Pulau Riama. The channel between Pulau Riama and the reefs close off the W side of Pulau Selaru is deep and clear of dangers.

Caution.—An 8.3m and an 8.5m shoal are in the W approach to Labuan Olendir, about 8 and 9 miles, respectively, WNW of Tanjung Watatutu; an 8.5m shoal is 9.5 miles W of the same point.

An 8.5m coral patch is about 8.5 miles WSW of the SW end of Pulau Selaru.

A 10m shoal and a 9.1m shoal are 3 and 10 miles, respectively, E of the SE end of Pulau Selaru, and two 9.1m shoals are, respectively, 13.5 and 21.5 miles ENE of the same point.

A ridge with depths of 8.5 to 15.5m extends parallel to the SE side of Pulau Selaru between positions about 6 miles SSE and 10 miles SSW of the NE end of Pulau Selaru.

Off-lying Islands off the West Coast of Pulau Yamdena

4.95 Pulau Seira (7°41'S., 131°03'E.), about 21 miles N of the NW end of Pulau Selaru, is separated from the coast of Pulau Yamdena by a narrow, shallow channel which is used by small native boats. A broad reef, not very well marked by discoloration, extends S and SW about 4.5 miles from Pulau Seira. On the W part of this reef, about 1 mile off the SW extremity of Pulau Seira, is Pulau Ngolin, a remarkable island with a heavily-wooded N half and a bare S half. About midway along the NW side of Pulau Seira is the village of Kampung Wailutu.

Bara Sadi (7°48'S., 130°48'E.), a drying reef 9 miles WSW of the S end of Pulau Ngolin, can generally be sighted for a considerable distance because of the surf breaking on it.

Depths of 10 to 12.8m lie from between 8.5 miles SE to 11 miles SSW from the S end of Bara Sadi. An 11.9m shoal lies about 2 miles W of the same spot.

Selat Yamdena (7°35'S., 131°05'E.), separating the W coast of Pulau Yamdena from its off-lying islands, is easy to navigate because there are numerous headlands and islands on which bearings may be taken. Because of murky water, sighting of reefs or shoal water should not be relied upon. Even the deep water of the strait is often discolored by mud stirred up by the currents. On clear days with a few clouds, the murky water often gives the illusion of discolored water because of the shadows of the clouds.

4.96 Pulau Sukeler (7°38'S., 130°57'E.), near the middle of the S entrance to Selat Yamenda 2.5 miles NW of the NW end of Pulau Seira, is 42m high and is a good mark for entering the strait. A drying reef extends about 0.75 mile WSW from the W side of Pulau Sukelar. Lengwati Islet is near the outer end of this reef. A 7.6m coral shoal is 3.5 miles W of Pulau Sukeler.

Pulau Selu, 7.5 miles NW of Pulau Seira, has two conspicuous peaks in its hilly W part, Amat Dawah and Wuru Wuru, 211m and 207m high, respectively. On the reef that projects NW 2 miles from the NW extremity of Pulau Selu are several islets, of which Pulau Nitu, 76m high, is the largest and is a good landmark. Off Pulau Nitu, as well as Tanjung Metanuan, the SW extremity of Pulau Selu, there are sometimes heavy tide rips that raise a heavy sea.

Tides—Currents.—Seaward of Pulau Selu, tidal currents set N and S at a maximum rate of 2 knots. Observations taken in Selat Yamdena during July and August and the first part of September showed a maximum drift of not more than 1 knot. Currents in the strait increase the discoloration of the water.

Pulau Wuliaru, the largest of the islands off the W side of Pulau Yamdena, is close E of Pulau Selu. It has several hills, the highest, 188m high, near the center of the island, but appears to be more nearly flat than Pulau Selu. The numerous dangers, usually marked by discoloration, around Pulau Wuliaru almost precludes any possibility of landing on the island.

4.97 Pulau Keswu (Kiswui) (7°32'S., 131°09'E.), 104m high, about midway between Pulau Wuliaru and Pulau Yamdena, is separated from Pulau Wolas, an islet E of it, by a narrow, deep channel, clear of dangers. Close E of Pulau Wolas are several reefs, some of which dry and form sandbanks. The passage between these reefs and the coast of Pulau Yamdena and that between Pulau Keswu and the edge of the foul rocky ground mentioned above, about 1.25 miles WNW of the NW end of Pulau Keswu, are clear of dangers. The coastal reef extending from the E side of Pulau Wuliaru is almost always marked by discoloration.

Nus Taram (7°29.5'S., 131°14'E.) are three small islets on a mud bank extending from the shore of Pulau Yamdena, 4.5 miles NE of Pulau Wolas.

Selat Wotap (7°23'S., 131°11'E.), separating Pulau Wuliaru and Pulau Wotap, provides easy access to Selat Yamdena to vessels coming from W.

Jarngur Rual and Jarnguar Raa are two well-wooded sand banks on separate reefs in the middle of the strait and are, respectively, 1.5 miles SSW and 2 miles SE of the SW extremity of Pulau Wotap. Passage may be made on either side of these sand banks. On the SW side of the strait are Pulau Natrool, 72m high, and Pulau Natraal, 52m high, respectively, 0.5 mile E and 1.5 miles ESE of the E end of Pulau Wuliaru. A 6.7m shoal is about 0.5 mile SE of the SE end of Pulau Natraal; a similar shoal is 0.5 mile SE of the SE end of Jarngur Raa. Foul ground extends a short distance NE from the NE end of Jarngur Raa. There is a 5m shoal 2 miles N of Natrool.

The narrow channel between Pulau Natrool and the NE side of Pulau Wuliaru is farther restricted by the coastal bank of Pulau Natrool, which has extended 0.13 mile.

Tides—Currents.—Tidal currents set along the axis of the channel in Selat Wotap at a maximum rate of 1 knot.

Directions.—The recommended channel through Selat Wotap is N of Jarngur Rual and Jarngur Raa. Approaching from W, after sighting the SW extremity of Pulau Wotap, steer for Jarngur Raa on a course of 132°. When the remarkable rocky point with a rock off it, 1 mile SE of the 93m hill at the SW end of Pulau Wotap, bears 013°, change course to 102°. Jarngur Raa will then be well open W of Pulau Natrool. When E edge of Jarngur Raa comes in range with the highest point of Pulau Natraal, bearing 218°, change course to 131°. The rocky point mentioned above will then be almost dead astern. This course leads into Selat Yamdena. Caution should be taken to avoid the rocks, dangerous to navigation, NW of Natrool and N of Natraal.

Vessels using the channel leading S of Jarngur Rual and Jarngur Raa steer in with these two islands in range bearing 097° until the W side of Pulau Natrool is in range with the E extremity of Pulau Wuliaru bearing 194°, and then change course to 127°. Keep on that course until the W extremity of Pulau Natraal comes in range with the E point of Pulau Wolas, bearing 196°, and then proceed on an easterly course into Selat Yamdena.

Either of these channels can easily be navigated by eye when the reefs can be made out. A detached, partly drying reef, 0.25 mile SSE of the rocky point mentioned above in the directions for the N channel, is almost always marked by discoloration. The channel is also subject to the same misleading discoloration of the water that was mentioned in Selat Yamdena which was discussed above.

4.98 Pulau Wotap (7°20'S., 131°15'E.), on the W side of the N entrance to Selat Yamdena, is hilly with a maximum ele-

vation of 189m near its center. On the W side are two small bays affording good anchorage.

Pulau Laibobar (7°13'S., 131°23'E.), 7.25 miles NE of Pulau Wotap, is very thickly wooded. A hill, 156m high, is at its N end, but the 391m elevation at the S end of the island dominates the entire Kepulauan Tanimbar group. On a clear day, this can be seen from vessels on the E side of Pulau Yamdena. The S side of the island is indented by a bay affording good anchorage. The coastal reef of this bay discolors well, therefore there is no difficulty in entering. The channel between Pulau Ungar and Pulau Laibobar has a depth of 7.6m.

Pulau Ungar and Pulau Vulmali, 0.5 miles and 2.5 miles, resepctively, S of Pulau Laibobar, are very thickly wooded. A reef with several drying rocks is within 1 mile ENE of the N end of Pulau Vulmali.

Bolu Island, close to the shore of Pulau Yamdena abreast the S end of Pulau Laibobar, is low and wooded.

Caution.—A 3m shoal is about 0.75 mile N, a 6.7m shoal is about 1.5 miles NW, and 7.6m shoal is about 1 mile W, respectively, from the N end of Pulau Vulmali.

4.99 Pulau Mitak (7°11'S., 131°28'E.), which has a coconut plantation, is 3.25 miles ENE of Pulau Laibobar, and is separated from the coast of Pulau Yamdena by a narrow channel which is made almost impassable by many reefs which do not show up clearly because of opaque water. A small craft pier is on the S side of the island. A 4.1m shoal which does not discolor is 2 miles W of the SW extremity of Pulau Mitak, between that island and the N end of Pulau Laibobar. A rock awash, dangerous to navigation, is 1 mile NE of the N end of Pulau Mitak.

Karata and Kabawa are high conspicuous islets, respectively, 1.75 miles N and 2.5 miles NNW of the N end of Pulau Mitak.

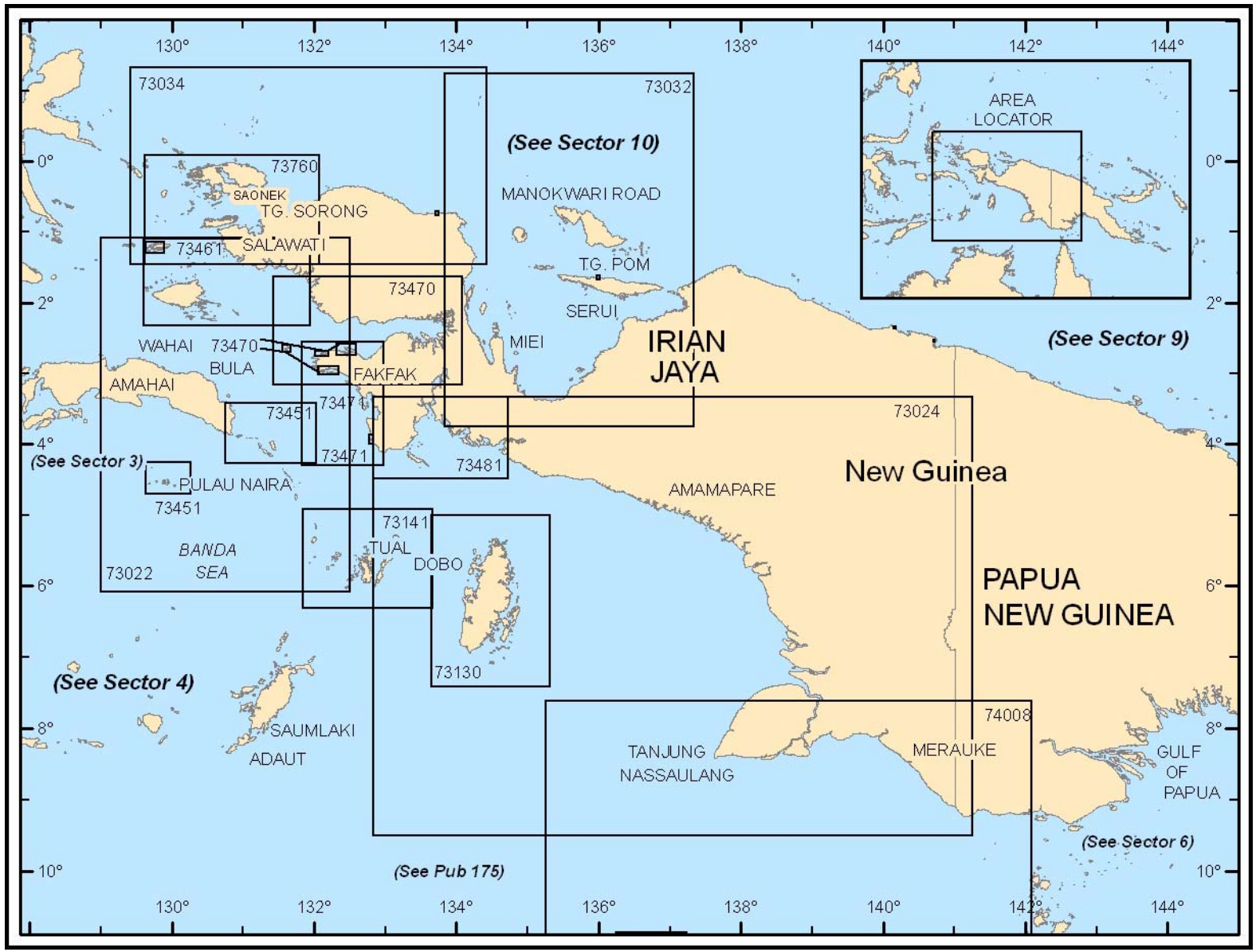
Pulau Namwaan (7°07'S., 131°27'E.) and Pulau Itain, 6 miles NW of the NW end of Pulau Yamdena and 4.75 and 7.5 miles, respectively, NNE of the N end of Pulau Laibobar are being cleared for coconut plantations and are, therefore, constantly changing in appearance. The two islands are, respectively, 151m and 128m high. The channel between them is clear, but it is so narrow that it should be used only when the reefs along its shores are clearly visible. Depths of 10.9m or less extend more than 1 mile W and SW from the S end of Pulau Namwaan. Depths of 18.3m or less extend about 2 miles farther SW.

Pulau Temar (7°09'S., 131°26'E.), a low and well-wooded coral islet, is 1.25 miles S of the S end of Pulau Namwaan. Two 10m shoal spots are within 2 miles W of Pulau Temar. These shoals as well as the reefs around Pulau Temar do not discolor well.

Two reefs, each with a least depth of only 0.9m, are about 1 mile apart on a N-S line 2.75 miles E of Pulau Itain. These reefs show well.

Pulau Vatvurat (7°07'S., 131°27'E.) is separated from the NE side of Pulau Namwaan by a clear channel 0.33 mile wide. Off the S side of Pulau Vatvurat are two rocks, above-water, the northernmost of which bears a striking resemblance to a Madonna and Child.

Two reefs with depths of 0.9m lie close together about 2 miles NE of Vatvurat and are well marked by discoloration.



Additional chart coverage may be found in NGA/DLIS Catalog of Maps, Charts, and Related Products (Unlimited Distribution).

SECTOR **5** — CHART INFORMATION

SECTOR 5

SOUTH COAST OF IRIAN JAYA AND OFF-LYING ISLANDS

Plan.—This sector begins by describing the islands to the N and NW of Irian Jaya, including the large Pulau Waigeo and lesser islands, and the straits between them and the mainland. Next, beginning at Tanjung Yamursba, the northernmost point of Irian Jaya, and then W, the NW coast of Irian Jaya is described to its westernmost point on Salawati. Then in an E direction, the SW coast of Irian Jaya is described to the Bensback River, the point dividing Irian Jaya and Papua New Guinea. This last part of the coast includes Selat Sele, Teluk Berau, and the many bays and rivers entering the sea along this coast.

General Remarks

5.1 Winds—Weather.—Along the S coast of Irian Jaya ,the seasonal changes in wind and weather are the same general character as in the Afura Sea and the Banda Sea, with the East Monsoon predominating. During the West Monsoon there is much rain along the coast and squalls are fairly frequent. The West Monsoon weakens in April and the East Monsoon becomes established in May, although the winds are variable in both months. The East Monsoon blows with much constancy from June to November, but locally is influenced by the development of land and sea breezes. The West Monsoon prevails in December, but it is not dependable. The seasonal distribution of rainfall depends upon the topography, but as a rule the wet season extends from December to March and the dry season reaches its height in August and September.

Along the extreme S coast in the vicinity of Port Moresby and to the E, the West Monsoon is poorly developed and predominates only in January and February. The wind begins to turn in March and is quite variable in April and again in December. The velocity of the wind is highest in July and August, when it averages 14 to 15 knots in the open sea.

The seasonal distribution of rainfall on the coasts of Irian Jaya is quite variable, and depends to a large extent upon exposure to the monsoons. The East Monsoon is, as a rule, relatively dry except where it strikes elevated regions.

On the S coast the East Monsoon is cool and generally agreeable, but on the N coast there is little difference between the temperatures of the two seasons.

It is much cooler in the elevated regions of Irian Jaya, especially at night and in the early morning. On the tops of the highest mountains, there are snow and ice at all seasons.

The Coral Sea is a place of origin for tropical cyclones, the majority of which cross E Australia or skirt the E coast.

Tides—Currents.—With the exception of the tidal currents, the surface currents in the area covered by this volume move, generally speaking, in the direction of the prevailing monsoon. This general movement, therefore changes semi-annually. The actual direction of the currents is greatly influenced by the geographical locations of the various islands. They are not very strong in the more open passages and seas.

In the Afura Sea, during the entire year, the currents set in a SW to W direction from Torres Strait to the Timor Sea and the Banda Sea.

Caution.—Aids to navigation in this area are reported to be unreliable. They may be missing, unlit, or out of position.

Islands North of Irian Jaya

5.2 Kepulauan Asia (1°03'N., 131°15'E.) consists of the islands of Fani, Igi, and Miarin, all on a narrow reef 6.5 miles, long in a NNW-SSW direction. The islands are low, but are covered with tall trees. The reef projects about 0.75 mile N from the northernmost island and 0.5 mile W from the W sides of the islands. There are no anchorages in this group. The islands are uninhabited, but are sometimes visited by the natives from Kepulauan Ayu. A pillar is on the W side of Pulau Miarin, the southernmost island. The channel between Kepulauan Asia and Kepulauan Ayu is considered to be free from dangers.

Kepulauan Ayu (0°30'N., 131°07'E.), about 22 miles S of Kepulauan Asia, consists of almost 20 islets on two extensive reefs separated by a 1 mile-wide deep and clear channel, free of known dangers.

Pulau Aju, the largest of the group, is near the E end of the S and smaller reef. The island, with several villages, has a maximum elevation of 106m in its NW part. Ur Babo, two small uninhabited islets on the W part of the reef about 4 miles WNW of Pulau Aju, are covered with coconut palms.

Mios Kuan, the southernmost islet on the large N reef, is a sand bank covered with coconut palms. A conspicuous plume-shaped casuarina tree is at the S end of the islet and a small shrub-covered islet is off the N end. A village is on Mios Kuan. Mios Ros is a small round tree-covered islet on the E edge of the reef about 1 mile E of the N end of Mios Kuan.

A lagoon in the central part of the N reef is entered through a narrow channel that leads in from the W side of the reef. On the N side of the entrance to this channel is a group of black stones which cover only for a short time during exceptionally HW. A vessel 55m long and with a draft of 3.4m has entered the lagoon. There is a detached 1.8m reef, barely marked by discoloration, on the S side of the entrance and a 4m patch in the middle of the channel about 1.25 miles within the entrance. Temporary anchorage may be taken in the entrance to the channel, but the current there is strong. A more secure anchorage without strong currents is, in 33m, just S of the inner end of the channel. Local knowledge is necessary. The flood current in the entrance channel has a maximum strength of 5 knots. Slack water is of short duration, especially during spring tides. Vessels proceed with the reef in sight, conning from aloft. Ordinarily the edges of the reefs are clearly visible, but there are several reefs and rocks along the channel; some of these dangers do not discolor well.

5.3 Pulau Abdon (0°30'N., 131°07'E.), in the central part of the reef on the W side of the lagoon, has a maximum elevation of 90m. It has been practically stripped of trees and is used by the natives for the cultivation of a type of beet, one of their

dietary staples. There are a few houses and coconut palms on the S side of the island. Pulau Reni and Pulau Ruton, N of the lagoon, about 5.5 miles NE of Pulau Abdon, are two low islands on which there are coconut plantations and several houses. In the central part of each of these islands there is a conspicuous square tree. Pulau Kanobe, on the NW part of the reef N of the entrance to the lagoon, is 61m high and entirely covered with trees and is uninhabited. Mios Mandung, 1.75 miles NNW of Pulau Kanobe, is partly sandy and partly rocky. The sandy portion is covered with coconut palms among which are houses.

Tides—Currents.—In the vicinity of Pulau Aju, the lowest water that can be expected, occurring in June or July and December or January, is 1m below mean sea level; the highest tide, occurring at all semidiurnal spring tides, is 0.7m above mean sea level. Sometimes the prevailing meteorological conditions are such as to cause a fall of as much as 1.2m below mean sea level.

Currents were observed to set strongly in a W direction, especially through the channel separating the two reefs of Kepulauan Ayu. No surf was observed on the reefs. According to the natives, the Northwest Monsoon causes a prevailing E current which breaks strongly on the reefs.

Budd Islet (Moff) (0°32'N., 130°44'E.), about 20 miles NW of Pulau Aju, is low, covered with trees, and uninhabited. The islet has been reported to be a good radar target at a distance of 16 miles.

Caution.—Caution must be exercised in approaching Budd Islet, Kepulauan Ayu, and Kepulauan Asia. When the sun is low and the sea calm the edges of the reefs cannot be seen. Further, the reefs rise so steeply that soundings give little warning of approach to them. The reefs dry only at LW springs.

Islands Northwest of Irian Jaya

5.4 A chain of islands, the westernmost of which is Pulau Sayang, described in paragraph 2.85, extends NW for 40 miles from off the W end of Pulau Waigeo.

Pulau Wayag (0°10'N., 130°03'E.), Pulau Stephanie, Pulau Quoy, Pulau Coquille, and Pulau Uranie, and the other islands of this chain are rocky with an average elevation of about 198m. The islands are uninhabited except for occasional turtle hunters. The islands are heavily infested with mosquitoes. Many small detached rocks are around these islands. A 4.9m shoal marked by discoloration is 1 mile S of the SW end of Pulau Wayag, and a 7.6m shoal which does not discolor is 1 mile farther S. A 9.1m shoal which discolors well is 1.75 mile S of Pulau Stephanie. The tidal currents in the vicinity of these islands are strong, particularly during spring tides.

The channel between this group of islands and Pulau Kawe is wider and easier to navigate at night than is Selat Bougainville, the passage S of Pulau Kawe. Pulau Deem, a small wooded islet, 52m high, on the S side of the W entrance to this channel and 1.25 miles off the NW end of Pulau Kawe, is a good landmark. Two shoal patches, barely above water, are 0.75 mile off the N coast of Pulau Kawe, 2.25 and 3.75 miles E of Pulau Deem; they usually break. Currents run through the channel with considerable strength and strong tide rips are frequently encountered W of Pulau Deem.

Directions.—Vessels approaching the passage between Pulau Wayag and Pulau Kawe from W should steer for the SE point of Pulau Uranie on a bearing of 081°, then, when the NE point of Pulau Kawe bears S, alter course to E. Do not approach Pulau Kawe closer than 2.5 miles.

Pulau Kawe (0°04'S., 130°08'E.), the largest island NW of Pulau Waigeo, has a very irregular outline. Its N part is very heavily wooded, but the reddish-colored hilly S section is only sparsely wooded. The highest point of the island, near the center of its main part is 717m high. The island is reported to be a good radar target at a distance of up to 30 miles. Two inlets penetrate the E side of the island for a distance of about 1.75 miles. Several rocky islets are off the E side of the island. An islet about 1.25 miles SE of the easternmost point of Pulau Kawe extends in a SE direction in Selat Bougainville, with a reef at its outer end. Pulau Balabalak, 1.75 miles W of Pulau Kawe, has several low grass-covered hills. There are several rocks between the two islands.

5.5 **Selat Bougainville** (0°08'S., 130°12'E.), a strait between the NW coast of Pulau Waigeo and the island SE of Pulau Kawe, is generally deep, but several shoal patches, including a 9.1m shoal and a 6.7m shoal, 8 miles SW and 9 miles SSW, respectively, from the summit of Pulau Kawe, are at the W end. Farther E, on the N side of the channel, 5 miles NE of the 6.7m shoal and 4.5 miles S of the summit on Pulau Kawe, are two above-water rocky patches. The tidal currents running over the uneven depths cause strong overfalls and eddies. In the narrower parts of the strait currents frequently attain a rate of 3 knots.

The best route for vessels coming to the strait from S is through the channel between the islands of Pulau Ju and Pulau Minyafuin.

When approaching from W, after leaving the strait between Pulau Gebe and Pulau Ju from a position about 4 miles S of Pulau Ju, steer for the summit of Pulau Batanpele on a course of about 104°. This will lead about 3 miles S of the 5.8m shoal SSW of Pulau Kawe. Then alter course to 054°, steering for the high island of Pulau Me. On this course Tanjung D'Entrecasteaux is approached to about 1 mile. When the cape is abeam, steer 036° for the highest islet of Kepulauan Seprang. There is a 0.5m shoal 1.25 miles N of Pulau Me. Pass S of these rocky islets and N of the islets of Kepulauan Loh Loh.

Pulau Waigeo

5.6 **Pulau Waigeo** (0°10'S., 131°00'E.), lying NW of the W end of Irian Jaya, consists almost entirely of hills and mountains which rise steeply from the sea. The highest elevations are on the N side of the island. **Buffalo Horn** (0°05'S., 130°45'E.), a 958m mountain peak about midway along the N coast is a good landmark, as is Serodjil, 939m high and 14 miles W. Teluk Mayalibit, a bay entered on the S side of the island, nearly divides the island in half. The island, covered with a dense forest, has a hot and moist climate.

The only place on the island that is visited frequently by vessels is **Saonek Road** (0°28'S., 130°45'E.), about midway along the S coast of the island. The only place where good water can be obtained is **Teluk Fofak** (0°02'S., 130°44'E.), on the N side of the island.

Pulau Waigeo—West and Southwest Coasts

5.7 These parts of the coast are extremely irregular and are characterized by numerous moderately high mountains with peculiar shapes. **Gunung Meja besar** (Groote Tafelberg) (0°14'S., 130°19'E.), the highest elevation in the W part of the island, 6 miles E of Tanjung Selpele, the W extremity of Pulau Waigeo, is 486m high. Waisilip, 310m high and 3.3 miles ESE of Gunung Meja besar, is conspicuous when seen from SW. Gunung Puri (Kasteelberg), 326m high and 5.5 miles E of Waisilip, is hard to make out, but when identified is a good mark.

Between **Pulau Pef** (0°26'S., 130°26'E.) and **Tanjung Manare** (0°16'S., 130°19'E.), the SW coast of Pulau Waigeo forms a large bight. Teluk Waisai is in the NE part of this bight, and Teluk Warparim, an indentation in the N shore of Pulau Gam, is in the SE part of the bight. Both of these bays afford good anchorage and, except for the reefs and shoals close along their shores, are clear of dangers. A channel close along the shore of Pulau Waigeo E of Tanjung Manare leads to Teluk Waisai; a channel close around the NW extremity of Pulau Gam provides access to Teluk Warparim.

Vessels must exercise caution in navigating the above-mentioned channels as well as those among the islands in the bight. The use of the chart is essential. Good anchorage is available off Kampung Waisai, at the head of Teluk Waisai. Kampung Waiwoom, the only other village on the SW coast of Pulau Waigeo, is about 4 miles SSE of Kampung Waisai.

Directions.—Approaching from Selat Bougainville, steer 120° for the peak on Pulau Biantsyi-besar. When Pulau Manare is abeam, steer for the S point of the headland N of Pulau Biantsyi-kecil until Pulau Biantsyi-besar peak bears 189°, then alter course for the hilltop on Pulau Gemien bearing 102°. A sheltered anchorage can be found N of Pulau Gemien behind the small island lying N of that island.

Approaching Teluk Waisai from SW, steer for the NW point of Pulau Gemien bearing 050°.

Vessels bound for Teluk Warparim can approach Pulau Pef and Tanjung Ombrab closely. Leaving the bay and bound NW, an inner fairway can be followed. Keep the summit of Pulau Biantsyi-besar in range 307.5° with the middle of Pulau Peniki. When the E point of **Pulau Yeben** (0°29'S., 130°21'E.) bears 220.5°, alter course to 349° for Tanjung Waisai. Approach the latter point until Tanjung Manare bears 280° until the peak of Pulau Biatsyi-besar is abeam, then alter course for the N point of Pulau Ronsuar bearing 258.5°. When Pulau Manare is passed, the archipelago can be left for Selat Bougainville without further difficulty.

Pulau Waigeo—Off-lying Islands

5.8 Between Tanjung Selepele and the large hilly island of Pulau Gam there are many small islands and rocks. Among the larger of these islands are **Pulau Batanpele** (0°18'S., 130°13'E.) and Pulau Minyaifun, respectively, 4.5 and 7 miles S of Tanjung Selpele. Pulau Batangpele may be identified by its 368m summit. Pulau Ju, 1.75 miles W of Pulau Minyaifun and separated from it by a deep channel, is low. Two shoal patches with depths of 6.7 and 10m are, respectively, 2.5 and 1.75 miles NW of Pulau Ju. About 5.5 miles SSW of the S end of Pulau Ju is a 9.1m shoal. SE of this last group of islands is a group of small, low, coral islands including **Pulau Yasbekar** (Fwojo) (0°24'S., 130°13'E.), Pulau Arar-besar (Mios Arar-besar), Pulau Tsiep (Pulau Jef), and the Mutus Islands. Another group of islands is NE of the Mutus Islands; one of these, Pulau Biantsyi-besar, has a conspicuous peak, 136m high.

The drying reef on the N side of Pulau Biantsyi-besar has been reported to extend 0.3 mile from shore. Passage between Pulau Biantsyi-besar and its surrounding islands should be avoided because the area has not been fully surveyed.

Pulau Gemien (0°19'S., 130°30'E.), E of the last group and close to the shore of Pulau Waigeo, has a number of hills with a maximum height of 226m. These hills aid in identifying it at a considerable distance.

5.9 **Pulau Jeben** (0°29'S., 130°21'E.) and Pulau Apibok are two small rocky islets 5.5 miles WNW of the SW extremity of Pulau Gam. A drying reef is between the two islets, and several rocks extend out SW from the W end of Pulau Jeben. A 2.1m shoal is about 1 mile W of Pulau Jeben. A 5m shoal is located 3 miles ESE of the E side of Pulau Jeben.

The only permanent village on the islands of this group is on the N side of Pulau Minyaifun. Local knowledge is necessary. There is anchorage, in 25m sand, off the village. The anchorage can be reached either from E or W by proceeding along the shore of Pulau Minyaifun at a distance of 183m.

Tides—Currents.—The highest water level that can be expected at the Mutus Islands occurs in May or June and November or December and is 0.7m above mean sea level. The lowest level to be expected is 0.4m below mean sea level.

5.10 **Teluk Alyu** (Aljoei) (0°10'S., 130°18'E.), penetrating the W end of Pulau Waigeo for about 12 miles, is very irregular in shape. There are three large islands and several smaller islands in the entrance to the bay. There are two entrance channels, one N and one S of this group of islands. Tanjung D'Entrecasteaux is the W extremity of the small westernmost island of the group. Tanjung Selpele, the S entrance point to Teluk Alyu, is backed by a conspicuous 425m hill. The S entrance, between Tanjung D'Entrecasteaux and Tanjung Selpele is narrowed to some extent by a drying reef projecting 0.6 mile NW from Tanjung Selpele and by a 3.9m shoal on the N side, but the channel itself is clear. In the N entrance channel are two 5.8m shoals and, farther in, a 12.8m shoal.

The inner part of the bay consists of several irregular arms that are almost landlocked. The channel leading from the outer bay to the inner bay is divided into two narrow passages by along narrow island. A chain of small islets and rocks lies about 0.5 mile off and parallel to the NW side of this island. The N passage has a least width of about 0.2 mile and a least mid-channel depth of 5.9m. A rocky shoal extends 0.3 mile off the coast of Pulau Waigeo directly N of the NE point of the narrow island. The S passage is wider at its W end and has the same least depth, but several rocks at its E end restricts its width. A 3.7m shoal is about 0.25 mile N of the small island in the center of the lower inner bay. The shores of the outer bay are steep and rocky with sandy patches in places. The chart is the best guide in entering the outer bay. Except for the small village of Kampung Selpele, near the point of the same name on the S side of the entrance to the outer bay, and another vil-

lage on the N entrance, there are no inhabitants in the vicinity of the bay.

Directions.—The S entrance between Tanjung D'Entrecasteaux and Tanjung Selpele is the easier of the two. Enter the bay on a course of 098° with the southernmost of the Alyu Islands in range with the S point of the southernmost island in the entrance to the inner part of Teluk Alyu. This point may be rounded closely. The Alyu Islets are the chain of small islets close off the W part of the long unnamed island dividing the entrance to the inner bays into two channels.

The inner bays are reached either by the passage N of the long unnamed island or by the passage S of it. The S passage is a long winding channel with a least mid-channel depth of 11.9m. There are no off-lying reefs. The E end is about 0.2 mile wide in the fairway.

Vessels using the N passage should steer 095° for the small islet NE of the long unnamed island. As soon as the NE point of the long unnamed island bears 135°, alter course hard to starboard for that point for not more than 91m, then turn hard to port, setting a course of approximately 104° midway between that point and the small islet mentioned above.

Vessels departing by the N passage should keep in the middle of the passage between the NE point of the long unnamed island and the small islet NE of it on course 282°. Straight ahead is a small hilltop on the large 248m summit at the outer part of the bay. This hilltop is S of and somewhat lower than the 248m summit. When the NE point of the long unnamed island bears 135°, turn hard to starboard on a course of 315°. Follow this course for about 91m, then turn hard to port and proceed on a course of 275°, with the small islet that is in the N entrance to the inner bay bearing 095° astern. The route should have a least depth of 18.3m.

From the inner bay a deep and clear passage leads into the spacious N bay. The middle inlet of this bay reaches to within about 0.3 mile of the head of Teluk Saripa on the N coast of Pulau Waigeo.

Anchorage.—The outer part of the bay affords anchorage, in 42 to 55m. The inner part of the bay and the bay N of it affords excellent anchorage, in 26 to 33m.

Pulau Me (0°07'S., 130°15'E.), off the NW extremity of Pulau Waigeo 1.5 miles NW of the N entrance to Teluk Alyu, is 233m high. Drying reefs extend off the several points of the island. A clear passage leads between Pulau Me and Pulau Waigeo, but there are frequently heavy tide rips in its narrowest part. A drying rock is 0.75 mile N of Pulau Me and a depth of about 0.45m is close N of this rock.

Pulau Waigeo—North Coast

5.11 Except for the shores of the bays this coast is very rocky. In some places the hills rise almost vertically from the water's edge. Most of the inlets along the coast afford suitable anchorage; the most sheltered is Teluk Fofak, which is discussed in paragraph 5.12. Between **Tanjung Bomasi** (Hoek Lamarche) (0°10'S., 131°18'E.), the NE extremity of the island, and **Tanjung Saobasar** (0°05'S., 131°10'E.), about 10 miles NW, there are no anchorages. This stretch of coast is low but it is backed by rather high hills. Tanjung Bomasi is low but can be recognized by Mount Pupri, 262m high and close S of the point. The more conspicuous elevations along this coast were described under the general description of Pulau Waigeo in paragraph 5.6.

Winds—Weather.—The winds of the Southeast Monsoon frequently blow with a force of 7 or 8 over the mountains of this coast, withtheir full strength occurring during part of the night and in the forenoon.

The principal inlets between the W end of the island and Teluk Fofak are Teluk Mane Tep, Teluk Wunoh, Teluk Saripa, and Teluk Arago. Teluk Mane Tep is an open bay E of Pulau Me. Teluk Wunoh, separated from Teluk Mane Tepby a steeply-rising tongue of high land, is an open inlet and is fronted by Pulau Wunoh, 106m high, near which are several rocks, some above water.

Teluk Saripa (0°07'S., 130°22'E.), 5.5 miles E of Pulau Me, is a large inlet that penetrates the island for 3.5 miles, and, with the N arm of Teluk Alyu, cuts nearly through the W part of the island. On the N side of the entrance is Pulau Sipsipa, from which a reef with rocks extends NW 0.75 mile. A similar reef extends in a NW direction from the W entrance point of the bay. Some small islets with extending reefs are near the head of the bay.

There is a village on the W side of Teluk Saripa, about 0.5 mile S of the W entrance point, and another at the head of a small inlet on the E side of the bay, about 1.5 miles SSE of the E entrance point.

5.12 **Teluk Arago** (0°03'S., 130°33'E.), 11 miles E of Teluk Saripa, is open to the N; in its S part there are two inlets. An island about midway between the entrance points has a reef, with several rocks extending about 0.3 mile to the E. Pulau Schun is off the W entrance point to the bay.

Caution.—Kepulauan Seprang, a group of islets, the highest and westernmost of which is 38m high, is on the W side of the N entrance to Selat Bougainville, 5.5 miles NNE of Pulau Me. Kepulauan Loh Loh consists of six small, rocky islets 6 miles E of Kepulauan Seprang. Both of these island groups are good landmarks.

Teluk Fofak (0°02'S., 130°44'E.) is entered between Tanjung Forrest and Tanjung Rotsige. About 0.25 mile NNW of Tanjung Rotsige are some beehive-shaped rocky islets. A 14.6m shoal is in the middle of the entrance to the bay, and foul ground, with Lelede Rocks, extends 0.35 mile from the E shore a short distance within Tanjung Rostige. The entrance channel has a least width of 0.3 mile and depths of 37 to 55m. A reef with an islet projects 0.4 mile NW from a point on the S shore of the bay facing the inner end of the entrance channel. A waterfall is on the N shore of the bay about 1 mile E of the inner end of the entrance channel. Good fresh water can be taken here; about 91m of hose is needed. The shore abreast the waterfall can be approached closely. A village with a mosque is at the head of the bay; it is fronted by a wide mud bank.

5.13 **Pulau Manuran** (0°02'N., 130°53'E.), 10 miles ENE of Teluk Fofak and 1.5 miles off the coast of Pulau Waigeo, has a flat central summit 298m high. A 4.9m reef is about 0.75 mile S of the S extremity of the island.

Pulau Lawak (0°01'S., 130°57'E.) is 3 miles SE of Pulau Manuran. A channel, with depths of 12.8 to 16.4m, and a navigable width of 0.2 mile between the reefs on either side sepa-

rates Pulau Lawak from Pulau Waigeo. A 5m patch lies in the middle of the channel on its NE end.

Between Lawak and Tanjung Wariai, 5.5 miles E, anchorage may be obtained during the South Monsoon in any required depth.

Teluk Kabarei (0°03'S., 130°58'E.), SE of Pulau Lawak, affords anchorage during the Southeast Monsoon. A pier, which dries, projects from the shore abreast the village of Kabarai on the SE side of the bay.

Directions.—Approaching Teluk Kabarei from W, proceed through the wide and safe passage between Pulau Waigeo and Pulau Manuran, avoiding the 4.9m reef S of the latter. Keep to the Pulau Waigeo shore in the narrow passage between Pulau Lawak and Pulau Waigeo. When passed the narrow elbow of this passage, bring the S point of Pulau Lawak astern bearing 253°. Proceed on this course, 073°, until the E point of Pulau Lawak is abeam, then alter course to starboard for the anchorage in Teluk Kabarei. A good anchorage for small vessels is in 5.8 to 7.3m E of the three islets at the head of the bay.

5.14 **Teluk Boni** (0°03'S., 131°03'E.), at Tanjung Wariai, 5.75 miles E of Pulau Lawak, the coast line turns sharply S for 2.5 miles and then, forming a right angle, turns again to the E. Fronting the bight thus formed is Teluk Boni, low, but covered with high trees. A wide drying reef projecting E 1.25 miles and NW 1.5 miles extends out from the E and N sides of the island. There is a village on the NW side of the island.

Directions.—Approaching Teluk Boni from NNW, keep to the Pulau Waigeo side of the fairway. When W of Pulau Boni keep in mid-channel and proceed to the anchorage S of Pulau Boni. To leave to the E bring Bombedari Islet ahead bearing 113.5°. When the E side of Pulau Boni bears 349°, turn to port and steer midway between the large drying reefs.

Vessels approaching from E should bring the S point of Pulau Boni ahead bearing 270°. Keep this course until the middle of Bombedari Islet bears 205°, then follow the reverse of the directions given above.

5.15 **Bombedari Islet** (0°04'S., 131°06'E.), with a drying reef extending N for about 0.5 mile, is nearly 1.5 miles SE of Pulau Boni. There is a wide channel on the W and S sides of Pulau Boni, but the latter, entered from the E, between Pulau Boni and Bombedari Islet, is the better channel. The channel between Pulau Boni and the coast of Waigeo W, affords good anchorage over a bottom of mud and sand. In the harbor, about 0.5 mile S of Pulau Boni, is an area with numerous reefs and rocks. A channel separates Bombedari Islet from the shore of Pulau Waigeo, but there are several dangerous boulders in it and a 0.9m patch NW of Bombedari.

A 5.5m shoal is reported about three miles NNW of Tanjung Wariai.

Pulau Waigeo—South Coast

5.16 This section of the coast between **Tanjung Imbikwan** (0°23'S., 131°15'E.), the SE extremity of the island and the SW extremity of Pulau Gam, is indented by two large bays, Teluk Mayalibit and Teluk Kabui. A chain of reefs, shoals, and small islets paralleling the coast at an average distance of a little over 2 miles extends from the E end of Pulau Mansuar, S of Pulau Gam, to a position abreast of Tanjung Imbikwan and then NE to Tanjung Momfafa, 7.75 miles NE of Tanjung Imbikwan. Shoal patches of 5.9 to 9.1m are reported up to 7 miles E of Tanjung Momfafa, the E extremity of Pulau Waigeo. It has been reported that depths in the vicinity of the 5.9m shoal are less than charted. Between this chain of dangers and the coast of Pulau Waigeo there is a deep channel which can be used when the reefs and shoals can be easily distinguished. The preferred course on this inside channel leads close along the shore. Off the entrance to Teluk Mayalibit there is an opening in the off-lying reefs. Close inside this opening is an unmarked 3.2m shoal which seldom discolors. Abreast the village of Kampung Wakre, 5.5 miles WNW of Tanjung Imbikwan, the off-lying dangers recede toward the shore to such an extent as to make it absolutely necessary for vessels to be able to see the reefs. A stone, which cannot always be seen, is 0.75 mile SW of the village.

5.17 **Memyai Islet** (0°22'S., 131°11'E.), 3.5 miles W of Tanjung Imbikwan, is a 134m wooded hill and is a good mark for entering the inner channel through the opening WSW of that islet. Pulau Wayam, 1 mile S of Tanjung Imbikwan, is quite low, but is made conspicuous by its high trees and is a good mark for vessels rounding the E side of Pulau Waigeo. Tanjung Imbikwan, backed by a 490m elevation, is also conspicuous.

Teluk Mayalibit (0°21'S., 130°56'E.), entered from the S coast at a position 18 miles W of Tanjung Imbikwan, extends in a NW direction nearly across Pulau Waigeo and reaches to within 1.75 miles of Teluk Fofak on the N coast. Tidal currents and tide rips in the entrance are very strong and vessels over 91m long are advised not to enter. It is advisable to wait for the turning of the tide before entering. The tide turns 3 hours before or after HW at Saonek. The currents in the narrows attain a maximum rate of 5 knots, and in the wider, southern part, rates of 3 to 4 knots have been recorded. In the narrow parts eddies are formed and along the shores there are countercurrents. Vessels are advised to anchor before entering and then proceed after observation of the current.

Locally it is reported to rain often in August and September and during these months the mountains are often clouded.

Directions.—The following general directions should assist in passage of the channel through the strait.

A mid-channel course of about 308° should be steered for the first mile through the strait; then the point on the W side of the channel, about 2 miles NW, should be brought into line with the point beyond it on the opposite side of the channel bearing 330°, and kept in line for another mile, after which the W shore should be followed at a distance of 0.13 mile until the point on the E shore is abeam. There is a 1.8m shoal just outside the strait entrance. A mid-channel course should then be held to and through the narrows, which is less than 0.2 mile wide, and where the channel turns abruptly W. Past the narrows the channel is clear of shoals to **Pulau Manil** (0°18.3'S., 130°54.0'E.), which should be passed on the N side on entering, and on its S side when leaving the bay due to the tidal stream disturbances in this vicinity.

The depths in the bay gradually shoal toward its head and there are generally depths of 9.1 to 24m over most of the bay within the entrance. The entrance itself is less than 183m wide

in the fairway in places and is quite tortuous, but depths are 10.9m or more over the recommended track. It is reported that a vessel drawing 5.9m can proceed to nearly all parts of the bay. The bottom is mainly soft mud. The chief off-lying dangers are a 1.8m shoal and a 6.4m shoal about 0.75 mile E and 2 miles ESE, respectively, from the W entrance point to the bay. A reef, surrounded by shoal water, is about 2.25 miles inside the entrance on the E side of the channel.

A moderate speed should be maintained in the vicinity of Pulau Manil in order to overcome the effects of the current. In entering, after passing the narrows in the vicinity of the same islet give its NW point a wide berth when the tide is setting out.

There are small islets in the narrow channel about 1.5 and 2 miles NW of the NW extremity of Pulau Manil.

Small vessels intending to anchor in the vicinity of the village of Pitsjor should first pass N of Pulau Manil, then turn around that islet and pass between it and the E end of Pulau Waiwah, then proceed to anchorage.

The narrow Mulu Bayong, separating Pulau Waiwah from the coast SW is recommended only for shallow-draft vessels. A river discharging into the middle of the passage frequently carries debris into the passage, causing obstructions to navigation.

5.18 Saonek Road (0°28'S., 130°45'E.) consists of Pulau Saonek-kecil and Pulau Saonek-besar, two islets off the S coast of Pulau Waigeo about 11.5 miles SW of the entrance to Teluk Mayalibit. Pulau Saonek-kecil, the smaller NE islet, is wooded and is 71m high. Pulau Saonek-besar is well-wooded and is 45m high near its SE end. A village is on its NW side. The islet is fringed by a drying reef extending nearly 0.25 mile from its SW side. A reef with a depth of 3m is 1.5 miles NW of Pulau Saonek-besar. The reef and the fringing reef on the SW side are marked by discoloration. A shoal with a least depth of 3.6m is about 3 miles E of Pulau Saonek-besar.

Tides—Currents.—At Saonek Roads anchorage, the maximum rise and fall of tide that can be expected are, respectively, 0.6m above and 0.6m below mean sea level. Strong currents may be encountered around the island.

Anchorage.—Anchorage can be taken, in 29m, sand, NW of Pulau Saonek-besar, on the axis of the main pier of the village. Vessels may anchor closer to the island, but the tidal currents are strong and it is advisable to run a line to the shore if anchoring farther in shore.

5.19 Kampung Saonek (0°28'S., 130°47'E.) (World Port Index No. 53040), on the beach on the NW side of Pulau Saonek-besar, is the only place of commercial significance on Pulau Waigeo. Jungle products from this area are collected here for export. Two small boat piers and a larger pier for sailing craft front the village.

Teluk Kabui (0°22'S., 130°38'E.) is a wide inlet in the S coast of Pulau Waigeo NW of Saonek Road anchorage. Pulau Gam closes off the greater part of the otherwise open section of the inlet. East of Pulau Gam is an entrance channel 1.75 mile wide. Pulau Ura, an island 2 miles inside the entrance, is 126m high. The channel W of this island is safe and deep. Vessels may encounter strong currents in the entrance channel. Anchorage can be taken anywhere in the bay. Pulau Myanef, an islet in the NW part of the bay, fronts Teluk Sesil, a small comparatively shallow arm of Teluk Kabui. There are several small villages in Teluk Kabui. Among them are Kampung Ura, on the islet of the same name; Kampung Warai, on the N side of Pulau Myanef; and Kampung Menyaifun, on the N shore of Teluk Kabui.

Selat Kabui (0°26'S., 130°33'E.), a strait separating Pulau Gam and Pulau Waigeo, leads from Teluk Warparim into the SW part of Teluk Kabui. It is a very narrow channel with a least depth of 1.2m and can be used only by small craft with local knowledge. The tidal stream in the strait sometimes attains a rate of 4 knots, causing tide rips and eddies.

5.20 Pulau Gam (0°30'S., 130°35'E.) has high steep coasts. The highest point on the island, a hill 405m high, is 3 miles W of Tanjung Jenanas, the E extremity of the island. Another hill, 296m high with another peak on its S side, is 2.5 miles S of the highest point. These two hills are good landmarks when seen from E and SE. The island is not very conspicuous when seen from SW. Two inconspicuous islets, Friwin and Friwinbonda, each 10m high, are close off the E end of Pulau Gam. Pulau Camphuys, an islet 2 miles SE of Friwinbonda, is 42m high, rocky, and covered with vegetation. Pulau Kerupiar, a rock about 10m high, is close off the coast of Pulau Gam, 2.5 miles SW of Friwinbonda. Several reefs and shoal spots in the channel between Pulau Gam and Pulau Mansuar do not discolor well. The currents in this channel are strong. Only small vessels can use the small bays on the S and W sides of Pulau Gam.

Pulau Yanggelo is an islet off the SW extremity of Pulau Gam; a 3.2m shoal is 0.5 mile W of Tanjung Ngan, the W extremity of that islet.

Selat Dampier

5.21 Selat Dampier (0°37'S., 130°45'E.), the strait between Pulau Waigeo and Pulau Batanta, has several channels. The main channel leads close S of Pulau Mansuar, Pulau Kri, and Pulau Koh and N of Pulau Augusta and Pulau Duiven. Another channel leads along the S side of the bank on which Pulau Augusta and Pulau Duiven lie. A third channel is between the N side of Pulau Batanta and the chain of reefs and islets to the N. A bank of soundings which vary considerably and extending across Selat Dampier connects Pulau Batanta and Pulau Waigeo. A chain of reefs and shoals, on which are Pulau Augusta, Pulau Duiven, Pulau Jerief, and Kepulauan Tapok (Mansfield Islands), and through which the two S channels lead, extends in an ESE direction from a position about 2 miles W of Pulau Augusta to Karang Batanta, a distance of more than 30 miles.

Tides—Currents.—The character of the tides and the rise and fall of tide in Selat Dampier are essentially the same as at Saonek Road, which has been discussed earlier in paragraph 5.18.

Vessels off the W entrance to Selat Dampier, between **Tanjung Soos** (1°10'S., 129°58'E.), marked by a light with racon at the E extremity of Pulau Kofiau, and **Tanjung Mabo** (0°56'S., 130°23'E.), the SW extremity of Pulau Batanta, during the months between September and April, will usually encounter a S current which is considerably influenced by the direction and force of the wind. Between May and August, the current in this vicinity sets in a N or NW direction. During the turning periods

of the monsoons there is scarcely any current in this vicinity.

At the height of the Northwest Monsoon, in the narrow part of the strait, between Pulau Duiuen and Pulau Jerief, the ebb current sets ENE for 6 to 8 hours at a rate of 4 to 5 knots at springs, and 1 to 3 knots at neaps. The flood current sets SW for 3 or 4 hours but is weak. At the height of the Southeast Monsoon, the flood current here sets W for 8 to 10 hours, setting successively to the WSW, SW, and SW by S; it then attains its greatest rate, which at springs sometimes exceeds 5 knots, and at neaps, 4 knots. The ebb at this season sets ENE or NE, but it is neither strong nor long lasting. It has been observed, however, to attain a rate of 4 knots for periods of 1 to 2 hours.

At the E entrance to the strait, the ebb current is generally stronger during both monsoons. During the Northwest Monsoon, an E current sometimes runs for 2 or 3 consecutive days.

Directions.—Vessels coming from W set an E course on the high NW point of Pulau Batanta, taking care not to approach the southwesternmost island of the Kepulauan Fam group within 2 miles because of the detached reef lying S of that island. Close the NW point of Pulau Batanta to about 1.5 miles distant, then steer 036° toward the W point of Pulau Mansuar. When the 186m hill at the NW extremity of Pulau Batanta bears 203° astern, alter course to 023° in order to pass W of the 9.1m shoal W of Pulau Augusta. When the E points of Pulau Duiuen and Pulau Augusta come in range bearing 108°, change course to 070° and pass S of Pulau Mansuar, Pulau Kri, and Pulau Koh.

If proceeding to Saonek Roads anchorage, take care to remain outside the line joining Pulau Koh and Pulau Sanoek-besar until the reef NE of Pulau Koh has been passed. Pulau Saonek-besar may be passed on either side, but in rounding that island to the W they must give a good berth to the reef extending out from the island. The highest point of Pulau Gam and Pulau Saonek-besar hill in range bearing 282°, leading well S of the SW extremity of the ridge of reefs E of Pulau Saonek-besar and is a good mark for vessels approaching Saonek Roads anchorage from E. There is a 3.7m shoal 3 miles E of Saonek Besar.

Vessels desiring to take the channel close along the Pulau Waigeo shore when leaving Saonek Roads anchorage should pass N or S of Pulau Saonek-kecil and parallel to the Pulau Waigeo shore about 0.5 mile off until E of Teluk Mayalbit at which point the distance offshore should be increased to 1 mile. The reefs are easily detected. Southeast of Tanjung Babula, SW of the entrance to Teluk Mayalbit, there is an opening in the ridge through which a vessel may pass, but there is no clearly defined range for navigating it. A 1.8m shoal is N of this entrance. At the E end of the ridge there is also a passage, but here, too, there are no marks, therefore, local knowledge is necessary. With good visibility it offers no difficulty, but the small reef under the shore, which is passed to the S, was barely discernible during a survey.

Vessels can pass close outside Pulau Memyai, which has practically no coastal reef. Small craft can pass between this islet and the shore, but this cannot be recommended because of strong currents. Beyond Pulau Memyai there is a convenient channel between the shore and Pulau Wayam. A mid-channel course is recommended. Pass either E or W of Pulau Wayam having due caution for the reef extending NE of the E end of that islet.

Eastbound vessels using the channel that passes S of Pulau Augusta and Pulau Duiuen should bring Pulau Camphuys to bear 028°, midway between Pulau Kri and Pulau Koh, and make good that course; it leads across the ridge E of Pulau Duiuen over depths of 10.9 to 11.9m. Vessels preferring deeper water should, when Pulau Duiuen is about on the port beam, turn two or three points to starboard until the NW side of Pulau Camphuys is just open of the SE side of Pulau Koh, bearing 028°; the small mountain N by W of Pulau Saonek-besar will come into range with the NW side of Pulau Camphuys. Vessels coming from E bring the last-named marks in range astern in good time to keep on that range line until Pulau Augusta and Pulau Duiuen are in range, when course may be set to pass N of the NW points of Pulau Batanta.

The channel along the N coast of Pulau Batantais easy to navigate. Between the NW point of Pulau Batanta to the N point of **Pulau Wruwarez** (0°47'S., 130°46'E.) it is advisable to remain N of the line that joins the N point of **Pulau Dajang** (0°47'S., 130°30'E.) to the N point of Pulau Wruwarez in order to clear the dangers lying off the coast. Subsequently the outermost points of Pulau Batanta can be passed close-to. There is a 4.6m shoal extending 0.8 mile off the coast from the point 5 miles E of Pulau Wruwarez. When **Tanjung Kandorwa** (0°50'S., 130°54'E.) is in range with the E side of **Pulau Ayemi** (0°48'S., 130°54'E.), just clear of Tanjung Evanas, the easternmost point of Pulau Batanta, course should be changed to bring this range astern; this course leads across the ridge W of Karang Batanta reef. Vessels bound to the S from Tanjung Evanas should round that point and then proceed in a S direction to the deep channel E of Teluk Sagewin.

Off-lying Islands on the North Side of Selat Dampier

5.22 The Jef Doif Islands (Yef Doif Islands) (0°46'N., 129°47'E.) have been described in paragraph 2.88.

Kepulauan Fam (0°37'S., 130°14'E.), off the W entrance to Selat Dampier, consists of two groups of islands separated by a clear deep channel.

Pulau Penemu (0°35'S., 130°16'E.), the largest island of the NW group, and Pulau Keruo, about 1 mile E, are high and rocky. A rocky peak, 214m high, on the N end of Pulau Penemu, helps to identify the island. Pulau Penemu is the only island of the group that is inhabited. A bank of soundings with a least depth of 7.8m extends WSW 8.5 miles from the W side of Pulau Penemu. The passage N of Pulau Penemu NE to Pulau Yeben is clear.

A 5m patch lies about 4.25 miles E of the S point of Pulau Penemu.

5.23 **Pulau Fam** (0°39'S., 130°17'E.), the largest and northeasternmost of the SE group of islands, is about 2.5 miles S of the S end of Pulau Penemu. Near the E end of the island are two flat hills of about equal height and a conspicuous, flat-topped, 139m hill is in its W part. There is a village on the N tip of Fambemuk, a small islet to the S. The other islands SW of Pulau Fam are low, coral formations with high trees visible for 16 miles.

Pulau Mingiman, 55m high, and Pulau Jar, SW of Pulau Fam are coral islands with high trees. These islands are surrounded

by deep water but there are many shoals, most of which are marked by discoloration around the island between these last two and Pulau Fam. A 2.1m shoal is about 1 mile S of Pulau Mingiman. A conspicuous tree is on a reef about 8.5 miles E of Pulau Mingiman.

Anchorage may be obtained in a few places in this S group. Tidal currents may attain a rate of 2 to 3 knots.

Karang Bata (Woodford Reefs) (0°42'S., 130°25'E.), about midway between the S part of Kepulauan Fam group and Pulau Augusta, are three rocky patches with depths of 4.9 to 5.8m. These reefs have little discoloration.

5.24 **Pulau Mansuar** (0°36'S., 130°34'E.), about 3 miles S of Pulau Gam, has three inconspicuous peaks, the highest of which is 383m high at about the middle of the island and a lower but more conspicuous 281m hill at its E end. Airborei Islet is near the W end of an extensive drying reef, extending 3.5 miles NW of the W end of Pulau Mansuar. A 10.9m shoal is 1.5 miles SW of Pulau Mansuar.

Pulau Kri (0°34'S., 130°41'E.), 215m high, is close E of Pulau Mansuar and is connected to it by a drying reef on which is a small islet. The village of Yanbuba lies at the W end of the island. Pulau Koh, 41m high, is on a drying reef 0.5 mile NE of Pulau Kri. A detached 3m shoal is 1.5 mile NE of Pulau Koh. There is deep water SE of the islets.

Pulau Augusta and Pulau Duiven, 2.25 and 3 miles, respectively, S of the W end of Pulau Mansuar, are low and flat but are covered with high trees visible for 16 miles. They are near the W edge of a ridge extending across Selat Dampier. There is a detached 9.1m shoal about 1.75 miles W of Pulau Augusta and several 10.9m shoals in the area. Although there is deep water in the channel separating Pulau Augusta and Pulau Duiven, strong currents through the passage make its use inadvisable.

Pulau Jerief (0°42'S., 130°42'E.), at the SE end of an extensive reef 7.5 miles ESE of Pulau Duiven, is similar in appearance to Pulau Augusta and Pulau Duiven.

Kepulauan Tapok (Mansfield Islets), three in number are small, low, and flat, lying on separate drying reefs about 4 miles E of Pulau Jerief. The southwesternmost is brush covered, the middle islet has higher growth, and the northeasternmost has trees visible for a considerable distance.

Caution.—Avoid the area between the reefs on which Pulau Jerief and Kepulauan Tapok lie between which there may be unknown dangers.

Pulau Batanta

5.25 **Pulau Batanta** (0°51'S., 130°40'E.), on the S side of Selat Dampier and separated from Salawati by Selat Sagewin, is about 34 miles long E-W and 3.5 to 8 miles wide. It consists principally of a chain of moderately-high and densely-wooded mountains with a maximum elevation of 1,070m. It can be seen for a distance of 30 miles.

Pualu Batanta—North Coast

5.26 The N coast, very irregular in outline, consists of projecting spurs of mountain chain, between which are several deep bays. Several islands are along the coast. All of the bays, except the westernmost, afford good sheltered anchorage, but there are no good marks for entering them. There are a few small villages on the N coast.

Pualu Batanta—West Coast

5.27 The W coast is very steep and there are no off-lying dangers. Two bays on this coast are so deep and exposed that they afford no anchorage. **Tanjung Mabo** (0°55'S., 130°23'E.), the SW extremity of Pulau Batanta, has a 99m hill at the end of a long low neck of land which from a distance appears as an island. **Pulau Nelajan** (Vischers Island) (0°55'S., 130°22'E.), 65m high, W of Tanjung Mabo and separated from that point by a deep and clear 1.25 mile-wide channel, is wooded and can be approached closely from all sides. A 186m cone-shaped elevation is on the NW extremity of Pulau Batanta and is conspicuous when seen from NE and SW; from a distance it appears as an island.

Pualu Batanta—South Coast

5.28 The S coast of the island is very steep-to and consequently there are no good anchorages along this coast. Kampung Jodlo, the only village of any importance in this vicinity is on this S coast near the E entrance to Selat Sagewin.

Pualu Batanta—East Coast

5.29 **Teluk Marchesa** (0°49'S., 130°53'E.) occupies most of the E side of Pulau Batanta. Pulau Ayemi, 183m high, is about midway between the 2 mile wide entrance between Tanjung Makoi and Tanjung Kandorwa. A 0.6 mile, free of dangers, is N of Pulau Ayemi. The narrow channel S of the island can only be used by small craft with local knowledge and with the reefs showing. Vessels enter the N channel on a westerly course past the N side of Pulau Ayemi and steer for Maribio Islet, a small islet at the head of the bay.

Safe anchorage can be taken in the N part of the bay, in 29 to 40m, mud and sand. In the S part of the bay, S of the N tangent of Pulau Ayemi extended to Maribio Islet, and in the coves on the N side of the bay, there are numerous reefs. Depths of 9.1m extend 0.5 mile off the NW and W shores of Ayemi, and there is a 9.1m shoal 0.7 mile NW of the W end. Rocks and a reef with depths between 0.5m and 5m extend 1 mile N of the coast into the bay NW of Tanjung Kandorwa. These reefs can be avoided by keeping the N side of Pulau Ayemi bearing more than 090° and Maribio Islet bearing more than 250°. A village is on Mesawai Islet, situated in the S part of the bay.

5.30 **Karang Batanta** (0°47'S., 131°00'E.), the SE extremity of the ridge extending across Selat Dampier from Pulau Augusta and Pulau Duiuen, ranges 3 to 8 miles E of Tanjung Evanas, the E extremity of Pulau Batanta. The least depth on the reef is 3.2m. The currents around the reef are very irregular.

Vessels bound from Selat Sagewin or Teluk Marchesa desiring to cross Karang Batanta should make good a course of 030° close along the E end of Pulau Batanta. This course leads across the reef with a least depth of 11.9m or 12.8m. Because currents set strongly across this course at a position N of Tanjung Evanas, it is advisable to keep Tanjung Kandorwa, on the

S side of Teluk Marchesa, in range with Pulau Ayemi, just clear of Tanjung Evanas. There is a 9.1m patch 2.5 miles NNE of Tanjung Evanas.

Selat Sagewin (0°57'S., 130°44'E.), between Pulau Batanta and Pulau Salawati, is about 28 miles long from the NW extremity of Pulau Salawati to the E extremity of Karang Batanta and varies from 1.75 to 3.75 miles wide. The S shore of the strait will be discussed under Salawati, beginning in paragraph 5.42.

Pulau Sagewin (0°57'S., 130°39'E.), Tanjung Dadi, and Tanjung Wasaget, all on the S side of the W entrance to Selat Sagewin, are conspicuous for a good distance and are good landmarks for that entrance. Heavy rains often obscure the entrances to the strait and makes navigation through it difficult at night.

A large white beacon was reported to stand on Tanjung Wasaget, 0.75 mile S of Tanjung Dadi.

Irian Jaya—Tanjung Yamursba to Selat Sele

5.31 The NW coast of Irian Jaya from **Tanjung Yamursba (**Cape of Good Hope**)** (0°21'S., 132°25'E.) to **Tanjung Sorong** (0°49'S., 131°13'E.), the NE entrance point to Selat Sele 80 miles to the WSW, is generally high and closely backed by high mountains but in places there are tracts of level land near the shore. There are a number of scattered villages and several unimportant streams empty into the sea along this stretch of coast. Vessels coming from Selat Sagewin or Selat Sele usually proceed rather closely along the coast and are able to take bearings on the numerous hills between Teluk Dore Hum and Tanjung Yamursba. The most important of these are: a hill, 435m high, W of Teluk Dore Hum; Olifant, 470m high, 4.5 miles SW of Tanjung Sawasar; a round hill, 511m high, 2.5 miles E of Tanjung Sawasar; and **Tonggerap** (0°39'S., 132°03'E.), the most conspicuous peak along this coast, 8.75 miles E of Tanjung Sawasar.

The N part of this stretch of coast is backed at a distance of 10 miles to the S by the Tamrau Mountains, which are usually masked by clouds. Among the mountains are many peaks with elevations of 914 to 1,707m, but they are of little use for navigation.

5.32 **Tanjung Yamursba** (Cape of Good Hope) (0°21'S., 132°25'E.), the N extremity of Irian Jaya, can be identified by some yellow stripes; on nearer approach, a small lower cape will be seen projecting from it at right angles.

From Tanjung Yamursba, the coast trends WSW for 80 miles to Tanjung Sarong, at the N entrance to Selat Sele. Between Tanjung Yamursba and Tanjung Opmarai, 10 miles to the WSW, there is a wide bank of soundings on which a vessel may anchor, in depths of 9 to 18m, during the Southeast Monsoon. This anchorage, however, is untenable during the Northwest Monsoon because of heavy swell.

Kampung Koor is a village 5 miles WSW of Tanjung Yamursba and 0.5 mile E of the mouth of the river Sungi Koor. This river is navigable for small boats for about 0.75 mile. A conspicuous stone, covered with vegetation, is off the village. As stated above, anchorage can be taken anywhere along this coast. Small boats can land on the E bank of the river just inside the entrance, or in the lee of some rocks close E of the mouth of the river.

From **Tanjung Opmarai** (0°23'S., 132°16'E.), 5 miles W of Kampung Koor, the coast trends SW for about 28 miles to Tanjung Sasawar. The first part of this coast is level at places, especially at the mouth of the river, Sungi Wewe. From a point midway between Sungi Wewe and Tanjung Sansapor to Tanjung Sasawar the coast, except for a patch of level land close S of Tanjung Sansapor, where Sungi Wesan discharges, is steep. Between Tanjung Sansapor and Tanjung Kasbi, 10 miles to the SW, the coast recedes, forming an open bay.

A drying reef extends 0.13 mile W from the village of Kampung Sansapor and a coral reef with a depth of 0.9m is 1 mile SW of the village. The drying coastal reef extends about 0.25 mile offshore from a point 1.25 miles NE of Tanjung Kasbi. A group of three drying rocks is close offshore about 3 miles NW of Tanjung Kasbi and a 2.3m patch is about 2.5 miles NNW of the same point.

5.33 **Mios Su** (0°21'S., 132°10'E.) are two small coral islands, Middelburg and Mios Su (Amsterdam), which are, respectively, 2.5 and 4.5 miles offshore and 4 to 6 miles W of Tanjung Opmarai. They are low, reef-fringed, and covered with high trees visible for a great distance. A light is shown from the N coast of Mios Su.

A very shallow reef about 0.5 mile wide extends 1 mile from the NW point of Mios Su. The NE point of Middelburg is low and a drying reef extends 0.5 mile N from that island.

The channel between Middelburg and the shore is about 2 miles wide and is navigable except for a 6.4m reef 1.5 miles E, and a 9.1m shoal about 0.5 mile farther N. A pier is on the S side of Middelburg. Both islands have coconut plantations.

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

Anchorage.—Anchorage is available, in 46m, good holding ground coral and mud, S and W of Mios Su (Amsterdam Island). Anchorage is also available, in 14.6m, good holding ground coral and sand, S of Middelburg close to the mainland shore. In this vicinity, however, heavy swells are caused by SW winds that usually blow during the night and in the early morning hours.

Mega Road (0°40'S., 131°51'E.) has Sungi Mega discharging into the sea S of Tanjung Sawasar. A small village is on the S side of the mouth of this river. Three drying reefs are within 1.5 miles WNW of the river and a conspicuous above-water rock is about 0.25 mile outside the outermost reef. A detached 4.5m shoal is about 1 mile NW of the rock. Vessels can anchor, in depths of 6 to 9m, mud and sand, in the small roadstead inside the reefs. Anchorage can also be taken outside the road, in depths of 11 to 14m, to the NE between Mega Road and Tanjung Sansapor.

Near Sungi Mega, the mountains are back from the coast. For a distance to the W of the mouth of the river is a beach interrupted only in places where a projecting cliff rises directly from the sea. From Mega Roads the coast trends WSW to Teluk Dore Hum with no intervening bights. A 2.3m coral reef is about 5.5 miles W of the mouth of Sungi Mega and 1.25 miles offshore. A 6.4m shoal is 1.5 miles N of this reef. Tanjung Asi,

12.5 miles WSW of Mega Road, can be identified by a mountain spur 550m high, to the E.

5.34 Kampung Asbakin (0°45'S., 131°41'E.), on the banks of the river Sungi Asbakin, about 1.25 miles W of Tanjung Asi, is on a flat beach which has steep-to rocks on both ends. The coastal range in this vicinity is a reddish stone with a species of cajaput tree on it. A narrow reef with a least depth of 5.8m extends about 3 miles in an ENE-WSW direction 2.5 miles NW of the village and an 11.9m shoal is about 2 miles NW of the village. Kampung Sausut is about 5 miles W of Kampung Asbakin on the bank of a small stream with the same name.

Teluk Dore Hum, penetrating the coast for 2.5 miles in a W direction, is S of **Tanjung Dore** (0°44'S., 131°32'E.). It affords good anchorage, in a depth of about 28m, sheltered from N swells. Pulau Hum, a small islet and covered with trees is off the E entrance to the bay. A wide reef extends W and NE from this islet and a shoal area with several drying reefs extends W nearly 1 mile and N 1.5 miles from the islet. A detached shoal, with a least depth of 2.3m, is about 1 mile E of Tanjung Dore.

The bay entrance channel, about midway between Tanjung Dore and Pulau Hum, is deep and about 278m wide. Two detached 3.9m shoals are in the middle of the bay, about 1.5 miles SW of Pulau Hum.

Kampung Makebon is at the N entrance point to the bay.

Tides—Currents.—In Teluk Dore Hum, the lowest water that can be expected is 1m below mean sea level; the highest HW, occurring at all semidiurnal spring tides, is about 0.6m above mean sea level.

The coast between Tanjung Dore and Tanjung Sorong is uninhabited and has no landmarks of value to navigation. This stretch for the most part is so steep-to that it affords no anchorage; however, vessels may anchor in fine weather, in 46m, about 0.3 mile offshore off the mouth of Sungi Warsamson (Samson), about 9 miles WSW of Tanjung Dore. This stream is navigable by small boats for about 1 mile. Batu Lobang, about 2 miles NE of the mouth of Sungi Warsamson, is a rock about 24m high with an arched opening visible from close E.

Selat Sele

5.35 Selat Sele (1°10'S., 131°10'E.) separates Salawati from Irian Jaya. The depths in the N part are irregular, but nearly any deep-draft vessel can pass through the strait without difficulty.

The oil facilities of Sorong, Sorong Doom, and Arar Terminal are on the E side of the N part of the strait. Kasim and Salawati Oil Terminals, in the narrow S part of the strait, are approached from the N part of the strait through a swept channel which leads from position 1°00.0'S, 131°10.8'E to the terminals. The minimum depth in the area of the mooring system is 16m. The approach channel has a minimum depth of 15m. Ships up to 305m long with drafts not exceeding 13m can make the passage.

The central part of Selat Sele is encumbered by many islands, islets, shoals, and other obstructions, and the S part of the strait becomes increasingly narrow. Passage through the strait is via a swept, sometimes tortuous channel marked by lighted ranges and other aids.

Winds—Weather.—During a survey of Selat Sele, S and SE winds of variable force were experienced during July and August. In September, October, and November the force of wind decreased and periods of calm intervened. There were persistent light N and NW winds during February and March. West winds in February and March were occasionally accompanied by intermittent rain squalls, which were sometimes quite local and usually occurred at night or in the afternoon. The rainfall during the East Monsoon is usually very slight.

More recently it is said that winds may attain hurricane force in local storms and vessels should carry enough ballast to insure maneuverability in the restricted waters of the strait.

Tides—Currents.—In the wide N section of Selat Sele, tidal currents are not perceptible. In the narrow section at the S end of the strait, currents can attain a rate of 3 to 4 knots, but they cause no difficulty in navigating the strait.

Pulau Unaginim (1°12'S., 131°06'E.), an islet near the middle of the strait, the maximum rise and fall of tide that can be expected are, respectively, 0.4 above and 0.5m below mean sea level. At the S and N entrances to the strait HW occurs, respectively, 3 hours earlier and 0.5 hour later than at Pulau Unaginim.

A light is shown from a beacon on a drying reef close NW of Unaginim.

5.36 Tanjung Sorong (0°49'S., 131°13'E.), the NE entrance point to Selat Sele, is moderately high; reefs project almost 0.75 mile from this point.

Pulau Ram (0°50'S., 131°13'E.), 65m high, close SW of Tanjung Sorong, is covered with tall trees. Three islets covered with vegetation are on the drying reef N of Pulau Ram, and there are some low black rocks on the reef that extends almost 1.25 miles W from the island. A dangerous wreck is about 1 mile off the S coast of Pulau Ram. There is a light on Pulau Ram; a radiobeacon and racon transmit close E of the light. A light is also shown from the rocks W of it.

Sorong Roads is in the NE end of Selat Sele, about 4 miles S of Tanjung Sorong.

Tanjung Noejew (Tanjung Nuyew) is about 3.5 miles S of Tanjung Sorong. Close E of the point are piers and offices and many shore structures. A light is shown from **Dopior Islet** (0°53'S., 131°14'E.), close off the point and another light is shown from the root of the oil pier at Sorong.

The passage between Tanjung Noejew and Dopior Islet is obstructed and should not be used.

Sorong (0°53'S., 131°14'E.) is built on the shore E of Tanjung Noejew (Tanjung Nuyew). Sorong Doom is a native village on Pulau Doom, an island to the S. The water tanks and oil tanks at Sorong are good landmarks visible in daylight for a considerable distance seaward.

5.37 Pulau Tsiof (0°53'S., 131°12'E.), 53m high and marked on its SW point by a light, is the westernmost of the islands of Tanjung Noejew and is about 2.5 miles SSW of Pulau Ram. It is wooded and has some gardens on it. Some above-water rocks are off the SW side and shore reefs extend 0.25 mile offshore on the N side. Three detached reefs with depths of 0.9 to 3.3m and marked by discolored water are 0.5 to 0.3 mile off the N shore. The northernmost of these reefs is marked

by a lighted buoy.

A small isolated 1.5m reef is 0.5 mile ENE of the NE end of Pulau Tsiof.

A stranded wreck with a beacon marks a reef with a least depth of 1.8m, 0.3 mile S of the SE end of Pulau Tsiof. A shoal, with a depth of 0.9m is S of the 1.8m reef.

A coral reef, about 91m in diameter and with a least depth of 3.9m, is 0.5 mile ESE of the SE point of Pulau Tsiof.

5.38 Pulau Doom (0°53'S., 131°14'E.), 38m high, is about 0.5 mile SW of Tanjung Noejew. A lighted beacon (starboard hand) stands on the summit of Doom, and a light (starboard hand) stands on the foreshore on the N side of the island. The passage between Pulau Doom and the mainland was wire-dragged to a depth of 14m, however, a 6.1m shoal is 0.2 mile E of the NE extremity of Pulau Doom and a 5.5m is 0.25 mile N by W of the W extremity of the island. There is a sunken wreck, dangerous to surface navigation, along the coast close S of Tanjung Noejew.

The channels between Tsiof and Nanah, an island about 1.5 miles SE, and that between Nanah and Doom, are encumbered with scattered dangers and neither should be attempted without local knowledge.

Caution.—A beacon marks a drying reef 0.7 mile SSE of Pulau Nanah. A stranded wreck is on the SW side of the reef about 0.5 mile S of the beacon. Beacons standing 0.3 mile SW of the S end of Pulau Nanah mark a reef extending in that direction. Another beacon is about 463m WNW of the S end of Pulau Nanah.

A 1.4m shoal and a shoal swept to 7.6m are 0.2 mile SE and about 0.3 mile SSE, respectively, from the S end of Pulau Nanah, close W of the W edge of the swept channel. Foul ground extends from these dangers to Pulau Nanah.

A detached reef, 278m off the S end of Pulau Doom, is marked by a beacon. Two seaplane mooring buoys are NE of this reef, near the piers at Sorong Doom.

A drying reef, on which is a stranded wreck, about 0.5 mile S of the front range light structure at Sorong is marked by a beacon. A 3m shoal is about 0.4 mile W of the same structure. A wreck with a swept depth of 11.3m is about 0.7 mile WNW of the structure and off an oil pier at Sorong.

Several shoals and drying reefs are between Pulau Doom and Pulau Nanah, and between Pulau Nanah and Pulau Tsiof.

A large part of Sorong Roads off the shoals and dangers has been wire dragged to a depth of 14m. An area SE of Pulau Nanah in the center of the swept channel and on the range line of the S approach to Sorong inner roads has been swept to a depth of 6.5m over two shoal patches with depths of 6.5m and 10m, respectively, close SW of the range line. The NE side of the swept channel adjacent to this area has been swept to a depth of 12m.

Dangers not previously described and within the swept area of Sorong inner roads are a shoal with a swept depth of 6.5m about 1.25 miles SSW of the front range light structure; a shoal with a swept depth of 5.6m about 1.5 miles S by W of the structure; and two patches, one with a swept depth of 9.7m and the other with a swept depth of 4.2m, about 0.5 mile and 0.75 mile, respectively, ENE of the NE end of Pulau Nanah.

The channels into Sorong inner roads, one from the W and the other from the SSW, are marked by range lights.

Sorong (0°53'S., 131°14'E.)

World Port Index No. 53020

5.39 Sorong is situated E of Tanjung Noejew (Nuyew); oil company facilities are situated here. Sorong Doom is at about 0.5 mile S of Tanjung Noejew and situated on the E side of Pulau Doom. The town of Sorong is built on the N of Tanjung Noejew with a harbor on the S shores to facilitate shipping. The port imports foodstuffs, consumer goods, and oil field machinery; exports include crude oil, plywood, nickel ore, frozen shrimp and tuna fish.

Port of Sorong

http://www.portina4.go.id/sorong.htm

Winds—Weather.—At Sorong during the West Monsoon (December to March), the wind has insufficient force to cause difficulty. A slight ocean swell reaches as far as the roads. There is heavy rainfall although it is less than during the East Monsoon. During the East Monsoon (May to October), the SE winds blow with a strength of 3 to 6 knots and care is necessary when docking or undocking a vessel.

Tides—Currents.—The tidal currents near Tanjung Noejew are strong.

At Tanjung Sorong, the maximum rise and fall of the tide that can be expected is, respectively, 1.5m above and 0.9m below mean sea level.

Depths—Limitations.—Sorong is approached from Selat Sele and entered from either W or S on range lights via two navigable channels. The W approach has a least depth of 19m and the S approach has a least depth of 16m.

Aspect.—Five large oil tanks are situated on the hillside above the harbor.

Many piers, wharves, and quays are situated SE of Tanjung Noejew. A ferry quay stands close E of the point.

There are two commercial wharves at Sorong. These berths handle general cargo, bulk cargo, and passenger vessels.; both are of concrete construction, totaling 280m in length, and have 11m alongside. Vessels up to 165m in length can be accommodated.

The oil pier, Pertamina Quay, is a dolphin berth and extends 200m S from the shore. This berth can accommodate vessels up tp 21,000 dwt, 175m in length, and 10m draft.

A jetty for coastal vessels, Usha Mina Quay, is situated close E of the oil pier, is about 40m long, with a depth of 7.6m alongside.

Farther E are two fishing quays, Alfa Kumia Quay and Karimun Solo Quay.

The harbormaster's office is situated at the root of the oil pier. A modern hospital is situated close N of the port area.

At Sorong Doom, there is a government official headquarters, hospital, and a government landing stage with a depth of 3.9m alongside, suitable only for small craft. There are seaplane moorings areas situated close N and S of Doom. Another seaplane mooring area is at about 0.5 mile SE of the oil pier.

Pilotage.—Pilotage is compulsory and available 24 hours. The pilot boards in the anchorage area 1.4 miles NW of Tsiof Island Light.

Anchorage.—Anchorage can be taken, in 20 to 31m, mud and clay, good holding ground, in the swept area S of a line between the NE corner of Pulau Doom and the beacon marking the stranded wreck about 0.5 mile S of the front range light structure. This anchorage is open to the S and SE.

Temporary anchorage to await the pilot is NW of Pulau Doom between the outer lighted buoy and Dopior Islet.

Anchorage can also be taken, in 12m, hard bottom, 0.75 mile E of Bam Islet, with **Katapatjan Rock** (0°56'S., 131°06'E.) in range with the S point of Efman. There is always a NE swell in this anchorage causing vessels to roll heavily. Cargo can only be worked during HW.

Directions.—To approach anchorage from N, steer a course of 180° for **Pulau Matan** (0°58'S., 131°09'E.) until Tanjung Sorong bears 090°, then steer for Yef Doif, bearing about 241°. When Bam Islet bears 170°, steer for it on that course until Katapatjan Rock is in range with the N point of **Pulau Rombombo** (0°57'S., 131°06'E.), bearing 097°; then steer around gradually to the eastward to bring Katapatjan Rock in range with the S point of Efman bearing 086° and anchor on this range line.

Vessels bound for Sorong from N should pass W of the low black rocks W of Pulau Ram. The light structure of the W extremity of Pulau Tsiof bearing less than 178° clears these rocks. Then steer to pass N of the lighted buoy marking the 3.3m shoal about 0.75 mile NW of the N end of Pulau Tsiof, then remain N of the 102.5° range line until E of the 3.3m shoal. A course of 108° with Dopior Islet Light ahead leads in the middle of the swept channel until E of the 3.3m shoal.

When E of the 3.3m shoal alter course S to bring the 102.5° range into line which leads between Dopior Islet and Pulau Doom toward the Oil Pier. If bound for anchorage, alter to a southerly course when the E extremity of Pulau Doom bears 187°, passing E of the 6.1m shoal 0.2 mile off the NE side of Pulau Doom.

Approaching Sorong inner roads from S steer for the 003.5° range which leads close NW of the previously-mentioned 6.5m shoal, about 0.5 mile E by S of the S end of Pulau Nanah.

Arar Terminal (1°02'S., 131°14'E.), situated about 10 miles S of Sorong, consists of an offshore loading platform and mooring buoys. There is a depth of 11m alongside. The terminal is a LPG and refined light oil-loading port.

Kasim Oil Terminal (1°18'S., 131°02'E.)

World Port Index No. 53045

5.40 Kasim Oil Terminal is situated on the mainland of Irian Jaya, abreast the E side of Pulau Kasim, from which it is separated by a 0.25 mile wide channel.

Winds—Weather.—See paragraph 5.35.

Tides—Currents.—See paragraph 5.35. Currents of up to 7 knots have been reported.

Depths—Limitations.—The tanker berth at the terminal has four breasting and four mooring dolphins, with a loading platform setback at the mid point. The mooring dolphins are spread along the length of the berth, near the shore, fitted with quick-release hooks and electric winches to handle light messenger lines.

Vessels up to 130,000 dwt, with a maximum length of 280m and a maximum draft of 15m, can be accommodated. The depth alongside the terminal is 15m at LW; the mean tidal range is 1.5m. The controlling depth at the entrances are 15.5m; the depth at the anchorage is 36.5m.

A general cargo berth is situated close N of the oil berth. It is 113m long with an alongside depth of 6.1m and is fronted by a vertical steel face and rubber fenders. The Marine Office is situated close N of this berth, on the S side of a stream. A detached reef lies S of the oil terminal.

Vessels usually dock during daylight hours; casting off the dock with a strong stern current is not unusual.

The terminal is approached from either NW or SW, depending on the direction of the tide.

Repairs can be undertaken at Sorong but not at Kasim Terminal.

Aspect.—Pulau Kasim is an islet about 8.5 miles NNE of Tanjung Sale, the S entrance to the strait. The islet is about 1.5 miles long in a N to S direction, and is about 0.75 mile wide. A light is shown from a village on the W side of the strait, about 0.75 mile NW of Pulau Kasim.

Pilotage.—Pilotage is compulsory and should be requested from Sorong 6 hours prior to arrival.

Vessels awaiting a pilot can anchor about 1.25 miles NW of the SW end of Pulau Tsiof, over a bottom of mud and coral. Vessels arriving after 1600 will wait at anchor until daylight to make the transit to the terminal.

Regulations.—Except for local fishing craft, the port limits area is a restricted area. Any vessel authorized to use the port must have a mooring master on board.

The vessel's ETA must be sent 72 hours, 48 hours, and 24 hours prior to arrival.

Salawati Oil Terminal (1°21'S., 130°59'E.)

World Port Index No. 52695

5.41 Salawati Oil Terminal is an offshore tanker mooring system positioned on the W side of Selat Sele about 3.75 miles SSW of Kasim Oil Terminal.

Winds—Weather.—See paragraph 5.35.

Tides—Currents.—At the berth, currents may attain a rate of 4.5 knots; engines should be ready on standby. See paragraph 5.35 for further information.

Aspect.—The terminal is situated in an area where the minimum depth is 15.5m. The terminal, NE-SW oriented, has two mooring dolphins 0.2 mile apart and two breasting structures. The storage barge Wampum is permanently moored on the W side, with a pipeline extending NNE to the shore. A tanker may berth starboard or port side-to, on the SE side of the dolphins, depending on the stage of tide. Two tugs and mooring boats assist in berthing operations, directed by a mooring master who boards at the pilot station.

Tankers, with a maximum length of 275m and up to 100,000 dwt have berthed at Salawati Oil Terminal; however, the maximum draft permissible to load is 13m. The least depth on the passage through the strait is 15m.

Pilotage.—Pilotage is compulsory. See paragraph 5.40, Kasim Oil Terminal, for details.

Directions.—After passing between **Efman** (0°55'S., 131°07'E.) and Pulau Tsiof, bring range lights on **Balbili**

(1°06'S., 131°11'E.) and Wolo Genan, 3 miles S, in line bearing 180°. The course leads E of dangers extending 2 miles NE of **Kasiem** (1°00'S., 131°09'E.).

When the SE point (1°04.7'S., 131°10.3'E.) of Kabra Bemuk bears 297°, alter the course SW to 237°. This leads close N of a 4m shoal which extends a short distance N from the reef fringing the islet off the NW end of Balbili, however, vessels exceeding a draft of 4m must pass S of Balbili.

When **Mehil** (1°07'S., 131°10'E.) bears 100°, alter course SSW to bring the range lights on **Segarau** (1°10.5'S., 131°06.6'E.) and Kamoomjel, which lies 3.5 miles farther SSW, in line on a bearing of 196°; this course should lead W of the buoy moored 0.5 mile ENE of the light column on Segarau. Avoid the 5.5m patch lying 0.25 mile W of the same buoy then pass E of the light column.

Maintain a heading of 196°. At about 1 mile off Kamoomjel Light alter course SW to pass SE of **Jef Nanas** (1°13'S., 131°05'E.), avoiding a depth of 8m 0.25 mile SE of this islet. Then pass N of **Tanjung Wafkalette** (1°15'S., 131°03'E.) and into the narrows at the S end of Selat Sele, keeping in mid-channel through the narrows.

It was reported that the following route appears to provide the deepest passage through the N part of Selat Sele to be taken by large tankers. From a position about 0.8 mile W of Pulau Tsiof, steer a SSE course until in a position where Kasiem bears 237° at a distance of 2.75 miles. Then alter course to SSW to pass through a position 2 miles E of Kasiem. Then follow the buoyed channel (black can buoys on the W and red on the E side of the channel) through Sangolin Mon; which leads to about 0.5 mile E of Orama Tje, and Kafanji. After continuing on the above course to about 0.3 mile SSE of **Ome Toejef** (1°10'S., 131°04'E.), steer S to pass midway between **Yef Mo** (1°13'S., 131°13'E.) and the shoal extending W and SW from Yef Nanas.

A least depth of 14.9m was located about 0.4 mile E of Orama Tje. Another depth of 11.3m lies about 0.6 mile NNE of Yef Mo.

From S, the S entrance lies between **Tanjung Menonket** (1°21'S., 130°51'E.) and Tanjung Sele, 7 miles SE. The S approach can be made by keeping the W end of Membok and Pele in line on bearing about 011° until the S side of Tanjung Sele bears 090°. Then steer through the narrows by keeping in mid-channel.

Caution.—Partially-afloat heavy logs are normally seen drifting anywhere in the strait and a good lookout should be kept to avoid closing and fouling the propeller.

Salawati

5.42 **Salawati** (1°06'S., 130°52'E.) is separated from the W end of Irian Jaya by Selat Sele. Its coasts are regular without any deep indentations. The greater part of the island is very low with impenetrable jungles; however, the NW part of the island is mountainous with several high peaks. The N coast is limestone hills about 396m high, rising to 610m in the W part, but it is considerably lower than Pulau Batanta, the island to the N. The W coast, except for the N portion, is low and marshy. The E coast, near **Kampung Samate** (0°58'S., 131°04'E.), is low and swampy, with extensive forests of sago palms. There are numerous coconut palms on the beach. There are some creeks, but no rivers. The only village of any importance on the island is Kampung Sailolof, on the SW coast of the island.

Salawati—North Coast

5.43 The N coast of Salawati between Pulau Sagawin on the W and Yef Doif on the E can be approached very closely. Pulau Sagewin, at the W entrance to Selat Sagewin and close NW of Tanjung Dadi, the fairly high NW extremity of Salawat, is hilly but not very high. On the NW end of Pulau Sagewin is a small village, conspicuous because of the coconut palms that surround it. Anchorage can be taken, in a depth of 46m, about 183m off the SE extremity of the island, but there is frequently a current of 3 to 4 knots here.

Tipin Road (0°56'S., 130°45'E.) is on the N coast of Salawati about 7 miles E of Pulau Sagewin. There is anchorage in about 46m, sand, 0.15 mile from the shore and to the W of the mouth of a stream. Less depths can be found closer inshore. Lelaa Islet is close inshore on the coastal reef about 8.5 miles E of Pulau Sagewin.

Yef Doif (0°53'S., 131°02'E.), an islet 169m high and 1 mile off the NW extremity of Salawati, has a round hill on its N side and is low and flat in its S part. The islet is joined to the Salawati coast by a shallow ridge.

Tides—Currents.—Near Yef Doif, the highest and lowest water levels that can be expected are, respectively, 0.6m above and 0.75m below mean sea level.

Anchorage.—There is good anchorage during the Southeast Monsoon in the SW corner of Teluk Waiyaar (Wajaar Bay), a bay 6.5 miles WSW of Yef Doif. The anchorage is in 48m, with Pulau Ayemi, at the E end of Pulau Batanta, in range with Tanjung Yupleket (Ajmoeri), and the drying rocks on the reef about 1.75 miles W of the S end of Yef Doif clear to the N of that island.

Kampung Samate—Off-lying Islands and Dangers

5.44 Extensive banks and reefs, partly dry at LW, extend offshore.

Bam Islet (0°56'S., 131°04'E.), moderately high and wooded, is near the edge of a drying reef 1.75 miles N of the village. There are several bare rocks near the islet.

Kepulauan Rombombo (0°56'S., 131°06'E.), NE of Kampung Samate, are a group of islands surrounded by a drying reef. Pulau Man (Pulau Efman) is low with a beach and some houses on the E side. This beach can be approached closely by boats. There are coconut plantations on the island and a T-head pier with depths of 2.1 to 3.6m alongside is on the SE side. There is also an airfield on the island.

Anchorage may be obtained, in a depth of 11.9m, hard bottom, about 0.7 mile E of Bam.

Katapatjan Rock (0°56'S., 131°06'E.), on the W edge of the drying reef surrounding Kepulauan Rombombo and S by W of the S end of Pulau Man, is a jagged mass of stone whitened with bird droppings; it somewhat appears as a crouching lion. A 4.5m detached reef which can be recognized by discoloration and slight breakers is about 0.7 mile WNW of the rock. A line of detached reefs extends across the approach to the roadstead NW of Katapatjan Rock.

Kampung Samate (0°58'S., 131°04'E.) lies 4.5 miles SE of Tanjung Mayasalava with the deserted village of Samatew, its houses built on piles, close W.

West Coast of Salawati—Off-lying Islands

5.45 The islands W of Salawati are low and thickly overgrown; they are on long narrow ridges running parallel to the coast. Kepulauan Kabu and Pulau Loslos are on the outer ridge with depths of 8.2 to 9.1m between them and 12.8 to 16.4m on either side of the ridge. A 1.8m shoal is about 0.25 mile S of Pulau Ifmun the westernmost island of the group. A 4.9m shoal is nearly 6 miles SSE of Pulau Loslos and 5 miles W of Pulau Denie. Reefs in this area are usually not marked by discoloration.

Kepulauan Menon (Gebroken Islands) (1°20'S., 130°42'E.), Pulau Danya (Jef Danja), and the Mokon Islands are on the next ridge to the E; the N part of this ridge is separated from Kepulauan Kabu by a channel with depths of more than 46m. Farther inshore there are several other ridges with islets on them; the chart is the best guide.

Strong tidal currents and muddy water N of Kampung Sailolof between the Salawati shore and the Loslos and Kepulauan Kabu ridge make it unnavigable.

5.46 **Sailolof Anchorage** (1°15'S., 130°46'E.) is off Kampung Sailolof, about 13.5 miles NW of Tanjung Kamjolo, the SE extremity of Salawati. The recommended anchorage is in 5.8 to 7.3m, with the mosque at Kampung Sailolof bearing 054° and Pulau Bodo in range with the S side of Pulau Tun bearing about 292°.

Approaching Sailolof Anchorage bring Pulau Loslos astern on a W bearing, then steer for Pulau Umien giving the latter a wide berth and proceed to the roadstead on a course of 054° on the mosque at Kampung Sailolof. Another route is to pass close S of Pulau Denie and Pulau Umat and then steer for Pulau Tun until the mosque bears 054°.

At Sailolof Anchorage, the maximum rise and fall of tide that can be expected are, respectively, about 0.45m above and below mean sea level.

Kampung Sailolof (1°15'S., 130°45'E.) (World Port Index No. 53050), a fairly large village on the SW coast of Salawati, consists of a double row of houses built on piles on the beach. There are many coconut palms around the village; coconut oil is the chief export. Drinking water can be obtained from concrete wells.

Selat Sele—South Approach

5.47 **Tanjung Sele** (1°26'S., 130°56'E.), at the S entrance point to Selat Sele, is a 10m high, rocky headland covered with high trees; it affords a good mark for vessels approaching from S. Pulau Umpe, about 4.5 miles ESE of Tanjung Sele, as well as two low islands, Pulau Membok and Pulau Gelo, S of Salawati and W of the S entrance to Selat Sele, are seen shortly thereafter. These uninhabited islands are sand, mud, and coral and are covered with high trees. Pulau Umpe and Pulau Membok are each marked by a light.

Numerous shoals with depths of 0.9 to 9.1m are W, SW, and SE of Pulau Umpe; the chart is the best guide. Depths of 5.8 to 19.2m, also charted, are between 13.3 and 21 miles S of Pulau Umpe Light. Some of the depths are swept.

A deep channel gives access to the narrow S part of the strait which is clear and deep and which ends near Tanjung Kanelmelmak, about 9 miles NNE of the SE end of Salawati. From that point the strait widens but is strewn with islets, particularly in its S part.

The W side of the S approach is bounded by a bank extending from Salawati and on which are Pulau Gelo, Pulau Membok, Pulau Kalilip, Pulau Omaki, Pulau Peli, Pulau Sabba, and Pulau Pan and other islets closer inshore near Kampung Saileen. The S coast of Salawati between Tanjung Menonket and Tanjung Kamjolo is low and covered with mangrove. Near Tanjung Kamjolo it rises a little and a red patch is seen, then farther N it is again low and covered with high trees.

During the West Monsoon, there is good anchorage E of Pulau Peli, in 11 to 16m, hard bottom. In the East Monsoon, there is good anchorage E of Pulau Lugo near the Irian Jaya shore, in 26m, sand and mud.

The coast of Irian Jaya making up the E side of the strait resembles the coast of Salawati. **Kampung Seget** (1°24'S., 130°58'E.), E of Pulau Lugo, is inhabited by fishermen and is the headquarters of a government official. There is a small-boat pier with a depth of 1.5m at its head.

Pulau Kasim (Pulau Jef) (1°18'S., 131°01'E.), in the W part of Selat Sele 6.25 miles above Pulau Lugo, should be passed on its W side. A restricted area is between the SE side of Pulau Kasim and the Irian Jaya shore. Vessels are not permitted to enter this area without a mooring master from the Kasim Oil Terminal aboard.

Irian Jaya—Tanjung Sele to Teluk Berau

5.48 From Tanjung Sele, the coast trends SE to Tanjung Sabra (2°17'S., 132°18'E.) and Teluk Berau (McCluer Gulf). There are few conspicuous points along this densely timbered and uniformly low coast. Tanjung Yamtup, 31 miles E of Tanjung Sele is clearly visible as far as Pulau Yus (Jef Joes), a strip of coral sand 15 miles offshore. Other prominent marks are Tanjung Wamonket, about 17 miles E of Tanjung Sele, and Pulau Kobalin, an islet just E of Tanjung Wamonket. A beacon is about 2 miles SE of the islet. The entrance points of the river **Sungai Karabra** (1°33'S., 131°41'E.) are excellent landmarks. Along the N part of this coast a low chain of hills are visible far inland, with higher mountains rising behind these hills. In the far distance the high peaks of the Tamrau Mountains, near the N coast of Irian Jaya, can be seen on a clear day, especially in the vicinity of Sungai Seremuk (1°36'S., 131°45'E.).

Several rivers enter the sea in this portion of the coast. A bar is across the mouths of most of these and the channels leading to them are constantly changing. The charts cannot be relied on.

In the N portion of this coast, where the shore recedes near the mouth of the rivers, the 10m curve extends about 10 miles from the shore and patches with as little as 2.1m on them are found outside the 20m curve.

From Tanjung Sele, the coast trends E for nearly 18 miles to **Tanjung Wamonket** (1°32'S., 131°12'E.). This part of the coast is low, but at the latter point it rises and is somewhat higher for a considerable distance E. Pulau Umpe, marked on its NW end by a light, is about 1 mile off Tanjung Kaledoko.

Yus (Joes) Genan islet, about 2 miles WNW of Tanjung Wamonket, is separated from the coast by depths of 2.1m. A rock that dries and several shoal patches with depths of 0.9 to 1.8m are inside the 10m curve between these islets.

Tides—Currents.—Off the mouths of the rivers along this stretch of coast the maximum fall of tide that can be expected is 1.3m below mean sea level, occurring in May or June and November or December. The maximum rise that can be expected is 0.8m above mean sea level.

The offshore currents are a variable combination of tidal currents and monsoon drift, but closer along the coast the tidal currents predominate. They frequently are very strong in the rivers.

The islands between the coast of Irian Jaya and Batanme (Misool) have been previously described in connection with the latter island in paragraph 2.92.

5.49 **Pulau Yus** (Jef Joes) (1°45'S., 131°08'E.), 16 miles S of Tanjung Wamonket, is a strip of coral sand about 0.2 by 0.1 mile, covered with high trees and surrounded by a reef that does not discolor. The islet is visible for 12 miles. A light is shown from the NE point of the islet from a white metal tower. It is obscured by the high trees between bearings of 018° and 060°. A stranded wreck is on the edge of a shoal about 0.3 mile SW of the light.

A 6.7m shoal is about 7.5 miles WSW of Pulau Yus; several shoal patches 2.7 to 10.9m are within the 20m curve WNW and NNW of the islet at distances of 4.75 to 14 miles.

A swept depth of 2.1m coral, and a 7.3m shoal patch are 10.75 and 6.5 miles, respectively WSW of Pulau Yus. A buoy marks the N side of the 2.1m shoal. A dangerous wreck lies 5 miles ESE of Pulau Yus.

Teluk Segun (1°27'S., 131°20'E.), E of Tanjung Wamonket, is entered over a 1.8m bar. A beacon marks the entrance.

Tanjung Yamtup (1°31'S., 131°26'E.) is conspicuous. Pulau Matel is a small islet on a drying bank 1.75 miles SE of the point.

Pulau Yal (Jef Jal) (1°40'S., 131°26'E.), about 9 miles S of Tanjung Yamtup, is covered with tall trees and is surrounded by a reef. Anchorage can be taken, in 9.1m, S of the islet, but caution is necessary because the turbid water prevents the reef from being seen.

Shoals are 3 and 2 miles NW and SW, respectively, from Pulau Ya; a rock, with a depth less than 0.9m, lies 4.75 miles SSW of the islet.

Caution.—Shoals with depths of as little as 1.8m are 14 to 27 miles S of Pulau Yal and between these patches are detached shoals of 1.8 to 5.8m. The channels between Tanjung Sele and Tanjung Sabra are constantly changing and the charts cannot be relied on.

Sungai Beraur, Sungai Karabara, Sungai Seremuk, and Sungai Kaibus are rivers navigable by small craft only with local knowledge. The channel into Sungai Kaibus is marked by buoys in Teluk Kaibus.

5.50 Off-lying banks off the mouths of Sungai Waronge, Sungai Suaboor, Sungai Kamamunu, limit their use to small craft only.

Sungai Kais, Sungai Davur, and Sungai Metamani flow into Teluk Metamani and have formed a delta at the mouth of that bay. These rivers are all limited to small craft.

A light is shown on the coast about 10 miles S of the entrance to Sungai Kais near Tanjung Mesjateririvaim.

Sungai Sigaroi (Bira) (2°10'S., 132°10'E.) has a buoy at its entrance, but depths over the bar are limited to about 1.8m. There are several villages along the tributaries.

A light is shown from **Tanjung Sabra** (2°17'S., 132°18'E.) at the N entrance point to Teluk Berau (McCluer Gulf).

Teluk Berau (McCluer Gulf)

5.51 **Teluk Berau** (2°30'S., 132°20'E.), an extensive body of water reaching to within about 16 miles of Teluk Sarera, thus almost isolating the NW part of Irian Jaya.

The gulf is about 23 miles wide between Tanjung Sabra and **Tanjung Salakiti** (2°40'S., 132°07'E.), narrowing to 12 miles wide at the entrance to Teluk Bintuni. The S shore is high and bold for 35 miles E of Tanjung Salakiti, but the rest of its shores are low and overgrown with mangroves. The region around the gulf is sparsely populated. **Kampung Kokas** (2°42'S., 132°26'E.), on the S shore of Teluk Sekar, is the principal trading center. A light is shown from a lattice tower 0.35 mile NNW of Kokas village.

Several rivers, the entrance of which are blocked by mangrove-covered islands, empty into the gulf. The mountains on both sides of the gulf are so far inland that they are of no importance to navigation.

Close to the S side of the entrance to Teluk Bintuni soundings range from 18.3 to 92m, but farther N they vary between 18.3m and 46m. Care should be exercised in approaching the shoal part of Teluk Berau because mud banks, with depths of 3.6 to 5.5m, extend from the shore in many places.

Winds—Weather.—The climate in the vicinity of Teluk Berau is very agreeable with moderate rainfall and temperature. The nights are cool and the sea is always calm, except for a few days during the West Monsoon. Rain falls during the entire year, but the heaviest fall occurs in the change periods, April to May, and October to November.

During the East Monsoon, the land winds are somewhat stronger, with a haze, sometimes a heavy fog, hanging over the low coasts. The West Monsoon is felt more, although it blows with only a moderate force, because it may be accompanied by heavy squalls and gales. These storms, together with the strong current, may be inconvenient for boats and small craft.

Tides—Currents.—Tidal currents set into the gulf until the time of HW and set out of the gulf until the time of LW. The maximum observed velocity of these currents, 2.5 knots, was in the deep channels between the banks along the S coast and in the vicinity of Pulau Ogar and Pulau Arguni. On the N side of the gulf, particularly at LW, the discharge from the rivers set up variable currents. This river water has a brownish-yellow color and, especially during the rainy season, can be seen for a great distance from the shore.

5.52 The N shore of Teluk Berau consists mainly of low, marshy land, interrupted in places by patches of sand which have clusters of trees. There area few conspicuous features. The headlands at the river mouths are low, but they project well and are useful marks for vessels coming from E or W.

There is a conspicuous wood near Kampung Tarof, about 8

miles NE of Tanjung Sabra. There is also a group of trees in the bight between this village and Sungi Kemudan, 14 miles ESE. There is constant traffic by native canoes with the S coast.

On the N coast there are several creeks and streams, including Sungi Kemudan and Sungi Sebyar, the navigation of which is limited to small craft because of bars across their mouths.

A wide mud bank, outside of which the depths increase regularly, projects out all along this coast. Farther out the depths are quite variable, probably because of channels scoured out by tidal currents.

Close E of Tanjung Sabra, about 2 miles offshore, is a narrow drying bank steep-to on its seaward side. A sunken rock is about 0.75 mile off the W end of this bank.

Tanjung Fatagar (2°46'S., 131°56'E.), the S entrance point to Teluk Berau, is the extremity of a thickly-wooded peninsula of irregular outline gradually rising to mountainous land with no conspicuous peaks.

A 3.9m reef is 1 mile W of Tanjung Fatagar. Strong rips set over the reef and for a considerable distance W.

The coast between Tanjung Fatagar and Teluk Tawar, 7 miles E, is rocky and broken. Was Island, close to the shore 3 miles NE of Tanjung Fatagar is an inhabited island, 88m high. A drying rock is just inside the line joining Tanjung Fatagar and Teluk Tawar. A rock, awash, is 0.5 mile offshore 1.5 miles NE of Tanjung Fatagar.

A mosque is at Kampung Rumbati, close W of Teluk Tawar. Vessels coming from the W do not sight the village until past it.

Teluk Tawar, entered 7 miles E of Tanjung Fatagar, affords anchorage to small vessels during the Southeast Monsoon but is not safe during the Northwest Monsoon.

5.53 Teluk Salakiti (2°44'S., 132°05'E.) affords safe anchorage for large vessels at all times. Some small rocks and islets on the N side of the entrance form a natural breakwater. Depths in the entrance and inside the bay range from 11.9 to 14.6m. In the S part of the bay some small islets are on a dry coast reef and behind them is a shallow basin surrounded by mangroves which also front the main shore. A few huts are on a rising hilly land forming the greater part of the shores of the bay.

Patipi (2°43'S., 132°04'E.) is in a basin which nearly dries at LW and is sheltered from wind and sea by the high rocky islands on the N side of Teluk Salakiti.

Teluk Patipi (2°42'S., 132°07'E.), penetrating the coast in an E direction for about 5 miles, has a maximum width of 2 miles and gradually narrows toward its head. It is easily recognized from seaward by the straight direction of its shores and by a round 127m hill on Tanjung Kramram, the S entrance point, which shows up dark against the land behind. Tanjung Osir, the N entrance point, is low and rocky. Off the entrance there are frequently strong tidal currents with swirls caused by the meeting of currents along the coast with those setting out of the bay.

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

The bay is quite clear except for the shore reef and a single detached drying rock close to the S coast about 0.3 mile NE of Perwa Islet, 3.5 miles E of Tanjung Kramram. The depths at the entrance and within the bay range from 10.9 to 18.3m, decreasing gradually toward the head. The bay affords anchorage protected from all winds. Groups of farmers houses are along the shores of the bay.

From **Tanjung Wetin** (2°42'S., 132°05'E.), at the N end of Teluk Patipi, the coast trends NE 2.5 miles to Tanjung Salakiti and then turns to the E for 18.5 miles to Tanjung Sekar. The land rises gradually from the spit that forms the N side of Teluk Patipi to heights of more than 610m. The coast is rocky with a few shallow inlets obstructed by reefs.

5.54 Teluk Sekar (2°42'S., 132°27'E.) is afforded good protection from wind and sea by the islands off its entrance. Mud brought down by the Sungi Kaiunni has shoaled the entire bay to a degree, but this shoal area ends abruptly at the entrance. The depths outside the entrance increase rapidly from 5.5 to 7.3m to 55m. A large sand bank, with depths of less than 3.6m and subject to change when Sungi Kaiunni is in flood, is near the W side of the entrance. West of this bank there is a deep channel leading along Tanjung Sekar to Kampung Kokas, the W entrance point.The E part of the bay is so shallow that it is of no importance to navigation.

Kokas Road (2°42'S., 132°25'E.), comprising the greater part of the W arm of Teluk Sekar, is bounded by a line drawn in a 090° direction from the point of the spit E of Kampung Kokas and by the arc of a circle, with a radius of 0.65 mile, centered on the head of a pier that projects out from the shore abreast of the village. A seaplane mooring buoy is 0.3 mile NW of the pier head. Vessels can anchor, in 4.9m, 0.1 mile N of the pier. When making this anchorage, a course of 182° on the jetty, or 185° on the charted flagstaff, will lead through the channel between Tanjung Sekar; the 3.6m sand bank off Tanjung Sekar can be passed close-to.

Tides—Currents.—At Kampung Kokas, the maximum rise and fall of tide that can be expected are, respectively, 0.8m above and 1.7m below mean sea level. Tidal currents, particularly in the inner part of the bay, are weak.

Kampung Kokus (2°42'S., 132°25'E.) is the headquarters of a government official whose residence is marked by a flagstaff. Provisions are scarce.

Teluk Sekar—Off-lying Islands

5.55 Pulau Ogar (2°39'S., 132°28'E.), 227m high, is the largest of high, steep, and densely-wooded islands extending nearly 11 miles E from Pulau Barat (West Island), the westernmost of the group along the coast of Teluk Sekar. A village on the S coast of Pulau Arguni is marked by a mosque.

South of Pulau Ogar and Pulau Arguni is a channel leading to Teluk Sekar. On the S side of this channel abreast Pulau Ogar are several high islets which greatly obstruct the channel, leaving only narrow passages. The widest of these passages, running along the steep shore of Pulau Ogar, has strong currents and overfalls.

Two reefs, one with a depth of 0.9m and another with a depth of 4.9m, are, respectively, 2.75 miles and 1 mile WNW of Pulau Barat. Neither of the reefs is marked by discoloration.

Tides—Currents.—In the channels and along the above islands the tidal currents are similar to the general currents in Teluk Berau. In the narrower parts of these channels currents

sometimes attain a rate of 3 knots. The flood current moving up the gulf divides at Pulau Barat, causing heavy tide rips in that vicinity. One part of the current sets through the channel along the S side of Pulau Ogar and Pulau Arguni, the other part sets E along the N sides of these islands.

Directions.—Vessels proceeding to Kokas from E can easily recognize Pulau Arguni. Its E hill is very conspicuous, with a sugarloaf summit which stands up darkly against the surrounding land. Care should be taken to avoid the shoal extending 1 mile ESE from the E coast of Arguni. When the conspicuous summit of Pulau Ogar bears 280°, steer for it on that course. Hold this course until 2.5 miles distant, then steer for the N islet of the group between Pulau Ogar and the mainland, keeping close to the Pulau Ogar side of the channel. Krok, a rock covered with vegetation, lies about 450m SW of the S point of Ogar. Then pass close E of Tanjung Sekar. Then follow directions given above to Kokas Road.

Irian Jaya—Teluk Sekar to Tanjung Tanah Merah

5.56 East of Teluk Sekar, the densely-wooded coasts consist of steep limestone cliffs that rise sheer from the sea. Several sugarloaf summits, many burned over, leaving only charred trees, give the land a unique appearance.There are white cliffs in places with numerous caves used by the local inhabitants as burial places.

The mountainous land runs parallel to the coast, the highest point rising to an inconspicuous 467m summit. At the back of the coastal range there is a wide valley and beyond that is a central ridge rising to 1,450m, again an inconspicuous summit.

Rocky wooded islets are scattered along the coast, concealing small settlements behind them. **Kampung Goras** (2°47'S., 132°41'E.), 14 miles SE of Tanjung Taramnusa, is the principal village.

Batu Layar (2°44'S., 132°38'E.), a rock about 0.5 mile from the shore near Kampung Darembang, is very conspicuous from NW. Rising from the sea like an obelisk it resembles a native canoe under sail.

The depths gradually decrease to the E. Between Tanjung Goras and Tanjung Tanah Merah, 33 miles to the NE, access to the coast is limited by a wide mudbank. Outside of this bank there are many shoals ranging from 1.8 to 9.1m extending as much as 9 miles from shore. The chart is the best guide.

North of Tanjung Goras the mountainous aspect of the coast ceases abruptly. The mountains recede far inland and the intervening land consists of mangrove-covered marshes intersected by creeks and streams. The more important of these streams are Sungi Bedidi and Sungi Bomberai which discharge in the S part of a large bight between Teluk Sekar and Tanjung Tanah Merah. A bar restricts the use of these last-named streams to small craft. There are a few small villages along the coast between Tanjung Goras and Tanjung Tanah Merah.

A light is shown from **Tanjung Tanah Merah** (2°26'S., 133°07'E.).

Teluk Bintuni

5.57 **Teluk Bintuni** (2°20'S., 133°25'E.), the E extension of Teluk Berau, is 12 miles wide at its entrance and fringed on both sides by low marshy land, above which a group of hills, 79m high, rises on the S side of Tanjung Tanah Merah. These hills, of reddish loam and bare on their seaward sides are a mark for vessels approaching from the W. Mountains are visible to the N and E.

Many small rivers flow into the N side of Teluk Bintuni. This part of the coast is fronted by a steep mud bank about 2 miles wide through which some of the rivers have cut moderately deep channels.

Inside the entrance the character of the S coast changes. The low marshy land continues, but it is intersected by wide salt water creeks and scarcely any land is visible. Fronting the S shore are the mangrove-covered islands, including **Pulau Asap** (2°28'S., 133°19'E.), Pulau Amutu Besar, and Pulau Amutu Kecil, all separated from the mainland by navigable channels.

The head of the gulf is hilly and fronted by a strip of mangroves.

There are no dangers in Teluk Bintuni and vessels can steer by bearings on the headlands and the Gunung Steenkoolberg hills at the head of the gulf. **Gunung Steenkool** (Steenkoolberg) (2°04'S., 133°32'E.) and Gunung Sigemerai, on the N side of the gulf, are conspicuous. The latter has slightly rounded summits, 537m and 522m high. At the head of the gulf, the Suwuri Range, 693m high, and Top Modan, 283m high, are conspicuous. Tawerei, with a round summit, 657m high; Tantiri, with two sharp peaks, 634m high; and Maniai, 183m high, are also good marks. The more distant mountains are seldom visible.

Winds—Weather.—The weather is nearly always fine in Teluk Bintuni. Persistent rain does not occur in either monsoon. During an early survey, the rainfall was heaviest at the beginning of the East Monsoon, then diminished steadily. The West Monsoon sets in suddenly at the beginning of November. The East Monsoon brings clouds and rain squalls off the land and much lower temperatures. During the East Monsoon, the direction of the wind is between SE and SW; during the West Monsoon, it is between SW and NW.

Tides—Currents.—At the entrance to Teluk Bintuni, the tide has a range of about 2.4m; at the head of the gulf, the tide range is about 6.7m. This great difference in range causes strong tidal currents that follow the direction of the coast. The maximum rate is about 3 knots. The direction of current changes at about the time of high and LW.

Close inside the mouth of **Sungi Muturi** (2°15'S., 133°38'E.), the incoming and outgoing tidal currents set in 070° and 250° directions, respectively. The currents are equally strong, attaining a maximum rate of 1.75 knots at springs.

Teluk Bintuni—North Shore

5.58 Many rivers empty into the N side of the gulf. The most important of these are Sungi Kamarin, Sungi Rittowe, and Sungi Wasian. Since there are no landmarks at the mouths of these rivers, entry must depend on bearings taken on the very conspicuous **Gunung Sigemerai** (2°02'S., 133°37'E.), the two-pointed summit of which is visible throughout the gulf.

Sungi Wasian (2°13'S., 133°33'E.), marked at its mouth by a lighted buoy, has a straight channel which has a depth of 3.6m over the bar. To enter the river a course of 020° should be set on the center of the mouth, passing the buoy on its W side.

Depths increase rapidly within the mouth of the river which becomes tortuous about 3.5 miles within the entrance. Navigation of this area should not be attempted without local knowledge.

About 4.5 miles above the bar the river divides into N and E branches. About 8 miles above the N branch is Steenkool.

Steenkool (2°07'S., 133°33'E.), a small petroleum port. is approached by passing W of the aircraft buoys and N of the main jetty to avoid some wrecks.

Sungi Muturi (2°15'S., 133°37'E.), about 5.5 miles E of Sungi Waisan, is marked by buoys at its mouth and for a short distance above the mouth.

Pilotage.—Pilotage for the Muturi Oil Terminal is compulsory for vessels over 50 tons. ETA at the outer buoy should be given at least 24 hours in advance. Pilotage at night is only by special arrangement.

Vessels awaiting a pilot should anchor W of the outer buoy, in a depth of 14.9m, hard mud. The harbormaster at Steenkool is the official pilot.

Kampung Muturi (2°11'S., 133°41'E.) (World Port Index No. 53052) is a deep-water oil terminal about 3 miles above the entrance to Sungi Muturi. The terminal consists of a T-headed pier 18.3m long, with a depth of 13.7m alongside; it can accommodate vessels of up to 30,000 tons, with a maximum length of 200m and a maximum draft of 10.6m. Mooring launches and a small tug are available. All mooring ropes should be of manila; steel hawsers are not permitted. The current always sets on to the jetty; the maximum observed rate is 4.5 knots.

Teluk Bintuni—South Shore

5.59 The main rivers along this coast from W to E are Sungi Kasuri, Sungi Kasira, and Sungi Kaitero. The headlands of these rivers are low and, because of the great range of tide, appear quite different at high and LW. The muddy points are, in some cases, covered with low mangrove and are difficult to identify.

After rounding Pulau Asap, vessels bound for Sungi Kasira (2°30'S., 133°26'E.), the next inlet E of Sungi Kasuri, steer a course of 118° on the SW point of Pulau Amutu Besar and, when the W extremity of Sianiri Kecil is abeam to starboard, alter course gradually to S to bring the second point on the E bank of Sungi Kasira to bear 175°. Steer toward the point on this bearing until the channel between Sianiri Kecil and Sianiri Besar bears 270°, after which Sungi Kasiri may be entered on a S course. Leaving the river favor the E shore.

Caution.—A dangerous wreck, marked by a beacon, is near the E entrance point to Sungi Kasiri.

5.60 **Kampung Babo** (2°33'S., 133°26'E.) is on the W side of Sungi Kasir, about 3 miles above the mouth. This large village has two piers only suitable for boats.

Sungi Kaitero, E of Amutu Besar, is well populated in its upper reaches.

A wide bank extends across the head of the gulf between Pulau Amutu Kecil to abreast of the mouth of **Sungi Bakor** (2°17'S., 133°45'E.).

Selat Modan is entered over a bar with a least depth of 4.1m on a course of 095°. Anchorage can be taken, in 20m, in the strait abreast of Kampung Modan.

Kampung Modan (2°23'S., 133°55'E.) is on the N shore of Selat Modan.

Tides—Currents.—At Kampung Modan, the highest water level occurs in February and March, the lowest water level in July, August and September. The maximum rise and fall of tide that can be expected are, respectively, 2.9m above and 3.9m below mean sea level.

Kepulauan Pisang

5.61 **Kepulauan Pisang** (2°38'S., 131°35'E.) are a group of islands about 20 miles NW of Tanjung Fatagar. The group consists of the long, narrow Pulau Sabuda and two massive rocks, Pulau Tartaruga and Pulau Senchan (Sentjan), NW of Pulau Sabuda. The islands of the group, rising steeply from depths of 73 to 110m, are hilly, heavily wooded, and uninhabited. The maximum elevation, in the middle of Pulau Sabuda, is 164m. A narrow reef extending off this island widens to 183m off the SW point. Pulau Senchan, the outermost of the rocks NW of Pulau Sabuda, is 47m high and Pulau Tataruga is 60m high. Both are surrounded by coastal reefs. On the NW side of Pulau Tataruga there is an entrance in the reef through which vessels may proceed to the reef in depths of 12.8m. Several reefs are around these islets and caution is necessary when passing between Pulau Sabuda and Pulau Tataruga. The channel between Pulau Sabuda and the islets to the S is quite clear as is the area between Kepulauan Pisang and the 3.6m reef off Tanjung Fatagar. A small 4.9m shoal is 2.75 miles NW of Pulau Sechan. A 5.5m shoal is 0.5 mile N of Pulau Tartaruga, a 7m shoal is 1 mile NW, and a 5.9m shoal is 1.2 miles E of this same island.

A light is shown from a metal framework tower at the NE end of Pulau Sabuda.

During the Southeast Monsoon, the best anchorage in this group is on the N side of Pulau Sabuda. During the Northwest Monsoon the most sheltered anchorage is close to the S shore of that island. Vessels will also be fairly well protected in this latter anchorage during the Southeast Monsoon.

Irian Jaya—Tanjung Fatagar to Tanjung Nassaulang

5.62 From **Tanjung Fatagar** (2°46'S., 131°56'E.) to **Tanjung Nassaulang** (Cape van den Bosch) (4°05'S., 132°54'E.), the coast is high, densely-wooded, mountainous land normally terminating in steep, rocky cliffs. The E coast of Teluk Sebakor is, however, considerably lower with an upward gradient, dipping at intervals, and forming a division between the mountainous Kumawa territory and that lying N of Teluk Sebakor.

There are few landmarks on this coast. Gunung Baik, 1,052m high, close S of Teluk Sebakor, is a good mark, and the rather sharply-pointed peak, 1,006m high and 4 miles N of Tanjung Nassaulang, is also conspicuous. Almost all of the few streams along this coast dry at LW and are navigable only by small native craft. Near Kampung Fafak there is a fair amount of trade in forest products, but in the S portion between Tanjung Tongerai and Tanjung Nassaulang, there are no signs of habitation.

Because the Southeast Monsoon blows mainly in the direction of the coast, there is little protection from the swell except

inside deep bays or behind projecting headlands. In Teluk Sebakor, probably because of the influence of the lower land, the East Monsoon is felt mainly in a direction N of E.

Tides—Currents.—The flood currents along this coast set to the N and the ebb to the S. Both are weak.

The coast between Tanjung Fatagar and Tanjung Kokraaf, about 9.5 miles to the S, is very irregular and forms two bays separated from each other by the very conspicuous Tanjung Tegin.

The N bay is Teluk Wirtopin and the S bay is Teluk Suweri. Both are of little importance.

Pulau Batu Putih (2°57'S., 131°58'E.), close S of Tanjung Kokraaf, is a rocky wooded islet about 2 miles long in an E-W direction and 155m high. It is a limestone formation with conspicuous white patches. The W point in particular, is a striking headland with steep white cliffs. A 4.9m coral shoal is N of the island and an 11.9m shoal is about 0.5 mile farther W. The least depth in the passage between Pulau Batu Pitih and Tanjung Kokraaf is 11.9m.

5.63 Teluk Togarwatan (2°55'S., 131°59'E.) and Teluk Sipatnanam, immediately E of Tanjung Kokraaf, are separated by Tanjung Gangrurimur, which has a cascade of fresh water on its E side. They afford safe anchorage during the West Monsoon but are of no importance otherwise.

During the East Monsoon, there is safe anchorage N of Pulau Batu Pitih.

A wide coral bank covered with fine sand extends out from the coast between Tanjung Ributtutin and Kampung Fakfak.

Pulau Ega (Eka) (2°59'S., 132°07'E.), SE of Tanjung Ributtutin, is a narrow, rocky, wooded island with a white beach and several remarkable white patches. A reef extends out about 0.5 mile from the island.

The Tipporra Islets are on an extensive reef between Pulau Ega and the mainland. The area is not navigable.

Pulau Panjang (2°59'S., 131°14'E.), about 1.5 miles E of Pulau Eka and separated from it by a deep channel, is narrow and 9.5 miles long in an E-W direction. A narrow ridge of hills whose slopes are under cultivation run along its entire length. A lighted buoy (port hand) marks the extremity of a spit extending SE from Pulau Eka at the channel entrance. Reefs extend 287m from the W end and 463m from the E end of the island. A light is shown from Tanjung Wamarusa, the E end of Pulau Panjang.

Caution.—Several charted reefs are S of the E part of Pulau Panjang. **Egeron Reef** (3°05'S., 132°18'E.) has a least depth of 1.2m and other reefs 2.1 to 6.7m are W of it. Between Pulau Panjang and Pulau Semai, about 10 miles farther SE there are two reefs, 1.8m and 2.7m deep which discolor well in a favorable light.

5.64 Fakfak Road (2°57'S., 132°17'E.), between Meti Meti Reef and Tubi Serang Islet, is sheltered by Pulau Panjang, but a heavy swell sets into it during the Southeast Monsoon.

Tubi Serang Islet is on the E side of Fakfak Road near the SE end of a 0.8 mile projection of the coast reef. It is wooded, partly with nutmeg trees. It has been reported that the coastal reef in the vicinity of the islet is extending SW and W.

Meti Meti Reef, on the W side of Fakfak Road, partly uncovers at LW. A lighted buoy marks the SE side of the reef. A beacon marks a similar but smaller reef 1.75 miles WNW of Metimeti. There is a deep passage between the reef and the coastal reef. A drying reef is 1.5 miles W of Meti Meti Reef.

5.65 Kampung Fakfak (2°56'S., 132°17'E.) (World Port Index No. 53100) is on the top of a hill, 100m high. The town is the administrative and trading center of the region. A pier, which projects from the shore S of the town, can be used by vessels up to 600 tons with a draft not exceeding 3m, although the pier has been reported to be in a bad state of repair.

A buoy is moored at 0.2 mile SSW of the pier. A lighted buoy lies about 0.3 mile S of the inlet.

Port of Fakfak

http://www.portina4.go.id/fak2.htm

Tides—Currents.—At Fakfak Roads, the highest water level occurs between February and April; the lowest water level occurs in July, August, and September. The maximum rise and fall that can be expected are, respectively, about 0.75m above and 0.9m below mean sea level.

Anchorage.—Anchorage can be taken, in 44m, off the coast reef. Vessels approaching the anchoage steer a N course toward the pier at Kampung Fakfak and anchor when the channel between Pulau Ega and Pulau Panjang becomes open, or when a steep point of land to the E is seen midway between the N point of Tubi Serang Islet and the S point of Keke Islet.

Directions.—The channel E of Pulau Panjang is clear of dangers, but two reefs, with depths of 1.8 to 2.7m, respectively, 6.5 and 3.75miles ESE of Tanjung Wamarusa must be avoided. These reefs show up by discoloration with good light. Vessels approaching from W can pass to within 0.5 mile of Tanjung Wamarusa on an easterly course. Vessels approaching from the S should steer for the lighthouse on a course between 320° and 347°. The lighthouse point can be rounded at a distance of 0.5 mile. A good range is with the S point of Tubi Serang Islet in a line 327.5° with the flagstaff at Kampung Fakfak.

There are several villages on the coast SE of Fakfak Roads including Kampung Wambar, 13 miles to the SE.

Pulau Urat, a small islet is separated from the mainland by a very narrow unnavigable channel.

Pulau Semai, 482m high and close W of Pulau Urat, is separated from that island by Pinto Besar, a narrow channel limited to small craft only. Two villages, one of which is Kampung Krabutwiendi, are on the W part of the N coast of Pulau Semai near Tanjung Tubokmatan.

Caution.—Caution should be exercised because the coastal reef close SW of the pier is reported extending S.

5.66 Tanjung Kirana (3°14'S., 132°35'E.), 24.5 miles SE of Fakfak Roads, is high. There are several reefs with depths of 3.6 to 5.8m within a 3.5 mile radius of the point; a drying reef is 6 miles W of the point. The reefs are generally well marked by discoloration. It affords good anchorage during the Southeast Monsoon, in a depth of about 45m.

Kawar Nuwa, an isolated high and very conspicuous islet, is 4 miles W of NW of Tanjung Kirana.

Teluk Weri (3°12'S., 132°35'E.) is a large bight on the N side of Tanjung Kirana formed by the coast bendingto the E.

This bay affords good anchorage, in 40 to 50m, during the Southeast Monsoon, but during the Northwest Monsoon anchorage is untenable. There are several settlements on the shores of the bay. Except for the dangerous charted reefs at the head of the bay the remainder is free from dangers.

Teluk Sebakor (3°26'S., 132°45'E.), between Tanjung Turkanggur, 5.5 miles SE of Tanjung Kirana, and Tanjung Tongerai, is divided into two parts by the islands, Pulau Karas, Pulau Faur, and Pulau Tuburuasa. The W part of the bay is clear except for a few reefs near the coast, but the E part is strewn with dangerous reefs, some of which may not be shown on the charts. With good visibility, all of the reefs are marked by discoloration. The part of the bay near the islands is safe and good anchorage can be found almost anywhere. There are few inhabitants except on the islands.

Pulau Karas (3°28'S., 132°40'E.), has two fairly-high portions connected by a low narrow strip of land; from a distance it appears as two hills. Kampung Mas and Kampung Tamisa are the two principal villages on the island. There is anchorage off Kampung Mas, in 55 to 73m; closer inshore there is danger of fouling the anchor in coral.

Pulau Faur is almost entirely level, except for a 329m summit in its S part.

Pulau Tuburuasa is about the same height as the N part of Pulau Faur.

A 5.8m reef is 4 miles WNW of the NW point of Pulau Karas; an 18.3m bank (position approximate) was reported, about 4 miles WSW of the same point.

A drying reef is close off the NW and NE coast of Pulau Tuburuasa.

Between **Tanjung Tongera**i (3°38'S., 132°43'E.) and Teluk Sanggala, about 17 miles to the S, the coast is high, steep, and rocky with deep water close-to. There is limited anchorage during the East Monsoon in the small inlet N of Tanjung Tongerai.

Gunung Baik, near the last-named point, rises gradually from the coast to a height of 1,052m.

There is safe anchorage, in about 50m, N or S, according to the monsoon, of the unnamed islet on the coastal reef about 12 miles S of Tanjung Tongerai. A 6.7m reef was reported, about 5 miles SW of the islet.

5.67 **Teluk Sanggala** (3°55'S., 132°49'E.) is formed by the Mommon Peninsula projecting in a NW direction from the coast 21 miles SSE of Tanjung Tongerai. This bay is easily recognized from a considerable distance seaward by a waterfall, close N of the entrance to the bay and which appears as a clear white patch. A detached 7.6m shoal is about 0.6 mile W of the waterfall. During the Southeast Monsoon, there is good anchorage, in depths of 29 to 40m, close N of the waterfall. The greater part of the shores of the bay are steep and high with occasional patches of sand between the rocks.

Two islets are on a reef close N of the waterfall. Other islets and reefs are off the N point of the Mommon Peninsula. Three detached reefs are inside the bay.

Anchorage can be taken inside the bay, either N or S of the E of the two drying patches on the E side of Mommon. S of this reef a vessel can anchor, in 33m. A reef with a depth less than 5m extends 0.5 mile from the NW point of the Mommon Peninsula.

Teluk Wap (3°58'S., 132°49'E.) is partly obstructed by three islands on a large connecting reef across the entrance; there is room in the bay for only one vessel. A 1.8m shoal about 0.25 mile N of the NW island obstructs that entrance to the bay. Anchorage can be taken, in 51m, in the bay, but during the Southeast Monsoon even the inner part of the bay is subject to swells. There are several islets near the head of the bay.

Tanjung Nassaulang (Cape van den Bosch) (Tanjung Katumin) (4°05'S., 132°54'E.) is steep and high and has been reported to be a good radar target at a distance of 30 miles. About 1 mile N of the cape is a low stretch of coast behind which the land rises steeply. Between this low land and Teluk Wap there is deep water right up to the shore. About 2 miles N of the cape, where the coast is less steep and is fronted by a drying reef, there is fairly good anchorage sheltered against the Southeast Monsoon. A prominent rock, covered with vegetation, lies near the N end of this break.

Irian Jaya—Tanjung Nassaulang to Tanjung Bohia

5.68 Between Tanjung Nassaulang (Cape Van Den Bosch) and **Tanjung Bohia** (4°07'S., 134°37'E.), about 100 miles to the E, the coast forms a large bay the NW shore of which is low, flat, marshy and bordered by shoals; the NE shore, however, is high and steep with considerable depths offshore.

Between Tanjung Nassaulang and Tanjung Usau, about 21 miles to the E, the coast consists of high densely-wooded land terminating in cliffs which descent sheer into the sea. East of Tanjung Usau the coast is low as far as Tanjung Simora, after which it again becomes high and rocky with densely-wooded mountains in the interior. The principal islands off the coast between Tanjung Nassaulang and Tanjung Bohia are Pulau Adi, Pulau Namatote, Pulau Aiduma (Alduna), and Pulau Kajumera (Kajoe Merah).

Because the highland in the interior has no conspicuous points, the principal landmarks along this coast are the headlands and the islands. Other conspicuous landmarks are the flat 247m hill on the S end of Pulau Namotote, the Lamansiere Mountain Range, the two pointed summits on Pulau Kajumerah, and Bohia Hill.

Winds—Weather.—Dense clouds and light winds from all quarters accompanied the change period at the beginning of April followed by sharp W squalls. East winds gradually prevailed and, at the end of April, the Southeast Monsoon was established, with generally ESE winds varied by W, SW, and S gales. In the middle of July, the wind increased in force and veered more to the S. During September the Southeast Monsoon gradually reached its strength and, at the end of that month very fine weather sets in with the change.

The West Monsoon began at the end of November with much less force than the East Monsoon; land and sea breezes succeeded each other regularly. The general direction of the wind was WNW, although considerably influenced by the contour of the land. The change set in about the middle of February with calms and fair weather.

The East Monsoon brought cool weather and considerable rainfall. The West Monsoon was warmer and drier.

Tides—Currents.—The flood current sets to the E between Cape Nassaulang and Tanjung Usau and to the WNW along the N and S sides of Pulau Adi. The direction of the ebb current is

opposite to that of the flood. These currents, meeting in Selat Adi (Nautilus), set up strong confused currents with swirls and make the greater part of the strait appear to be filled with breakers.

There are no tidal currents of any importance elsewhere except in the N part of Teluk Kamrau and in the narrow entrance to **Teluk Arguni** (3°27'S., 133°36'E.), where a strong ebb current causes heavy tide rips.

Anchorage.—During the West Monsoon, there is good anchorage anywhere between Tanjung Nassaulang and **Tanjung Simora** (3°40'S., 133°41'E.). During the East Monsoon the only safe anchorage is off the W coast of Pulau Adi or on the ridge connecting Nusa Wulan to the mainland. East of Teluk Bitsyara (Bitsaru) the only anchorage is close under the coast, but even there the depths are usually great.

5.69 Nusa Wulan (4°07'S., 132°57'E.) is a small inhabited island close to the shore between Cape Nassaulang and Tanjung Papisoi. It is connected to the coast by a ridge with depths of less than 18.3m. During the East Monsoon, there is safe anchorage, in 13.7m, between Nusa Wulan and the mainland. During the West Monsoo, anchorage can be taken close under the E shore of Tanjung Papiosi, W of the Derdi Reefs.

The small Derdi Islets are on a drying reef immediately E of Tanjung Papisoi; there are two more unnamed islets NW of them.

Pulau Adi is a low island 23 miles long in a NW-SE direction. There are some hills in the W part of the island but they have no conspicuous summits. A light is shown from a white structure on the E tip of Adi. The island is only occasionally inhabited. In the East Monsoon there is good anchorage off the W coast. The SW end of the island should be given a wide berth.

Caution.—Four dangerous reefs are N of Pulau Adi. Between the westernmost, which dries 1.5m, and Tanjung Lumatta there is a narrow passage which is obstructed by a 2.7m shoal. The other three reefs, the easternmost of which is 5.75 miles N of Tanjung Watukebo, have depths of 11.9 to 14.9m. A 10.5m depth is 12 miles NNW of Tanjung Watukebo.

Pulau Tumbu Tumbu, encircled by an extensive drying reef, is about 5 miles S of Pulau Adi. There are several charted reefs between this islet and Pulau Adi with depths of more than 5.5m.

5.70 Selat Adi (Selat Nautilus) (4°06'S., 133°16'E.), separating Pulau Adi from the mainland coast, is 4 miles wide between Tanjung Kainara and Tanjung Usau and has depths of 12.8 to 50m. Pulau Urobi, a small rocky islet E of Tanjung Usau, Pulau Unoga, and Nustiga, N of this islet; are in the NE part of Selat Adi. Simla Reef is NW of Pulau Unoga. Farther E are Pulau Karawatu and Pulau Keliwala, uninhabited low islands surrounded by a fairly wide coral reef with depths of 0.9 to 6.4m between the islands. There are several shoals between the two islands and the mainland. A light is shown from the E extremity of Pulau Keliwala.

Tides—Currents.—Within Selat Adi and S of Pulau Adi the flood current sets E and the ebb WNW at a rate of up to 1.5 knots. At times the sea breaks over the entire length of the strait because of the confluence of three currents from different directions.

Anchorage.—During the Northwest Monsoon, there is good anchorage everywhere. During the East Monsoon, there is no safe anchorage until the direction of the wind shifts more to the S, then there is good anchorage close under the N coast of Pulau Karawatu or Pulau Keliwala.

Directions.—A vessel approaching Selat Adi from W should keep the SE point of Pulau Urobi in line with the NW point of Pulau Karawatu, bearing 067°, until Tanjung Usau is abaft the beam bearing 271°. Then bring this point astern on this bearing and pass between Pulau Urobi and the dangers N of Pulau Adi. Care should be taken not to deviate from this line because the current sets across the channel in the vicinity.

Caution.—After passing N through Selat Adi, there are numerous shoals to the W of Pulau Urobi, Pulau Karawata, and Pulau Keliwala and also to the NW of Pulau Keliwala; the chart is the best guide.

Sungi Karufa (Karup) (3°53'S., 133°23'E.) is entered over a bar which limits its use to small craft.

Anchorage can be taken, in 6.7 to 7.9m, anywhere on the mud flat extending over 5 miles offshore between the entrance to Sungi Karufa and Teluk Kamrau during the Northwest Monsoon.

Teluk Kamrau is entered between Tanjung Taronmeta (3°34'S., 133°34'E.), a low point, and Tanjung Simora (Smora), 9 miles to the SE, also a low point.

Caution.—See Pub. 120, Sailing Directions (Planning Guide) Pacific Ocean and Southeast Asia, for danger areas in the vicinity of Tanjung Smora (Tanjung Simora) and Telak Kamrau.

5.71 Pulau Serotte (3°34'S., 133°38'E.), a low islet covered with high trees is at the N end of a shoal ridge which divides the entrance to Teluk Kamrau into two channels. The W channel should not be used because it is encumbered with reefs and shoals. The E channel has fewer shoal spots; the chart is the best guide. A light is shown at the N end of Pulau Serotte.

It was reported that the depths of about 0.5 mile WNW of Pulau Serotte were considerably less than charted.

Sungi Umbwallar (Kumbwaller) and Sungi Irimawa, flowing into the NW part of Teluk Kamrau, are more in the nature of arms of the sea and drain the marshy land. Sungi Umbwallar, as far as it has been surveyed, can be navigated, but Sungi Irimawa is difficult because the edges of the banks on either side are steep-to and the waters are muddy and sunken dangers cannot be seen.

Pulau Syirnusa is an island about 4 miles N of the joint entrance to the above rivers.

Teluk Arguni (3°23'S., 133°39'E.) is entered at the head of Teluk Kamrau close S of Pulau Syirnusa. The bay is difficult to navigate, particularly in its S portion, unless it has been previously buoyed. It should not be entered on a full tide; the best time is about 1 hour after LW when the three westernmost reefs are still visible and the ebb current is weak.

Teluk Kaimana (3°40'S., 133°44'E.) is a wide bight between Tanjung Simora and the high tongue of land that terminates in Tanjung Bitsyaru. Kampung Simora, on the W shore, is fronted by a reef and also extends offshore S of Kampung Kaimana on the E side of the bay.

Safe anchorage, in about 9.1m, is about 1 mile W of the pier

head at Kampung Kaimana.

Several charted shoal spots with depths of as little as 0.9m are in the bay.

Tides—Currents.—In the bay the maximum rise and fall of tide that can be expected are, respectively, 0.75m above and 1.4m below mean sea level.

Kampung Kaimana (3°40'S., 133°44'E.) (World Port Index No. 53110) has a prominent mosque, flagstaff, and customhouse with a corrugated roof. A drying reef extends 0.5 mile offshore from Tanjung Poweri, which lies close S of the village.

It was reported the pier at the village was in bad state of repair. A light is shown near the pier.

Teluk Bitsyaru, immediately E of Teluk Kaimana, extends 10 miles to the N. Its shores consist of high rocky walls, but there is some low land in the NW part of the bay near the mouth of Sungi Sisiandang. Farther inland there is a cleft running in the direction of Kaimana, between Mount Lowai, 757m high, and the mountains E of Teluk Kaimana.

There are three reefs in the middle of the bay, with depths of 1.2 to 5.5m, and several dangerous reefs in the SE part of the bay near the N entrance to Selat Namatote.

5.72 Pulau Namatote (3°47'S., 133°52'E.), paralleling the coast S of Teluk Bitsyara for about 10 miles in a NNW-SSE direction, is formed by a narrow mountain range which descends precipitously into the sea except near its N end, which terminates in a drying reef extending 0.15 mile farther N and E than charted. A small 247m hill in the S part of the island is a conspicuous landmark. The highest point of the island, 447m high, is about 2.25 miles N of this hill. Good anchorage may be obtained during the Southeast Monsoon off Kampung Namatote, on a low part of the island to the S of the flat hill mentioned above. The island terminates in a single mountain to the S of the village. Pulau Sagin is off the S point of Pulau Namotote and the channel between the two has several islets and should not be used.

Java Bay, on the E side of Pulau Namatote, has a shoal at its head. There is anchorage in the bay, in 18.3m, for one vessel, but the anchorage is exposed to the tidal currents. Local knowledge is necessary. The small bay on the W side of the island opposite Java Bay is closed by a reef.

Selat Namatote, separating Pulau Namatote from the mainland, connects Teluk Bitsyaru to the N with Teluk Triton to the S. The coast on both sides is high and rocky and in many places rises almost perpendicularly from the sea. The N part of the strait is obstructed by reefs and should not be used. The drying coastal reef off the N end of Pulau Namatote is marked by discoloration and it has been reported that it extends about 0.2 mile farther N and E than charted.

South of Teluk Gagak (Raaf Bay) the strait is clear. Good holding ground can be found anywhere in the strait. The current sets it the direction of the strait, but numerous rocks in the N part cause swirls.

5.73 Teluk Gagak (Raaf Bay) (3°45'S., 133°54'E.), on the E side of Selat Namatote, penetrates a considerable distance inland in a SE direction and affords safe anchorage with local knowledge under all conditions. The entrance is narrow, but, with due caution for the reef on the N side, it is not difficult to enter. This reef dries 0.9m and is well marked by discoloration. About halfway across the bay the holding ground is good but in the inner part there are several reefs.

Teluk Triton, E of the S end of Selat Namatote, is 6.5 miles wide at its entrance between Tanjung Aiwa and the NW end of Pulau Aiduma, and is 11 miles long NE-SW. It is completely surrounded by high rocky shores except in the N corner where the river, Sungi Tombona flows out through a cleft. Mauwara Island and Semisarom Island are in the NW part of the bay. The channel between these islands and the area between Mauwara Island and the mainland are not navigable by large vessels nor is the small bay NE of Tanjung Aiwa.

Many islets and rocks are inside of and off the entrance to Teluk Triton. Nusurumi Islet, the largest of these and in the middle of the bay, has a reef extending from its E side and a detached 1.8m reef about 0.75 mile W of its N end. The other islets can be approached closely. Nusurumi Islet is marked by a light. Ambasinsi Islet, on the S shore has a village on its SE side and is the only inhabited islet in the bay.

A 5.5m reef is 0.5 mile S of Pulau Lauzaro and 6.7m reef is about 1.75 miles NE of the NW corner of Pulau Aiduma.

The navigation of Teluk Triton presents no difficulties. Because the SW edge of the drying reef off the mouth of Sungi Tombona is very steep and the water muddy, vessels proceeding to anchor off Kampung Lobo should steer close in to the W shore after rounding Tanjung Kumura.

Pulau Aiduma (Pulau Alduna) (3°58'S., 134°06'E.), on the E side of the entrance to Teluk Triton, is high and steep-to, especially on its SW side. There are two mountain peaks on the island, the highest of which is 494m, but they are not easily recognized. Kampung Aiduma is on the NW end of the island. A dangerous 2.7m reef is close off the NW coast of the island.

Anchorage can be taken within the inlet about 3.75 miles E of Sarue Nus by vessels with local knowledge. Small vessels can anchor in the inlet about 4.5 miles SSE of the latter place. A 3m reef extending some distance offshore restricts the swinging room.

5.74 Pulau Dramai (4°01'S., 134°14'E.), off the SE end of Pulau Alduma and in the S entrance to Selat Iris, is hilly and partly cultivated. There is fairly good anchorage, in a depth of 24m, about 0.8 mile E of the NW point of the island, which is much lower than the other parts of the island.

Selat Iris (3°58'S., 134°09'E.), separating Pulau Dramai from the mainland, has a general width of 2 miles except at the N entrance where the navigable channel is reduced to 0.5 mile, and in the S part where it is split in two by Pulau Dramai. The strait is deep and clear and offers no difficulty except for a strong current, especially in the N part near Sarue Nus, where whirlpools may be encountered.

The E shore, like the W, is steep-to. The inlet N of Pulau Dramai affords good anchorage.

Across the entrance to Teluk Kajumerah is **Pulau Kajumerah** (4°01'S., 132°23'E.), roughly triangular shaped and attaining a height of 555m on its S side. Another 381m summit is a little farther W. The S and W sides of the island are steep and rocky, but elsewhere the land slopes up gradually. Pulau Salakula is off the W end of Pulau Kajumerah leaving a channel about 0.3 mile wide, deep and clear, between it and Tanjung Wandala on the mainland. The passage between Pulau

Salakula and Pulau Kajumerah is not navigable. Three small islets are off the E end of Pulau Kajumerah; the channel on either side of the islets is clear. Several small islets are off the N part of Pulau Kajumerah, the largest of which are Nasir, Marewa, and Mondan. The passage between these islets and Pulau Kajumera are suitable only for small boats.

The inlet on the W side of the bay between Tanjung Wandala and Tanjung Sawara Selai (Tanjung Soaka Sekai) is clear of dangers. The small bay S of Tanjung Wikrombus is almost closed by a 0.9m reef extending about 0.5 mile SSE and by a 1.4m reef fronting its entrance. The small cove at the head of Teluk Kajumerah is navigable at LW when the reefs can be seen.

5.75 The E shore of Teluk Kajumerah between Sungi Airawoi and **Tanjong Ferai** (3°58'S., 134°26'E.) is for the most part low, mangrove-covered, and backed by steeply-rising mountains. An inlet is N of Tanjung Ferai; its SE part has several shoals that dry at LW. Between Tanjung Ferai and Tanjung Awura the coast is steep and rocky.

Two rocks with depths of 8.5m and 2.1m are about 2 and 2.75 miles, respectively, NW of Tanjung Ferai. The W extremity of the islet NW of Tanjung Awura in range with the E side of the northernmost of the islets farther to the NW leads W of these dangers.

Teluk Lakahia is 8.5 miles wide at its entrance between **Tanjung Awura** (4°02'S., 134°29'E.) and Tanjung Bohia and penetrates the land in a funnel shape for 11 miles to the NE, after which it turns around to the E and continues several miles inland. This latter portion, known as Teluk Etna, is only about 0.75 mile wide. A drying bank extends W from Tanjung Bohia and merges into a reef with depths of less than 5.5m extending about 2.5 miles SW. Shoal patches with depths of 4 to 5m are about 2.5 miles SW, and a reef awash is about 2.25 miles S, respectively, of Tanjung Bohia. A group of coral shoals with depths of 1 to 2.2m are about 1.25 miles W of the same point. Two small islets about 2.2m high are near the end of a drying bank extending W from Tanjung Bohia, and a reef which dries 0.9m is about 0.75 mile N of the point.

5.76 Pulau Lakahia (4°04'S., 134°36'E.), a low and wooded island surrounded by a reef, is in the entrance to Teluk Lakahia. The reef extends for 1 mile from the SW extremity of the island. The channel between Pulau Lakahia and Tanjung Bohia is very narrow at the N end and should not be used without local knowledge. The preferred entrance between Pulau Lakahia and Tanjung Awura is wide and deep and has an area that has been swept to 11.9m.

The NW shore of Teluk Lakahia is steep and mostly high and rocky, except for an occasional sandy beach behind which the land rises. The E side is tree-covered and low except near Tanjung Bohia which has a hill of the same name, 110m high. Tanjung Tarella, 8.5 miles N of Tanjung Bohia, is a low, sandy, tree-covered point. A long, narrow, drying bank is 0.75 mile W of this latter point. The E side of Teluk Lakahia is mostly occupied by an extensive bank with depths of less than 5.5m. Teluk Terara is a shoal and unimportant.

Between the drying bank and the W shore there is an irregularly-shaped area swept to 4.5m.

There are two passages to Teluk Etna; each is narrow and hazardous. The W passage, close along the W shore, passes between a 0.6m rock off Tanjung Etaburi and Karang Japbari, a reef with a least depth of 1.8m. The E passage is between the drying bank W of Tanjung Tarella and Karang Japbari. The approach to the passages has been swept to 4.5m and leads on either side of a 1.9m bank. Local knowledge and alert piloting are essential for safe transit through this area. Numerous unmarked dangers within the area are shown on the chart.

Tides—Currents.—At Pulau Lakahia the highest water occurs in May and November. The maximum rise and fall of tide that can be expected are, respectively, about 1.1m above and 1.1m below mean sea level.

Anchorage.—There is good anchorage anywhere in Teluk Lakahia. During the East Monsoon, because a heavy swell then runs to the NNW of Pulau Lakahia, the best anchorage is off the mouth of the small Sungi Kambelangen, W of Tanjung Etaburi. During the West Monsoon there is anchorage off the NW side of the bay, E of Tanjung Amanmawa.

5.77 Teluk Etna (3°55'S., 134°45'E.), narrow and landlocked, is entered between Tanjung Itewi and Tanjung Bawia, two steep projections of the coast. Tanjung Itewi, is steep-to but on its E side a row of drying rocks extends nearly 183m from the shore between Tanjung Ulupala and Tanjung Bawai. Immediately outside the outer rock the depth is 7.3m. A drying sand bank is off Tanjung Ulupala. The N side of the bay is mountainous; the highest point, Pegunungan Bamana, about 3 miles NE of the entrance, is 1,371m high. The shore is not steep-to everywhere, but is broken by stretches of low mangrove-covered land. The S side is similar to the N except that the mountains are in detached groups. This more open coast has a perceptible effect on local weather conditions. A waterfall, with a graduated drop of about 198m, is in the W part of the bay N of the W entrance point.

Depths in the bay vary considerably, with the narrowest parts being the deepest. The E part of the bay is shoal, but a channel with more than 9.1m extends to within 5.5 miles of the head, and depths of 5.5m extend still farther.

A settlement is on the N shore about 1 mile NNW of Tanjung Itewi and an oil storage farm is on the N shore abreast Tanjung Bawai. A pier at the latter has a depth of 3.9m at its head.

Tides—Currents.—In Teluk Etna, the highest HW level occurs in April and May and October or November; the lowest water level occurs in May and November. The maximum rise and fall that can be expected are, respectively, about 1.3m above and 1.3m below mean sea level.

The tidal currents in Teluk Etna turn four times daily. The strength depends on the range, the phase of the tide, and the breadth and depths of the part of the bay. Generally the current at springs has a rate of 3 to 4 knots in the narrow parts of the bay. The currents follow the direction of the channel. Whirlpools, necessitating careful steering, are formed at the drying reef in the middle of the bay and at various places where the turns are sharp. In the bight N of Tanjung Itewi in particular, the water has a continuous turning motion.

Anchorage.—There is anchorage throughout the length of the bay in moderate depths. Current eddies and poor holding ground make anchorage inadvisable in the narrow parts of the bay or in the bight N of Tanjung Itewi.

Directions.—Approaching Teluk Lakahia from S, the moun-

tain **Bukit Buru** (4°13'S., 134°56'E.) to the E is a good mark because it stands quite apart and close to the coast. Closer, Bohia Hill and Pulau Lakahia serve to point out the entrance to the bay. The S portion of the bay presents no difficulties. From W, the 487m mountain on Tanjung Awura is a good mark. Vessels approaching from E should give Tanjung Bohia and Pulau Lakahia a wide berth.

After passing between Tanjung Amanamawa and Pulau Lakahia bring Tanjung Tarella, which is conspicuous because of its trees, to bear 068° and cross the bank abreast Tanjung Etaburi on that course over a least depth of 5.9m. When in depths of 10.9m, alter course to 040° until Tanjung Wariwi bears 285°, after which steer straight for the center of the entrance to Teluk Etna. On the E side of the navigable channel near Tanjung Tarella there are two drying reefs which at LW, assist in giving the direction of the channel.

In the entrance to Teluk Etna, a drying sand bank and shoal water between Tanjung Ulupala and **Tanjung Bawia** (3°56'S., 134°40'E.) considerably reduce the width of the navigable channel. The deep W side near **Tanjung Itewi** (3°56'S., 134°39'E.) should be held and the bay gradually steered into as Tanjung Saimba, the point on the N shore about 3.5 miles E of Tanjung Bawia, opens clear on Tanjung Bawia. Care should be taken to avoid the 7.3m patch NE of Tanjung Itewi. When about 2 miles E of Tanjung Bawia keep on the S side of the channel to avoid the bank to the W of Tanjung Saimba.

If the current is strong, give this point a good berth to avoid the eddies, and keep along its E side until the part of the bay E of Tanjung Yaramabonga comes open, then cross over and keep along the N side of that point and on the S side of the channel until the partly drying reef in the narrowest part of the channel abreast the Seriwi Mountains has been passed. The channel N of this reef is also clear. After passing the reef, gradually steer over to the N shore until abreast of the steep headland 2.5 miles E of the reef, when a course of 116° on a conspicuous mountain spur on the S shore leads farther into the bay. The channel here narrows considerably and is steepest on the N side. The best plan is to keep on soundings on the S side of the channel and act accordingly.

Irian Jaya—Tanjung Bohia to Tanjung Kool

5.78 From Tanjung Bohia, the coast trends ESE for about 13 miles to **Tanjung Narika** (4°15'S., 134°49'E.), a spur of Bukit Buru, which can be recognized by several large yellow patches against the rocks. Several streams discharge into the sea along this stretch of coast.

East of Tanjung Nariki, the land rises for about 7.5 miles to **Bukit Buru** (4°13'S., 134°56'E.), a ridge 14 miles long which slopes steeply on the E side. Between it and the Pegunungan Tiyo range to the E there is a valley with hilly ground.

Between Tanjung Nariki and **Tanjung Namaripi** (4°28'S., 135°13'E.), about 29 miles ESE, several rivers discharge into the sea. Between Tanjung Nariki and the mouth of Sungi Buru, 9 miles SE, the coast is high and rocky but beyond that it is lower and closely backed by hills. Breakers have been reported at a position 1.5 miles WSW of the river.

Sungi Katera (4°22'S., 135°03'E.), about 12 miles W of Tanjung Namaripi, has a large village on the E side of its entrance.

Tanjung Namaripi (4°28'S., 135°13'E.) is a steep foreland which appears as an island when seen from E and is visible for 30 miles. A stranded wreck is about 2 miles E of the point.

From a few miles E of Bukit Buru the Pengunungan Tiyo range of mountains extend in an E direction and join the Pengunungan Sudirman range. The highest summits are snow-covered and visible from S at a distance of 75 miles in clear weather, but are generally enveloped in clouds except in the early morning or at sunset. In general they appear to be gently undulating. **Puncak Jaya** (4°06'S., 136°50'E.) is a prominent landmark.

Between Tanjung Namaripi and **Pulau Naurio** (4°56'S., 136°48'E.), about 100 miles to the ESE, the coast is low and densely wooded, presenting a monotonously uniform appearance relieved only occasionally by the gaps at the mouths of the rivers. There are no known off-lying dangers along this coast except near Pulau Naurio.

A wooded point, conspicuous from E and W, is 30 miles E of Tanjung Namaripi. A remarkable flat summit is about 9 miles NW of the wooded point and 5 miles from the coast; it is a good mark when bearing between 045° and 315°.

5.79 **Sungi Uta** (4°35'S., 136°02'E.), discharging 45 miles E of Tanjung Namaripi, can be navigated by small craft for several miles above the mouth.

The entrance to Sungi Makemaw, about 8 miles E of Sungi Uta, is distinctive. The W entrance point projects sharply and the E point appears as two islets. From the latter point, a drying bank extends 2 miles SW and breakers have been seen 2.5 miles from shore. The river is not navigable.

Anchorage.—There is anchorage anywhere, in 11 to 14m, between Sungi Uta and Sungi Makemaw.

Sungi Mimika (4°41'S., 136°28'E.), 22 miles E of Sungi Makemaw is easily recognized by an isolated group of trees near Kampung Kokonao, just W of the mouth of the river. The river is navigable by small craft. The coast here is low and covered with mangrove. The banks at the river entrance are bordered by a strip of sand partly covered by trees, among which are some dwellings. There is good anchorage, in 20m, with the W entrance point of the river bearing 014°. Local knowledge is necessary. The river is only suitable for small craft at HW.

There are numerous rivers between Sungi Mimika and Pulau Naurio, none of which are of navigational importance. A large white beacon board is at the W entrance point to Sungi Keakwa, 5 miles SE of Sungi Mimika. A light is shown from the entrance to Sungi Keakwa.

Tanjung Steenboom (4°56'S., 136°50'E.) is at the E extremity of two islands, now joined together, Pulau Apiripi and Pulau Amewtiri, on the E side of the entrance to Sungi Tipuka. Another small island, Pulau Naurio, is about 1 mile NE of the point. All three islands have sandy beaches and are covered by high trees. A light is shown from Tanjung Aika at an elevation of 31m in the approaches to Amamapare.

The E mouth of Sungi Tipuka, known as Sungi Aika, is 4 miles WNW of Tanjung Steenboom. Kampung Apiripi is near its E entrance point and Port Amamapare is 6 miles upstream. There is a depth of 5.2m over the bar, but in any wind or swell heavy breakers occur across the entrance.

Caution.—A dangerous wreck is reported about 25 miles SW of Tanjung Steenboom.

5.80 Amamapare (4°49'S., 136°58'E.) (World Port Index No. 53115) serves the copper mines at Erstberg in the Pegunungan Sudirman mountain range, about 80 miles up Sungi Tipuka.

The port is approached by a well-marked channel about 12 miles long. The channel is 278m wide and its limits are marked by a range light and numerous lighted buoys and lighted beacons.

Vessels up to 20,000 dwt can be accommodated at the ore loading jetty. Vessels are loaded to a maximum draft of 6.7m at the jetty and then fully loaded at the outer anchorage.

A small hospital and a doctor are at the port, and an airfield is about 28 miles N.

Pilotage is not available, but local tug and barge masters are available as guides; they board vessels about 0.5 mile NW of the fairway lighted buoy. Vessels should make contact via telex with their agent. Contact the port on VHF channel 16 for anchoring and pilotage information on approaching Lighted Buoy A.

Good anchorage can be obtained in the river at Amamapare, in depths of 24 to 30m.

Bright working lights are shown from copper mines about 53 miles NNE of Tanjung Steenboom and are visible for about 90 miles SW in clear weather.

A 10.3m shoal about 8 miles WSW of Tanjung Steenboom is marked by a buoy about 2.5 miles to its N.

The depths off this part of the coast decrease gradually from 55m at 10 miles off to 9.1m at about 1.5 miles offshore. About 5 miles S of the entrance to Sungi Aika there is a 6.7m reef. There is a 10.5m patch 8 miles SW of Tanjung Steenboom. Vessels should not anchor in less than 12.8m or 14.6m if there is any sea or swell.

The flood current sets ESE and the ebb WNW along the coast, but the currents are irregular and are influenced by the river discharges.

5.81 Pulau Naurio (4°56'S., 136°50'E.) and Pulau Wajeteri are connected to the shore by banks and are conspicuous by their high trees.

Shoal water extends SW and S from Pulau Wajeteri and Pulau Naurio. Five miles SW of these islets there is a depth of 7.3m. Breakers have been seen about 1.25 miles N of this depth. The edge of the bank passes 4 miles S of the islets and trends in a SE direction 5 to 12 miles offshore. The edge of the bank off the islets is steep-to. Sungi Kupera Pukwa (Sungi Mayiweta) discharges about 10 miles E of Pulau Naurio. Anchorage can be taken 8 miles SW of the E entrance point of the river. Heavy breakers are frequent along the coast between this river and Sungi Newerip.

Numerous rivers of little or no navigational importance discharge between Sungi Kupera Pukwa and DeJongs Banks.

DeJongs Bank (5°18'S., 137°21'E.), consists of two shoals of hard sand, 4 miles apart with depths of 2m or less over them. Sounding give no warning of approach to these banks. In bad weather they are marked by heavy breakers.

Pulau Kasteel (5°15'S., 137°39'E.) is near the shore abreast of Sungi Kasteel. The island is lower in the center than at the ends and appears as a castle with battlements.

Sungi Kasteel and Sungi Blumen are navigable by small vessels.

5.82 Pulau Laag (Low Islands) (5°23'S., 137°43'E.), about 5 miles SSW of the entrance to Sungi Blumen, is about 1,000m long N-S and 463m wide; it is low and covered with vegetation. A depth of 10.9m is 7 miles WSW of the island with lesser depths between that depth and the island. Small Island is about 4 miles E of Pulau Laag and about 1 mile offshore.

Sungi Hellwig (Sungi Barat) (5°23'S., 137°52'E.) is reached by a 4.9m channel and is navigable by small vessels. The area is well populated.

Providential Bank (5°40'S., 137°50'E.), with a least depth of 4m over it near its W side, extends about 13 miles W from the SE entrance point of Teluk Flamingo. A lighted buoy is moored about 183m N of the 4m depth. A detached 4.9m shoal is about 7 miles S of the bank.

Teluk Flamingo (5°31'S., 138°02'E.) receives the waters of Sungi Northwest, Sungi Lorentz, and Sungi Utumbuwe. The outer entrances to these rivers are marked by lights. Vessels should keep in the channel marked by buoys and beacons.

It was reported (1992) that all the channel buoys and beacons were missing and depths do not agree with the charted depths.

Sungi Northwest (Sungi Barat Laut) (5°27'S., 138°01'E.) is navigable with local knowledge by vessels with a draft of 3.4m and about 50m long for about 50 miles and farther by small craft.

Sungi Lorentz (Sungi Dumes) (5°25'S., 138°05'E.) can be navigated with local knowledge by vessels up to 50m long and 3.4m draft to about latitude 5°00'S.

Sungi Utumbuwe is navigable with local knowledge for about 50 miles by craft the same size as those that can navigate the above two rivers.

5.83 Sungi Pulau (Sungai Jugu) (5°35'S., 138°10'E.) has two mouths about 8 miles apart. The N entrance, about 12 miles S of Sungi Utumbuwe, has a least depth of 1.5m, hence the S arm is generally used. The S arm has been navigated on a favorable tide by vessels with a 3.6m draft as far as position 5°21'S, 139°20'E. Smaller vessels have navigated further up river and into some of its tributaries.

Directions.—To enter the S entrance of Sungi Pulau, steer 093° on the S entrance point, where a group of trees rise above other timber. This course leads just N of a sand bank that dries at LW and extends to Triton Bank. The group of trees shows up fairly well when the approaching vessel gets into soundings of 4.9m. Before this mark comes into sight, however, the conspicuous and steep S entrance point of the N river mouth serves as a good mark. There is a least depth of 4.5m, soft mud, in the navigable channel to the mouth. The left bank should be favored, even at the bends, up to the junction with the second branch, Sungi Kampung.

Near the mouth of the river, the flood current sets to the N and the ebb to the S.

Triton Bank (5°58'S., 138°04'E.), which dries, is about 10 miles SW of the S entrance point of the S mouth of Sungi Pulau. The edge of this bank extends 2 miles farther seaward.

From Sungi Pulau the coast, low, wooded, and swampy, trends SSE for about 30 miles then SE. Sungi Kronkel and Sungi Cook are shallow unimportant rivers along this coast.

The Odammun River, about 60 miles S of Sungi Pulau, has three mouths, from N to S, Mabur, Mayu, and Jar (Viarre). The river is navigable with local knowledge to Sungi Digul. There

is very little current in the river.

Caution.—A wreck is 43 miles NW of Tanjung DeJongs in position 6°37'S, 137°53'E. A light is shown at Tanjung Dejongs.

A shoal with a least depth of 2.4m is off the mouth of Jar, 8 miles NNW of Tanjung DeJongs.

5.84 Sungi Digul (7°10'S., 138°42'E.), a river of some importance, is about 6 miles wide at its entrance abreast Tanjung Modder (Ujung Lumpur), but gradually narrows. Several charted banks and dangers that dry at LW are on the N side of the channel. Drying shoals extend about 5 miles W of Tanjung Modder. A lighted buoy is 11 miles WNW of Tanjung Modder. The channel is along Tanjung Modder, where the bank is not joined to the S shore. Over the bar, WNW of Tanjung Modder, there is a depth of only 1.8m, but the rise of tide is great enough to make the channel navigable.

Caution.—Mariners are warned that depths in the approach to Sungi Digul are reported to be extensively different from those shown on the chart. A 0.4m shoal is about 9 miles SW of Tanjung Modder. The land on either side of the lower Sungi Digul is low and swampy, but farther up the river it gradually becomes slightly hilly with elevations of 9.1 to 10.6m. Sungi Digul is navigable by vessels up to 50m long and 3.6m draft, and lesser depths can be carried farther into its tributaries.

5.85 Tanah Merah (6°05'S., 140°20'E.), on Sungi Uwamba about 50 miles above its junction with Sungi Digul, can be reached with local knowledge by small vessels up to 25m long with a draft of 1.9m.

Tides—Currents.—At the mouth of Sungi Digul, the lowest water occurs in July and November. The highest rise and lowest fall of tide that can be expected are, respectively, 2.1m above and 4m below mean sea level.

Directions.—Approaching from NW, be careful not to mistake one of the mouths of Sungi Odammun for Sungi Digul and steer for a position with Tanjung Dejongs bearing 011°, distant 8 miles, where there is a depth of 8.2m, then steer 125° to a position about 1.5 miles N of Tanjung Modder until Tanjung Gemeene (Gemeenehoek), on the N bank of the river about 10.5 miles ENE of Tanjung Modder, bears 084.5°, then steer for Tanjung Zondags (Zandagshoek), bearing 096°, taking care to avoid the 2.1m shoal ENE of Tanjung Modder, until Tanjung Gemeene bears 040°, then follow the channel passing N of the islet Amman Sileam, S of Habee Sillam, and W of Ora Sillam, 17, 28, and 34 miles, respectively, above Tanjung Modder.

Caution.—A tidal wave or bore, known locally as Kapala Arus, is experienced in Sungi Odammun and Sungi Digul. It occurs from 2 days before to 2 days after full or new moon. It is in the form of a wave about 1.8 to 4m high which moves up the river at a great speed. It is reported that several waves in succession can be experienced in Sungi Digul. Small vessels in the river when the bore is expected anchor in a branch of the river until the waves have passed. Larger vessels anchor with both anchors and steam ahead while the waves are passing.

5.86 Gosong Kolepon (Kolff Bank) (7°00'S., 136°50'E.), about 95 miles NNW of Tanjung Vals, the W extremity of Pulau Dolak, is a relatively small sandbank with a least depth of 14m. A 20.1m bank was reported 60 miles WNW of Gosong Kolepon.

La Cher Bank (La Chur Bank) (8°29'S., 136°15'E.), with depths of 24 to 26m, is steep-to, 6 miles long WSW-ESE, and surrounded by depths of 66m.

A shoal area enclosed by a danger line on the chart is W of La Cher Bank. Several 9.1 to 18.3m shoals are within 7 miles of the danger line enclosing this area. The area has not been completely surveyed.

A charted reef area reported 110 miles W of La Cher Bank has not been examined.

Pulak Dolak (7°50'S., 138°30'E.), the southwesternmost point of Irian Jaya, is separated from the mainland by Selat Muli. The island is about 100 miles long NE-SW and 50 miles wide at its E part, then tapers to a narrow point at Tanjung Vals, its SW extremity. The land is low, covered with dense forest and so marshy as to be almost unaccessible. The NW coast is fronted by a mud bank extending out 7 to 12 miles with 5.5m at its outer edge, increasing very gradually to seaward. About 50 miles NE of Tanjung Vals the bank decreases in width. The seaward edge of the shore bank is much steeper there than on the NW side of the island. The island is fairly heavily populated.

5.87 Tanjung Vals (8°21'S., 137°35'E.), the SW extremity of Pulau Dolak, is dangerous to approach from W because a bank with depths of less than 18.3m extends about 65 miles offshore and it is possible to run aground before sighting land. Isolated 12.8 to 18.3m shoals are 40 to 57 miles W of the cape. S of the cape depths decrease rapidly from 18.3 to 9.1m. There is generally a heavy sea off it during the East Monsoon and occasionally during the West Monsoon.

The flood current has been observed to set toward Tanjung Vals at a rate of 1.5 knots and then divides and continues NE along the NW coast and Ealong the S coast of the island. The ebb current sets in the opposite direction at a maximum rate of 1 knot.

The N entrance to **Selat Muli** (Marianne Strait) (8°00'S., 138°53'E.) is 10 miles wide with depths of 10.9 to 18.3m, but the width and depth gradually decrease to the S. The S part of the strait is narrow and very shallow and subject to constant change; it should be attempted only with rising water. While the strait affords passage for large sailing proas, enabling them to avoid the heavy swell of Tanjung Vals, it is seldom used by larger vessels. The bottom varies between sand mud and clay. The banks generally are just above HW level and the land is flat, wooded, and swampy. The depths in the S entrance, between **Tanjung Kool** (8°23'S., 138°56'E.) and Tanjung Kombies, are not more than 1.8m, soft mud, but when the drying bank extending from the W side of Pulau Bumbel is covered, just inside the S end of the strait, there is a depth of 3.6m over the bar.

Detached 1.8m and 0.6m shoals are 6 miles SSW and 9 miles SW, respectively, of Tanjung Modder.

Caution.—Both the N and S entrances to Selat Muli are subject to change and the charts cannot be depended upon.

Irian Jaya—Tanjung Kool to the Bensback River

5.88 This section of the coast trends E for about 65 miles, then SE, forming a wide open bight. The shores of this bight

are fronted by a wide mudbank. Between Tanjung Kool and Tanjung Kayakaya the coast is low and covered by mangroves; then between Tanjung Kayakaya and the mouth of Sungi Merauke a ridge of low sand dunes with abundant coconut palms rises behind a broad beach. Back of the ridge are low fertile valleys which are submerged during the rainy season and separated from each other by low sandy ridges. There are numerous villages along this coast. The Bulaka River, the Bian River, the Kumbe River, and the Merauke River discharge into the sea along this part of the coast. The few landmarks along the coast are useful only for inshore navigation.

The **Bulaka River** (8°08'S., 139°14'E.) discharges into the sea about 22 miles NE of the S entrance to Selat Muli. Either side of its entrances are fronted by mud flats extending out 0.25 mile. Although there are depths of 7.3 to 10.9m in the river mouth and 5.5 to 7.3m, 8 miles upriver, the approach is over shallow flats 1.8 to 3.6m extending about 6 miles offshore. The river has been navigated by a 49m long vessel with a 3.3m draft as far as Kampung Apong, a village about 20 miles above the mouth. The least depth in the approach to the entrance was 1.8m with 1.3m over the bar, and 10.9m in the river.

A drying bank is 2 miles SW of the entrance and a small 0.6m coral reef with 3.6m around it is about 3.5 miles S of the E entrance point. Drying rocks lie 4.5 miles SSW and S of the W entrance point of the Bulaka River.

Tanjung Kayakaya, about 25 miles E of the S entrance to Selat Muli, is at the W end of a more densely-wooded shore. From E it appears as a sharply defined point. About 1.5 miles W of the point is a small detached wood with low brush wood on either side of it. The coastal bank, extending 1.5 to 5 miles offshore, dries in some places for a distance of 1.5 miles offshore.

5.89 **Pulau Habeeke** (8°15'S., 139°28'E.), about 6 miles SE of Tanjung Kayakaya, is about 3m high and about 463m wide. It is covered with high trees visible for about 15 miles. A ledge of sand and stones with depths of 1.4 to 4.5m extends 2.25 miles S from the island. Karang Sametinke, a drying reef is 1 mile within the S edge of this bank. A light, from which a racon transmits, is shown from Pulau Habeeke. An 8.2m shoal and an 7.8m shoal are about 25.5 miles, 164° and 142°, respectively, from the islet. There is a 7.3m shoal 16 miles, bearing 241° from Pulau Habeeke also.

There are many boulders on the detached shallow flat extending far seaward from the E side of Pulau Habeeke. Along the N side of the island is a blind channel with a depth of 4.9 to 6.1m. It is approached from the W over a 5.5m bar. This channel provides the only access to the island and the water is almost always smooth; however, this channel should be marked before its use. On the N side of the channel the reef rises steeply and is more or less dry to the mainland. Dangers other than those charted may exist in the area of the island. There is a light on a white metal framework shown from Pulau Habeeke.

Anchorage.—There is good anchorage, in about 6m, mud, about 2 miles WSW of Pulau Habeeke. To reach the anchorage the island should be steered for, bearing 055° until Tanjung Kayakaya bears 315°, then steer NNE and anchor N and anchor with Pulau Habeeke bearing 079°.

The section of the coast bewteen Tanjung Kayakaya and the Bian River is low, sandy, and thickly overgrown with tall trees. The only perceptible break is at the mouth of the Bian River. Many coconut palms grow near the villages. Small woods and clumps of tall trees are along this stretch and some can be seen for a distance of 13 miles.

5.90 The **Bian River** (8°08'S., 139°57'E.) is about 1 mile wide at its mouth. A light is shown at the E entrance. It has been ascended by a vessel 50m long with a draft of 3.1m as far as Kampung Kabtel, a village about 30 miles above the mouth. Above this point it narrows. The depths in the entrance vary from 1.8 to 2.4m. A large volume of muddy water brought down by the stream is noticeable as far as 10 miles offshore. Shoals, 5.8 to 9.1m, are outside the 10m curve. At high tide the mangrove-covered banks of the river are flooded for a considerable distance.

In the SW approach to the Bian River two shallow spits extend SW from the coastal bank and two detached drying banks are about 4 miles SW of Tanjung Mawal, the E entrance point to the river.

Tides—Currents.—There is practically no period of slack water in the river; in fact, while the ebb current is still running in the outer bend the flood current may be flowing at a considerable rate into the inner bend. There may be a bore here because the water has been observed to rise 2.4m in 10 minutes, rushing in with a hissing sound. Caution should be exercised because of drifting timber in the tidal currents.

Directions.—Entering the river bring the E entrance point to bear 054° and steer in on that course.

5.91 The stretch of coast between the Bian River and the Kumbe River is fronted by a coastal bank with depths of less than 5.5m extending about 15 miles offshore. SW of the entrance to the Kumbe River, the coastal bank with less than 18.3m extends about 50 miles offshore. There are several detached shoals with depths of 9 to 11m on this bank. A 4.5m shoal is about 14.5 miles SW of the S entrance point to the Kumbe River and a wreck, in a depth of 0.9m, is 10 miles SSW of the entrance.

The **Kumbe River** (8°22'S., 140°15'E.) is accessible only to small craft with local knowledge because of the shallow coastal bank. The entrance is marked by beacons. Several charted dangers are in the approach. The entrance points have broad sand beaches with coconut palms behind them. A village is on the N entrance point and a red-roofed house serves as a good landmark.

Tides—Currents.—During November and December, the tidal currents were observed to set in the direction of the coast, averaging about 7 hours to the NW and 5 hours to the SE. During the Southeast Monsoon, the incoming tidal current at the river mouth has a rate of about 1.5 knots and the outgoing tidal current has rates of from 2 to 3 knots; during the Northwest Monsoon the rates are greater.

5.92 The **Merauke River** (Maro River) (8°29'S., 140°21'E.), about 10 miles SE of the Kumbe River, is deep and tortuous, but has been ascended for a distance of 60 miles by a vessel about 61m long with a 3.1m draft and 90 miles farther by boat.

A wide drying bank extends out from the coast on either side of the entrance. Breakers have been reported about 8 miles SW

of Tanjung Haram, the SE entrance point of the river. Depths of 3 to 4.5m are charted in this vicinity. A marked channel with a least depth of 0.9m across the bar leads NE through the above drying bank.

It was reported that the sand bank of Tanjung Haram had extended into the channel and it was necessary to keep to the W of the leading line when passing the point. The wreck of a large fishing vessel was observed on the river bank 0.75 mile E of a ruined jetty close SE of the front range light.

It was further reported that the entrance to the river was difficult to distinguish against the uniform jungle background and that it was advisable to rely on celestial navigation fixing until the inner buoy and range lights were identified. These leading marks, although difficult to distinguish against the dark background, and the aero radiobeacon tower 1.25 miles ESE of Tanjung Haram, were the only good fixing marks. Care was necessary, however, to avoid confusing this tower with others standing near them.

Numerous charted dangers are in the approach to the Merauke River and, because the position of shoals may vary, care should be taken to adhere closely to the marked channel.

Aspect.—Aids are lighted only on request and even then are sometimes difficult to identify. Tanjung Mimiabe, on the S side of the entrance to the Merauke River, is marked by a light; because the structure is difficult to see, a flag is sometimes flown from it to assist in identification. A radio mast, 52m high with red and white horizontal bands, is about 0.3 mile SE of the light.

5.93 Merauke (8°29'S., 140°23'E.) (World Port Index No. 53130), the principal town in the S part of Irian Jaya, is on a plain in the midst of the jungle on the S bank near the mouth of the Merauke River. The low land on which the town stands is protected by dikes. From a distance the town, covering a considerable area, looks like a mass of galvanized roofs. Copra and crocodile hides are the principal export. There is a hospital at the town.

Port of Merauke

http://www.portina4.go.id/merauke.htm

Tides—Currents.—At Merauke, MHWS rise 5m while MHWN rise almost 3.8m; the mean sea level is 3m.

At the mouth of the river during March and April, the ebb current reaches a rate of 2 knots and lasts about 7 hours, the flood current runs for about 5 hours at a rate of about 1 knot. It is reported that the flood tide comes in three bores, which makes pilotage extremely difficult. Abreast the town, the current has attained a rate of 5 knots.

Semidiurnal tidal currents are felt along the coast, even by vessels out of sight of the land. A strong current runs up and down the coast following the tides; the flood setts SE and the ebb sets NW. The ebb current is stronger and of longer duration. The rate of current is about 2 knots.

Depths—Limitations.—There is a depth of 1.5m over the inner bar at low water. Most vessels enter the port just before HW.

There is an T-shaped concrete jetty at the town. A berth at its head is 74m long, with a depth of 4m alongside. Large ferries use this berth, in addition to other types of vessels up to 100m in length..

An oil terminal jetty is situated just N of the commercial pier. This pier, a T-headed jetty with dolphins, has a depth of 6m alongside. Tankers up to 90m long and up to 3,500 dwt have berthed at this dock.

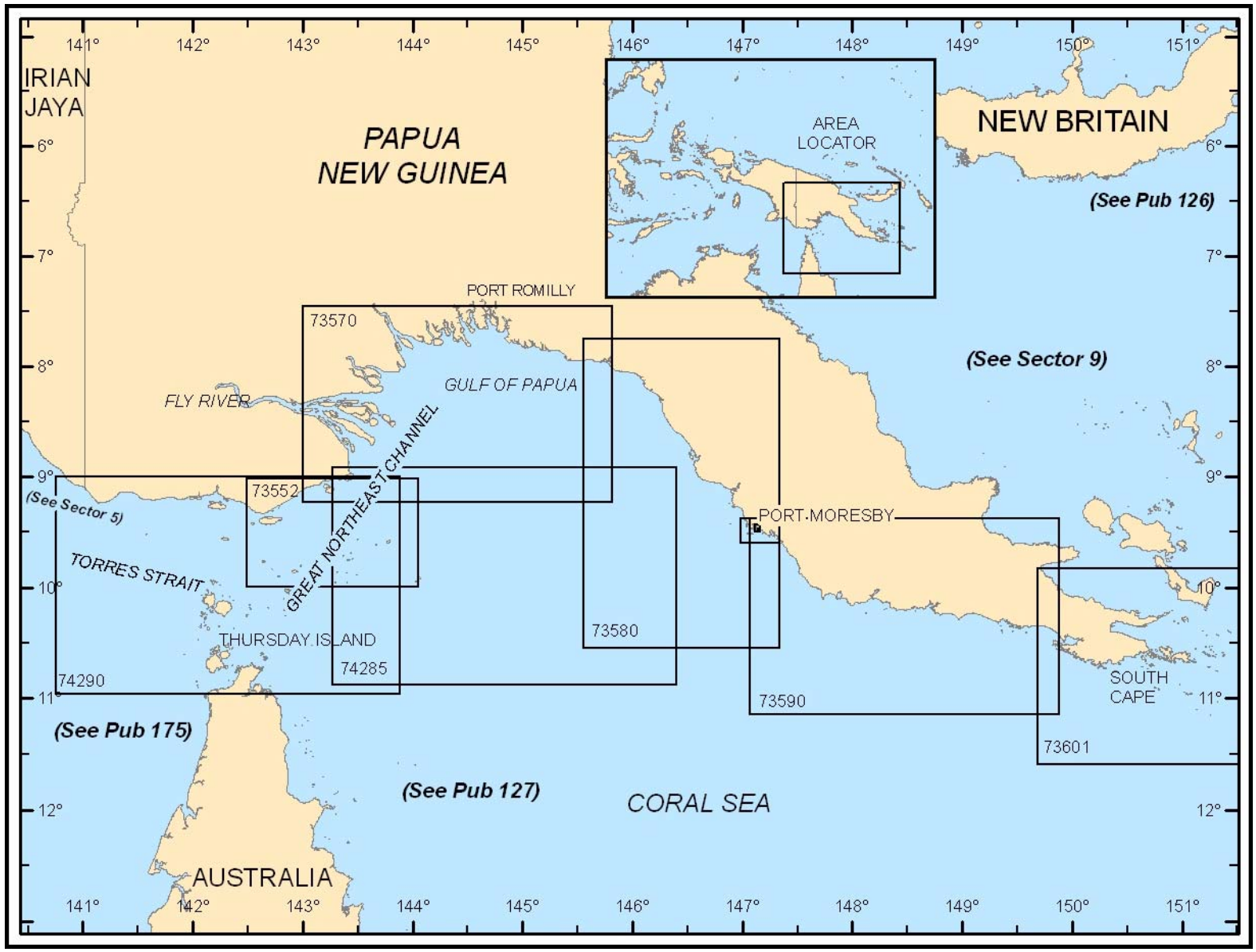
Pilotage.—The harbormaster is the pilot at Merauke and pilotage is compulsory for large vessels. Requests for pilotage should be made in advance by radio. Vessels without local knowledge are strongly advised to take a pilot because of the constantly changing positions and the lack of prominent features. Berthing and unberthing is restricted to daylight hours only.

Anchorage.—Anchorage can be taken, in 7m, in the middle of the river abreast of the town.

Directions.—It is not uncommon for vessels to ground on the bar approaching Merauke. Frequent fixes and constant soundings should be taken. In no case should the approximate 10m curve be crossed until the ship's position is definitely ascertained. Steer N until Tanjung Miambe Light bears 066°, then alter course to this bearing and steer in toward the light structure. The bar is subject to change and the buoys are relocated accordingly.

Between the Merauke River and a rounded point 19 miles to the SSE, the slightly receding coast is fringed by a sandy beach which dries in places to near 2 miles offshore. There are several small villages with coconut palms around them near the shore along this coast. The Bensback River, at the boundary of Irian Jaya and Papua New Guinea, is 55 miles SE of the Merauke River. The sandy beach continues along this part of the coast and is backed by cultivated low land.

A shallow bank extends 4.5 to 8.5 miles offshore along the coast between the Merauke River and the Bensbach River. A rock with a depth of less than 1.8m and a sandbank that dries 0.9m are about 8 miles SW and 6 miles SSW, respectively, from the rounded point in position 8°39'S., 140°33'E. A sunken rock is NW of the same point and 1.5 miles offshore. Outside of the bank there are depths of more than 5.5m. Because the coast is low and shoal depths extend so far offshore, it is difficult to get close enough inshore to make out the coast or the mouths of the rivers along it.



Additional chart coverage may be found in NGA/DLIS Catalog of Maps, Charts, and Related Products (Unlimited Distribution).

SECTOR **6** — CHART INFORMATION

SECTOR 6

SOUTH COAST OF PAPUA NEW GUINEA—THE BENSBACH RIVER TO SOUTH CAPE

Plan.—This sector describes the S coast of Papua New Guinea from its W limit, the **Bensbach River** (9°07'S., 141°02'E.), which is the boundary between Irian Jaya and Papua New Guinea, E to **South Cape** (10°43'S., 150°14'E.).

General Remarks

6.1 The coast from the Bensbach River to about 145°30'E, a distance of about 300 miles, is low, composed mainly of mangrove swamps, and fronted by shoals and reefs extending about 30 miles seaward. Navigable channels probably exist within this area, but until it is surveyed it should be avoided by strangers. The chart is the best guide to off-lying dangers.

Many little-known rivers, forming an immense delta with many creeks and mouths, are across the great plain along this stretch of coast. No entrance except for light-draft vessels has yet been found to any of these rivers, although the Fly River and the Aird River, the principal rivers, have deep and navigable channels inside the bars, and there may be a good entrance to the Fly River.

East of 145°30'E, the coast becomes gradually higher, and the water is, for the most part, clear of dangers as far as the vicinity of Cape Suckling, a distance of 90 miles, where the reefs begin. From this point to the E extremity of the Louisiade Archipelago, the coast is fringed with reefs forming barriers, within which there may be good anchorages, but because they have not been properly surveyed, they are mainly an impediment to navigation.

The Bensbach River to the Gulf of Papua

6.2 The **Bensbach River** (9°07'S., 141°02'E.) is navigable only by small craft. An extensive spit with depths of less than 5.5m extends S and SSW for about 25 miles from the river mouth. On this spit is a drying reef and several sand banks which dry up to about 1.2m.

The mouth of the Bensbach River is at the boundary between Irian Jaya and Papua New Guinea.

Shoalwater Point (9°14'S., 141°08'E.) lies midway between the entrance to the Morehead River and the Bensbach River. From Shoalwater Point a sand bank, which dries 1.8m on its outer end, extends 8 miles SE and 7 miles SSE.

Between the Bensbach River and Shoalwater Point, a sand bank which dries 0.9m, extends up to 5 miles offshore. Depths of less than 1.8m, with several drying sand banks, extend 18 miles SSW from the 0.9m drying bank. Tidal currents set WNW and ESE across the flat extending from this coast.

Caution.—A dangerous submerged wreck lies in an approximate position about 32 miles SW of Shoalwater Point.

6.3 From the Bensbach River, the coast trends E for about 15 miles to a low point marked by a clump of coconut palms then trends ESE for another 15 miles to Parliament Point, marked by a grove of tall mangrove trees. The open bight thus formed is Heath Bay. The water appears to be shallow for 5 miles or more offshore.

The Morehead River, navigable only by small craft, discharges at the head of Heath Bay. Anchorage can be obtained, in 7m, 8.5 miles SSE of the entrance to the river.

The coast between **Heath Bay** (9°10'S., 141°24'E.) E to the Talbot Group of islands is shoal up to 4 miles offshore. Beyond the shoal area are numerous reefs which extend up to 26 miles S of the shoreline between the Bensbach River and the Wassi Kussa River.

6.4 **Thompson Bay** (9°12'S., 141°46'E.), about 25 miles E of the Morehead River and between Walarter Point and Naguara Point, is fringed by a sandy beach on which are coconut palms and behind which is dense forest. The coast to the E is lined with mangrove. Walarter Point is easily distinguished by its red banks and coconut palms. This point can only be approached by small craft and boats can be landed here.

Deliverance Island (9°31'S., 141°35'E.), about 19 miles S of Walarter Point is about 0.3 to 0.9m high and covered with trees, the tallest of which are about 31m high. The island is surrounded with extensive reefs. There is anchorage S of the reefs about 4 miles E of the island. Another anchorage is 2 miles S of the island. The island abounds with turtles.

Kerr Islet, a sand bank on a reef 3.5 miles S of Deliverance Island, is covered with vegetation and has a conspicuous tree. A 3.6m shoal is about 3 miles ESE of the islet. A spit with a depth of less than 1.8m extends 2 miles N, a submerged rock is 3 miles WNW, and a 5.2m shoal is 3 miles SW, respectively, from the islet.

Shoals extend in an almost unbroken line from a position 5 miles NW of Deliverance Island to the W end of Boigu Island, but there appears to be a channel between these shoals and the shoal water fringing the shore of New Guinea.

The **Talbot Islands** (9°14'S., 142°10'E.) consist of one large island and six smaller ones. Boigu Island, the largest of the group, together with two small islands off its N side, are about 5 miles S of the entrance to the Maikussa River. The Kawai Islands, constituting the rest of the island group, are close off the entrance to the Wassi Kussa River.

6.5 **Boigu Island** (9°16'S., 142°14'E.) is 9.25 miles E-W and has a greatest width of 5 miles. The island, low and swampy, has a large cultivated patch near a village on its N side and two fishing stations are on the S side of the island. A bank of mud and rock that dries extensively and which has not been examined extends 5 miles offshore from the SW end of the island and 2 miles offshore elsewhere. West of the island there is foul ground up to 3 miles offshore from the mainland. A conspicuous tree is on the W side of the island.

A rock, witha depth of less than 1.8m, was reported about 3 miles ENE of the Boigu Island.

The channel between the Talbot Group and the shore should only be used with local knowledge. A drying reef 3 miles NW

of the N point of Boigu Island is marked by a beacon. A reef that dries is 4 miles W and another 5 miles WSW of the W end of the island. Red Sands, which dry at 2.7m and are subject to change, lie on the outer end of the unexamined bank which extends 5 miles WSW from Boigu Island.

The Wassi Kussa River and the Mai Kussa River are two arms of the sea surrounding **Strachan Island** (9°05'S., 142°08'E.). They unite 20 and 25 miles above their mouths; to that point they have depths of 9.1 to 18.3m. The approaches to the rivers have not been surveyed. The shores are generally mangrove swamps. Strachan Island is low, wet, and covered with mangrove and eucalyptus trees.

The coast from the entrance to the Mai Kussa River trends ESE for 24 miles to a point abreast the W end of Saibai Island; it is a low mangrove shore with low wooded country behind it. For the greater part this coast is fronted by a bank which dries for a distance of 0.25 to 1.5 miles offshore.

Bugi Village is on the mainland abreast Boigu Island and about 1.5 miles E of the entrance tot he Mai Kussa River.

Kussa Island is close offshore about 4 miles SE of the entrance to the Mai Kussa River.

A reef, awash, and a submerged reef are about 16 miles ESE of the entrance to the Mai Kussa River and about 2.25 miles offshore.

Dauan Island (9°25'S., 142°32'E.), about 16 miles SE of Boigu Island, is roughly triangular in shape; each side is about 1.5 miles long. The island rises to Mount Cornwallis, 259m high, near its center. A village is on the NE side of the island. Spring tides rise about 3.7m at Dauan Island.

A 2.7m depth is about 3 miles NE and a 4.5m depth is about 2.5 miles ESE, respectively, from Mount Cornwallis.

Phipi Reef (9°33'S., 142°36'E.) is awash, with Adrian Reef, which dries, 1.25 miles NW of it. Another drying reef lies 1.5 miles E of Adrian Reef.

6.6 **Saibai Island** (9°24'S., 142°42'E.), the W extremity of which is 2.5 miles E of Dauan Island, is 12 miles long E-W and has a maximum width of 3.75 miles. The island is mostly low and swampy, but a large portion of the NW side is under cultivation. The bank of mud, coral, and stones encircling the island dries up to 1 mile off at the W end and up to 3 miles at the E end of the island.

Saibai Village is on the NW side of the island and Churum Village is on the SW side. In the village of Saibai, there is a church and a mission. A radio tower is situated on the W side and a conspicuous tree stand 1.25 miles ENE of Saibai village.

Kauamag Island, close off the N shore of Saibai Island, is little more than a mangrove swamp. The channel between it and Saibai Island is nearly blocked at its E end.

Anchorage may be obtained for small vessels with local knowledge between the small island W of Kauamag Island in the middle of the W entrance to the channel separating the islands.

There is a channel 2 to 4 miles wide between Saibai Island and the mainland that can be used by vessels with up to a 3.6m draft with local knowledge. Some of the reefs in the channel are marked. The water is much discolored. North Reef, which lies 3.75 miles WNW of Saibai Village, dries and has foul ground extending 0.75 mile on the W and S sides. South Bank is located 1.5 miles WNW of Saibai Village and is marked by a beacon. There are two other drying reefs 1 mile NNE of the South Bank. The area 1 mile E of South Bank, about 0.75 mile N of Saibai village extending E to the N coast of Saibai Island was reported dry.

The area between Saibai Island and Warrior Reefs and for 20 miles S is unexamined.

Discolored water was reported to lie in position 9°28.2'S, 142°54.0'E. There is a 3m shoal 3.5 miles NW of this discolored spot.

The **Pahoturi River** (9°17'S., 142°45'E.) is entered about 6 miles NNW of the E end of Saibai Island. The approach to the river is obstructed by reefs and shoals but there is deep water in the river for many miles above the mouth.

Several islands at the mouth of the river include Paho, Marakara, and Sogeri. Foul ground with many rocks extend S of Marakara and a rock awash is about 2.5 miles ESE of that island. There is another rock, awash, 3.5 miles SSW of Marakara; a submerged rock, dangerous to navigation, lies 3 miles SSE of the same island.

Mabudauan Hill (9°16'S., 142°43'E.), on the W side of the entrance to the Pahoturi River, is high and covered with grass. It is the only elevation on the coast between the Fly River and the Bensbach River. A white concrete church on the S side of the hill is clearly visible when approaching from SE.

The Binaturi River is merely a creek that can only be used by boats. Villages are at the mouth of the river. Spring tides at the mouth of the river rise 3.6m.

6.7 The **Oriomo River** (9°03'S., 143°10'E.) is navigable for vessels of 3.0 to 3.6m draft for about 40 miles and it is approached from Daru Roads only. There is apparently no passage W of or between Bristow Island and Daru Island except for boats. A dangerous wreck which dries 1.2m is on a bank with depths of less than 1.8m, 0.75 mile S of the entrance to the river. There is another wreck, dangerous to navigation, SE of the above mentioned wreck, 0.5 mile N of Daru Island. A submarine pipeline crosses from the coastline to Daru Island 0.75 mile W of the Oriomo River entrance.

Bristow Island (9°08'S., 143°14'E.) is low, uninhabited, and covered with mangroves. It is about 15 miles E of the Binaturi River, 5 miles offshore, and connected by a shallow bank with Daru Island, which is between it and the mouth of the Oriomo River. Coral ledges front the E and S sides of the island. The island is marked by a light close E of the NE extremity of the island.

Daru Island (9°06'S., 143°12'E.), close NW of Bristow Island, is about 3 miles long on its N side and about 27m high. An aeronautical radiobeacon is situated on the N side of Daru Island, and there is an airstrip here. Daru Island is the administrative center for the W part of Papua New Guinea and has a population of approximately 8,000 people.

Daru Roads (9°15'S., 143°16'E.), with depths of 1.2 to 6.7m, is NE of Bristow Island and Daru Island. The approach is from the SE where there are irregular depths of 3.9 to 37m. Depths of 3 to 5.5m are between 2 miles E and 7 miles ESE of the NE extremity of Bristow Island.

Shoals with depths of 3.3m, 4.9m, and 3.9m are, respectively, 2, 5.25, and 6.75 miles SE of the light on Bristow Island and close SW of the recommended track through the road. On the NE side of the channel is the shallow flat lying SW of Bampton

Point, the S extremity of Parama Island. A narrow channel with a least depth of 3m in the fairway leads through Daru Roads to the entrance to the Oriomo River.

The channel is partly marked by beacons.

Directions.—A recommended track leads from a position 9.75 miles ESE of Bristow Island Light through Daru Roads on a course of 304.5° to a position 1.75 miles ENE of the head of the pier on Daru Island. The least known depth on this track is 5.5m. The 30m long pier has a depth of 3m alongside.

Narrow channels lead from the inner end of this track to the pier and to the entrance of the Oriomo River. There are depths of 1.8 to 5.5m in the former and a least depth of 3m in the latter.

The recommended track through Daru Roads should be approached on a course of 267° from a position 3.75 miles S of **Bramble Cay** (9°09'S., 143°53'E.) to the outer end of the inner track.

6.8 **Daru** (9°04'S., 143°12'E.) (World Port Index No. 53150) is on an elevation on the N side of Daru Island. It is the headquarters of a government official and there is a hospital.

The tidal range spring is 2.5m. Tidal currents are reported to run at up to 3 knots.

Missionary Passage, between Bristow Island and Warrior Reefs, has a least charted depth of 8.2m in the fairway. The N side of the passage is formed by the coral reefs extending about 13 miles SW from Bristow Island and terminates at Gimini Reef. Heavy rollers setting in during most of the year make approach to the passage dangerous. There are strong tidal currents in the passage which attain a rate of 5 knots at springs.

A wharf connected to the shore by a bridge and causeway totalling 340m in length is situated on the N side of Daru Island. At the head of the wharf is a berth 30m in length with a depth of 2.4m alongside. Smaller vessels berth on the W side of this area. A barge ramp is situated part way down the E side of the wharf.

Pilotage.—Pilotage is not compulsory. Pilots come from Port Moresby with at least 48 hours notice. The pilot boards about 2.75 miles ESE of the light on the E side of Bristow Island.

Anchorage.—Anchorage may be obtained in Daru Roads. Anchorage is also available N of the Government Station Jetty, mud of silt bottom. Small vessels can find anchorage W of the jetty.

A submerged rock, less than 1.8m, is about 11 miles WSW of Bristow Island.

6.9 **Parama Island** (9°00'S., 143°23'E.) is about 10 miles NE of Bristow Island. The passage between Parama Island and the mainland is about 0.25 mile wide and 1.8 to 5.5m deep. This island, on the S side of the S entrance to theFly River, is low and thickly wooded with trees as high as 61m.

A reef, with a probable depth of less than 1.8m, is about 7.5 miles S of Bampton Point, the SE point of Parama Island; submerged rocks are 5.25 miles SE and 7.25 miles SSE of the same point.

There is a mission station at Tetebe, on the E coast of Parama Island near the N end, and another at Gasiri, on the S side of the island.

Ellengowan Rock (9°00'S., 143°31'E.), with a depth of 1.1m, is 7 miles ENE of Bampton Point, the S extremity of Parama Island.

A drying reef of rocks and sand, over which the sea breaks heavily during the Southeast Trade Winds, extends 5 miles SSE from Bampton Point; the same reef extends farther SSE to Merrie England Shoals, with depths of less than 2m, 7.5 miles SSE of Bampton Point.

Bramble Cay (9°09'S., 143°53'E.), locally known as Massaramcoer, is a small islet 28.5 miles ESE of Bampton Point; it is about 3m high and surrounded by a drying reef, close around which are depths of 4.5 to 8.2m. The cay is marked by a light, with a racon, on a reef 0.25 mile to the NNW. Due to the proximity of the Fly River, strong and irregular currents may be experienced in the vicinity of Bramble Cay.

Black Rocks, the highest of which uncovers 1.2m at HW, is on a reef 3 miles SW of Bramble Cay. The passage between these rocks and the cay is clear.

The Gulf of Papua

6.10 The Gulf of Papua is between the entrance to the Fly River and Cape Suckling, 190 miles E. The N and W shores of the gulf are low except for Aird Hill, about 108 miles NNE of Parama Island, and the Saw Mountains, about 80 miles E of Aird At the Hill. There are no objects on the W or N sides of the gulf sufficiently conspicuous to serve as landmarks when approaching from S, therefore soundings are the best means of approach, especially for the W shore, where sand and mud flats extend a considerable distance offshore. The bars are composed of soft sand and the bottom outside of sand. Anchorage off the bars in SE weather is not good and there are always rollers in shallow water. Good anchorage can be obtained during the Northwest Monsoon when a vessel can feel its way on soundings. There is a lot of floating timber and logs are often encountered between Bramble Cay and the mouth of the Fly River and E across the gulf. Discolored water extends about 30 miles offshore.

For the most part, the coast is slightly higher than the land behind it, which is low and swampy for a distance of 10 to 20 miles or more inland, not rising above sea level. This swampy country, covered with mangrove, nipa palm, and sago, is being gradually raised by the combined action of crabs who build hollow towers. These foundations are filling in with silt deposit from the rivers.

From Parama Island to the Aird River entrance, 95 miles NE, the monotonous shoreline has no landmarks. It is wooded to the water's edge, with trees 30 to 46m high. In this area, the Fly River Delta deposit forms a continuous series of mudflats and banks of hard, fine sand with outer edges having depths of less than 5.5m extending 3 to 20 miles offshore. These mud flats extend farthest from the shore about midway between Parama Island and Cape Blackwood, 96 miles NE.

On the E side of the gulf, the land rises to lofty mountains, contrasting strikingly with the low level country to the W. Of the mountains, the Owen Stanley Range, which can be termed the backbone of the SE part of New Guinea, is an almost continuous chain extending from position 7°55'S, 146°25'E for about 300 miles in an ESE direction, terminating near East Cape, the E extremity of Papua New Guinea, culminating at Mount Victoria, 4,036m high, about 57 miles E of Cape Suck-

ling.

There are mission stations at Geav and Sui, on the coast about 2 and 6 miles, respectively, N of the N point of Parama Island.

In clear weather when within 25 or 30 miles of land, the interior mountains, about 1,829m high, with three peaks on the W part, will be seen. The two E peaks, about 35 miles NE of Aird Hill, are very rugged. Nearing the land it is easy to know if the vessel is E or W of Maclatchie Point because, to the W of Flat-Top Hill and Woody Hill NNW of the point, there is no high land, and the land near the coast is low and flat. Toward the head of the gulf, off the Fly River and the Aird River, the land is so low it cannot be seen 6 or 7 miles offshore. Discolored water and mud bottom may be considered a certain indication of the approach to shallow water.

Tides—Currents.—Spring tides rise 4.2m and neap tides rise 3.1m on the flats fronting the W shore of the Gulf of Papua.

Near the head of the gulf, the flood sets NW toward the rivers at a rate of 2 knots at springs, and at the ebb in the opposite direction at the rate of 3 knots.

Directions.—In approaching the head of the Gulf of Papua from S it is advisable to approach the area of **Maclatchie Point** (7°57'S., 145°25'E.) on the E side.

Caution.—Charts in the Gulf of Papua is not based on adequate surveys and uncharted dangers may exist. Tidal bores may occur on the main rivers at spring tides.

Throughout the bay, there are unsurveyed areas, of which no hydrographic survey has been conducted and accordingly, mariners attempting to enter this area should proceed with extreme caution as unidentified shoals, reefs, and other navigational hazards may exist.

In the various inadequately-surveyed areas, mariners are warned to exercise care within the areas indicated. These areas are not based on adequate hydrographic surveys and uncharted dangers may exist.

During the height of the Southeast Monsoon, there is a dangerous lee shore, with heavy surf breaking on it. The sea breaks in depths of 7.3m.

The Fly River Delta to the Aird River Delta

6.11 The estuary of the Fly River is approximately 50 miles wide at its entrance, between **Korimoro Point** (8°13'S., 143°43'E.) on the E end of Dibiri Island to the N and **Parama Island** (9°00'S., 143°25'E.) to the S, but only 7 miles wide abreast **Kiwai Island** (8°37'S., 143°29'E.), which may be considered as being the river mouth. Above this island the river gradually contracts to a width of 1 mile or less.

The estuary is studded with low and swampy islands covered with mangrove and nipa palm. There are villages and cultivated areas on these islands. The land on both sides of the estuary is of the same character.

The Fly River, perhaps the largest river in New Guinea, is of great importance as a means of reaching the interior. From the bar S of Dibiri Island, the river is navigable in depths generally greater than 4m (1981) for at least 458 miles to the mining town of Kiunga. For approximately 90 miles the Fly River forms the boarder between Papua New Guinea and Irian Jaya.

Winds—Weather.—The climate in the vicinity of the Fly River is good. There are considerable thunderstorms. Daytime temperatures have been reported to be 24° to 32°C; night temperatures have been reported to be 22° to 24°C.

The Fly River

The islands in the estuary are flat and are covered with a thick, fertile alluvial soil. The largest islands are Kiwai, Mibu, Purutu, Aibinio, and Wabuda.

Tides—Currents.—The tidal currents in the approach to the river are very strong and irregular, especially during the Northwest Monsoon and at the change of seasons.

Springs rise 3.7m close seaward of South Entrance.

Aspect.—There are depths of 7.3 to 9.1m in the mouth of the river, but extensive flats in the approach to the estuary limit the draft of vessels until more extensive surveys are made and a proper channel found. Charted positions of shallow places are doubtful and should not be relied on.

It has been said that vessels with a draft of not more than 4.2m could enter the river by sending a boat ahead to make soundings.

Historically, a steamer with a draft of 1.8m has ascended the river for a distance of 150 miles,; a launch with a draft of 1.1m has ascended about 500 miles upriver, where rapids prevented further progress.

Returning to the entrance, the channels on either side of the Kiwai Islands are known as North Entrance and South Entrance, and the pass close along the W shore is known as Neva Pass. The approach N of Wabuda Island although wide is marked by heavy rollers apparently indicating shallow depths.

6.12 Umuda Floating Terminal (8°40'S., 141°01'E.) is situated 17 miles SE of Umuda Island, in the outer part off the Fly River delta. The terminal consists of a 45,000 grt storage vessel secured to an SPM. Copper ore concentrate is shipped down the Fly River via barges and is stored in bulk onboard the floating terminal for transhipment.

Pilotage.—Pilotage is not compulsory; there is no pilot boarding area in the immediate vicinity of the terminal. Pilots may be provided by arrangement with Queensland Coast or Torres Strait Pilot Associations.

6.13 Kiwai Island (8°37'S., 143°29'E.), the largest island, separates the North Entrance and the South Entrance of the Fly River. The island is about 30 miles long and averages 2.5 miles wide. The island is well wooded and only a few meters above water. The chief village, Iasa, has a mission station and is on the S side of the island. Sumai village is on the same side of the island and 15 miles farther NW. Doropo village is about midway along the N side of the island. At the E end of the island are other small villages.

Wabuda Island, on the N side of the estuary, and Domori Island, on the mouth of the river above Kiwai, are apparently the only other inhabited islands.

The inhabitants of the Fly River delta engage in agriculture and hunting. Coconut palm, breadfruit, plantain, sago palm, and sugar cane are grown.

6.14 The **Bamu River** (8°09'S., 143°42'E.) is separated from the N mouth of the Fly River by a long, low peninsula whose shores are covered with mangrove and nipa palms backed by dense forests with occasional cultivated places.

The estuary of the river, about 8 miles wide, is encumbered with large, low, swamp islands covered with mangrove and nipa palms. These islands divide the estuary into three channels, with charted depths of 1.7 to 6.2m, but the approach to all of these channels is over a shallow flat extending 20 miles to seaward which is reported to break in places; consequently, until the river is surveyed, it can be entered only by small craft with local knowledge. Vessels able to cross the bar apparently can ascend the river for many miles.

Naviu Island and Aramia Island are the two largest islands in the estuary. There are some villages on the various islands and on the river banks.

The current in the river is said to have a maximum rate of 6 to 8 knots when the river is in flood. Spring tides rise 4.2m; neap tides rise 3.1m. The river is subject to bores.

The **Gama River** (8°01'S., 143°54'E.) empties into the sea about 10 miles E of the northernmost mouth of the Bamu River. The submerged and uninhabitable coast between the mouths of the river are covered with mangroves. The river is nearly 1 mile wide at its entrance and is fronted for a distance of 2.5 miles by extensive sand and mud flats with depths of 0.9 to 1.8m with 1.5m over the bar, which limits its use.

Bell Point (7°58'S., 143°55'E.) is E of the mouth of the Gama River. The coast here, covered with sago and coconut palms and along which there are several villages, turns sharply to the N, forming the estuary to Turama River.

The estuary of the Turama River is about 20 miles wide. Morigio Island and Neabo Island, which are large thickly-wooded islands, divide the estuary into three channels. All of these channels are probably fronted by shallow water and therefore, until properly surveyed, should only be used with local knowledge.

Historically, the river has been ascended, probably by small craft, for a distance of 80 miles. Numerous villages are on the banks of the river. The river has strong tidal currents and is subject to bores dangerous to small boats.

Goaribari Island (7°47'S., 144°14'E.), about 5 miles in diameter, is in the approach to the Omati River. The island is covered with tall mangrove and is barely above HW. There are several villages on the island.

South of Risk Point, the E extremity of the island, is a sand bank which nearly dries at LW and extends nearly 3 miles off the SE side of the island and about 1 mile NE from Risk Point.

A bank with a least depth of 4.5m is 13 miles S of Goaribari Island.

The Omati River, emptying into the sea N of Goaribari Island, is about 1.5 miles wide at its entrance. The river has depths of 0.9 to 3.6m, but much less in its approach. Several villages are on the river banks; some are on land barely above HW and are built on piles.

The Aird River Delta

6.15 The several mouths of the Aird River are on either side of Ibibubari Island.

Cape Blackwood (7°46'S., 144°30'E.), the SE extremity of the island, is about 12.5 miles E of the E extremity of Goaribari Island. The island, about 12 miles long and 2 to 3 miles wide, is barely a few feet above water and is covered with tall mangrove and trees. Cape Blackwood was reported to lie 1.9 miles further SE than charted. There is only one small village on the W side.

Between Goaribari Island and Ibibubari Island are the Newberry River, the Aird River, and the Nakari River mouths, while to the E are the wider mouths of Bevan Sound and Paia Inlet. There appear to be average depths of about 3.6m, with shoals in places in all these rivers, which are simply water channels through mangroves with only very little dry land anywhere. The depths apparently shoal gradually from S toward Cape Blackwood, but shoals with depths of less than 5.5m extend SE from the cape for 10 miles.

The three rivers mentioned above are joined about 30 miles above the mouth, at which junction the river is known as the Kikori River.

Historically, a steamer of unknown but probably shallow draft entered the Aird River by the Nakari Mouth and found the tidal effect ceased at a small village above Aird Hill. The steamer ascended the river about 25 miles and was stopped by a series of rocky bars. A boat ascended farther upriver to a point about 87 miles above Cape Blackwood. The upper waters were found to be obstructed by rapids. The steamer returned via Bevan Sound finding good depths as far as Deception Bay. The exploration took place in March, with generally fair weather during the day but only a few dry nights. The winds were W and N; the temperatures during the day ranged from 28° to 29°C.

Kumul Marine Terminal (8°00'S., 144°06'E.), a production platform with an SBM buoy situated about 2 miles further S, is enclosed by a cautionary area. A pipeline connected to the

shore leads NW from the platform. A light, with a racon, is shown from the terminal.

Depths—Limitations.—The tanker terminal has been designed for use by tankers from 60,000 to 150,000 dwt and for partially-loaded ULCCs up to 300,000 dwt. Draft is restricted to 17.1m.

Pilotage.—Pilotage is compulsory. The vessel's ETA should be sent 72 hours, 48 hours, and 24 hours in advance. The pilot boards in the anchorage area 1.5 miles S of the SPM.

Anchorage.—Anchorage for tankers is situated 2 miles S of the SBM buoy and a cautionary area, radius 5 miles, centered on the production platform, within which vessels should avoid navigating, anchoring, or fishing, has been established as shown on the chart.

Caution.—Mariners risk prosecution if they anchor or trawl within 10 miles of a pipeline and so damage it. Gas from a damaged pipeline could cause a fire or loss of a vessel's buoyancy.

Depths have been reported to be less than charted in various areas of the bay.

6.16 **Aird Hill** (7°27'S., 144°21'E.), about 23.5 miles above Cape Blackwood, is a steep limestone hill about 331m high.

Bevan Sound (7°45'S., 144°30'E.), the most direct route for Aird Hill, is practicable for a vessel with 4.5m draft; however, there are numerous sand banks in the sound.

Deception Bay, between Bald Head on the E and Ibibubari Island on the W, is about 15 miles wide and fronted by flats with depths of less than 5.5m for a distance of 10 miles. Little is known about the W side of the bay, which derived its name from its deceptive appearance as a deep entrance to a safe navigable river, which it is not. Numerous streams discharge into the bay, the more important of which are Paia Inlet, Era Bay, and Port Romilly. The islands separating these bodies of water are all low, swampy, and covered with mangrove and nipa palms.

The point on the E side of Paia Inlet has coconut trees and a sandy beach. A vessel passing through the inlet for a distance of 5 miles found a least depth of 9.1m; a vessel with a draft of 1.8m ascended to the junction with the Aird River at the foot of Aird Hill. At 20 miles up it was 91m wide and had a tidal rise of about 2.4m.

During the Southeast Monsoon, anchorage can be taken near the entrance to Paia Inlet.

The channel into Era Bay leads E of **Gully Bank** (7°47'S., 144°44'E.), a drying sandbank, 7.5 miles W of Bald Head and in mid-channel. The sand bank can be passed on either side. A depth of 5.5m can be carried through the channel. There is deep water and ample room within Era Bay. There are indications of a channel leading into Iviri Inlet, W of Bapai Point, about 7 miles NNW of Bald Head.

6.17 **Port Romilly** (7°42'S., 144°48'E.), on the E side of Deception Bay, is entered between Bapai Point and Mira Point, about 5.5 miles SE. A spit, with depths of less than 5m and with a shoal on the outer end of which the sea breaks, extends about 7 miles S of Bald Head. The main approach channel is W of this spit. Steer about 000° with Bapai Point ahead, then, shortly before Bald Point is abeam, alter course to 025°; this leads across a flat with depths of about 4m into Port Romilly. Inside the entrance the depths are greater, the channel narrowing between the sand banks on either side; then it extends N and becomes wider and provides ample anchorage space for any vessels able to enter the port.

Another channel, with a depth of about 2.7m skirts the coast between Bald Head and Mira Point. It was said that this channel was shoaling and changing.

Port Romilly connects with the Wame River; historically, a vessel with a draft of 2.7m ascended the river for a distance of about 20 miles above Bald Head.

Anchorage can be taken in Port Romilly between **Plum Point** (7°40'S., 144°49'E.), on the W side of the entrance 3 miles N of Miri Point, and Wami Point, 5 miles farther N. During the Southeast Monsoon, during which there is considerable swell, vessels should use the N part of the anchorage, but during the Northwest Monsoon it is not necessary to go so far up. The holding ground is good. Tidal currents in the anchorage attain a rate of 3 to 4 knots.

The **Baroi River** (Varoi River) (7°48'S., 144°58'E.) is entered 5 miles E of Bald Head. Historically the river has been explored by a vessel drawing 1.8m for a distance of 80 miles above the mouth.

Directions.—In approaching Deception Bay or any portion of the coast between it and Parama Island, to the W of the Fly River, soundings are the only safe guide because the water almost always shoals gradually toward the banks fronting the coast.

6.18 The delta of the Purari River (Purari Delta) is made up of all the streams emptying into the sea between Bald Head and the Alele Passage mouth of the Purari River, a distance of about 23 miles to the ESE. The Purari River proper is the easternmost and main mouth. Its estuary, about 3 miles long, is divided by an island into two mouths, Alele Passage and Aivei Passage, which connect 4 miles above their mouths. The points on both sides of the entrances to these passages are fronted by shoals to a distance 1 mile or more. During the Southeast Monsoon the sea probably breaks across the mouth of each passage. The passages can be used only by small boats and then with local knowledge.

Anchorage may be taken in Alele Passage, in a depth of about 7.3m.

A mission station is on **Urika Island** (7°48'S., 145°01'E.), in the mouth of the Urika River, about 12 miles W of Alele Passage.

Orokolo Bay (7°53'S., 145°18'E.) lies between the mouth of the Purari River and Maclatchie Point. The bay is about 12 miles across and has several villages on its shores. It has moderate depths and is clear of dangers. The highest land around the bay is near the easternmost village. About 1.5 miles N of the village there is a flat hill, 61m high. There is a missionary station at Orokolo village.

The **Vailala River** (7°57'S., 145°24'E.) entrance, just W of Maclatchie Point, has about 1.8m over its bar; a bank extends about 1 mile off its E point. Local knowledge is necessary to cross the bar; at times it is dangerous even for boats. There are villages on each entrance point and coconut groves near the mouth of the river. The river has been explored by small craft to 100 miles above the mouth.

Maclatchie Point to Port Moresby

6.19 Maclatchie Point (7°57'S., 145°24'E.), the SE continuation of the E entrance point to the Vailala River, is low but is the most prominent point in the vicinity. Vessels coming from SW will see the flat and wooded hills over this point. The hills are remarkable because they are the westernmost limit of the highland in this vicinity; between them and Orokolo Bay the land is marshy and only a few feet above HW.

A shoal which sometimes breaks is 4 miles SSE of Maclatchie Point, and shoals extend 1 mile WNW from this shoal; otherwise the surrounding depths are more than 8.2m.

A 1.5m shoal, is 4 miles W, and another shoal 3.6m 13 miles SW of Maclatchie Point.

Other shoals are 10.3m 10 miles ESE, and 15.7m 12 miles S, respectively, from Maclatchie Point.

The coast between Maclatchie Point trends E for about 19 miles to Kerema Bay, into which the Matupe River discharges. The Kea River, a small river, empties into the sea about midway along this stretch of coast, and a bold bluff with a ledge of rocks extending nearly 1 mile S from it, is about 7 miles E of the mouth of the Keuru. A dangerous breaking shoal is reported about 2.25 miles SW of the entrance to the river. There are some isolated hills 3 to 14 miles N of the bold bluff.

Kerema Bay (7°58'S., 145°45'E.), the estuary of the Matupe River, is large but almost blocked by sand banks. There is a small boat passage along the W shore and a narrow channel between the banks. Rollers are prevalent with onshore winds. The bar is bad and shifting. There is a wreck, dangerous to navigation, just offshore of the village of Kerema. An aeronautical radiobeacon is S of the village. A depth of 14.8m lies about 10 miles SW of the radiobeacon.

Keauna Hills (8°00'S., 145°48'E.), 254m high, about 3 miles E of Ipisi Point and N of Cape Cupola, are prominent. The Nabo Range, about 1,219m high, is 12 miles N of these hills. The Albert Mountains, about 2,134m high, are E of the Nabo Range.

6.20 Cape Cupola (8°02'S., 145°50'E.), the S extremity of the Keauna Hills, is a bold headland; E of the cape there are coastal hills ranging from 61 to 91m high and extending nearly to Karova Creek, 8.5 miles to the E. On the E side of the creek is Karama mission station.

A radio tower is reported to stand on the coast about 1 mile NW of the Cape Cupola.

From Karova Creek the coast trends 10 miles to the SE to Mopu Inlet. **Port Chalmers** (8°08'S., 146°06'E.) is about 1.75 miles SE of the Mopu Inlet. This coast is lower and more heavily wooded than that to the W and is backed for a few miles by a range of moderately high hills.

Freshwater Bay is a bight off Mopu Inlet. Vessels have anchored 1 mile outside the bar.

Alice Mead Lagoon (8°08'S., 146°05'E.), N of Port Chalmers, has a good anchorage for small vessels, in a depth of 3.6m, but there are no marks and local knowledge is necessary despite easy entry. Port Chalmers is a small inlet with a depth of 2.7m.

Several villages and coconut groves lie along this stretch of coast. The country N of Freshwater Bay is very hilly; the Saw Mountains, 771m high, are 17 miles N of Port Chalmers.

The delta of the Tauri River and the Lakekamu River, about 4 miles long, is made up chiefly of mangrove swamps. The mouths of the rivers are apparently barred at times during strong winds but are available for small boats other times.

The Narutu River, 4.5 miles SE of the Lakekumu River, is apparently barred at some times like the other rivers along this coast. Some low hills back the coast for the next 10 miles SE.

The Biaru River can be ascended only by boats and has been explored for 25 miles above the mouth.

Iokea is a mission station on the coast about 3 miles S of the mouth of the Biaru River and Oiapu village is 7 miles farther SE.

Between Iokea and Cape Possession, the coast, trending SSE for 12.5 miles, is bolder and is backed by a ridge of rather high hills that rise abruptly from the shore. The coast near the cape consists of cliffs and valleys. One Tree Hill and Northwest Hill are NE and SE, respectively, from Iokea and Wedge Hill is E of Oiapu. Between Wedge Hill and Cape Possession is peaked and well-defined Clump Hill. The S portion of the coast is fronted by a reef extending offshore for about 1 mile. This reef breaks at LW.

6.21 Cape Possession (8°35'S., 146°23'E.) is a bold point forming the S end of the coastal range mentioned above. The water is deep off Cape Possession, but closer in no soundings have been taken. There is heavy surf at times, as there is along the entire coast between this cape and Parama Island.

Tides—Currents.—For a distance of 10 to 20 miles offshore between Cape Blackwell and Cape Possession the flood and ebb current were found to set nearly W and E, respectively, following the general direction of the coast at a rate of 2 to 3 knots.

The SE portion of Papua New Guinea E of the Gulf of Papua rises to lofty mountains, contrasting very strikingly with the low level country to the W. Of these mountains the Owen Stanley Range, which may be termed the "backbone" of this part of Papua New Guinea, extends as an almost continuous chain from Mount Victoria to the head of Milne Bay.

6.22 Mount Victoria (8°55'S., 147°33'E.), 4,036m high and the summit of the Owen Stanley Range, about 72 miles ESE of Cape Possession, is remarkable for its square top and unmistakable height; a sharp ridge descends from it SW towards the sea.

Ten miles NW of Mount Victoria there is a sharp slope from this lofty mountain chain where there is a joining of two ranges of less height; one of these extends SW for about 25 miles to Redscar Bay and the other trends NW for about the same distance at a much greater elevation. Mount Cameron, the highest point in the latter range, is 2,216m high at its SE end.

Mount Yule (8°12'S., 146°47'E.), 33 miles NE of Cape Possession, is a remarkable table-topped mountain, 3,275m high, the crowning summit of a detached portion of the Owen Stanley Range; the dividing gap in the range is a deep valley about 20 miles S of Mount Yule. This mountain has been seen at a distance of 117 miles. The country between this mountain is hilly but apparently fertile.

The coast for the first 9 miles SE of Cape Possession is a sandy beach backed by wooded hills. Between these hills and the shore is a strip of level land with several villages backed by

a continuous forest of coconut palms extending to the base of the hills.

From the end of the beach to Au Point, 4 miles farther E, the land is very low and covered with dense jungle. Very few soundings have been taken off this part of the coast.

South of Cape Possession to Au Point, for about 13 miles, the coast is thickly populated. The principal villages are Kevori Poe and Maiua, which are mission stations.

Au Point (8°46'S., 146°31'E.), the NW end of Hall Sound, is low and sandy; the ground is swampy and covered with mangrove trees. Pinupaka Village, a mission station is 0.5 mile N of the point. A depth of 16.5m is reported to lie about 11 miles W of the point. About 3.5 miles NW of the 16.5m depth, a depth of 10m has been reported (1993).

6.23 Yule Island (8°50'S., 146°32'E.), the N end of which is about 1 mile off Au Point, fronts Hall Sound. The island is 4.5 miles long NW-SE and 0.5 to 1.75 miles wide. It has many peaks the highest of which is 1.75 miles from the S end of the island and is 160m high. The hills slope gently to the sea. The N end of the island is wooded, but there are many clearings with clusters of huts at the S end. There are several caves along the coasts of the island.

The seaward side of Yule Island is fronted by a moderately steep-to reef varying from 0.2 mile to 1 mile off. The inner side of the island, within the entrance to Hall Sound, is clear of reefs, with the depths shoaling gradually toward the shore of the island.

Anchorage.—Good temporary anchorage may be taken about 1 mile W of the N end of Yule Island, in a depth of 18.3m, mud.

A conspicuous white house stands close N of Maura Point.

Caution.—Depths of 14.6m and 7.4m lie about 11.5 and 4.75 miles W, respectively, of Maura Point.

6.24 Chiaria (Tsiria) (8°49'S., 146°31'E.), a village, is on the W side of Yule Island and a mission station is between the village and Maura Point. The climate on the island is considered to be less healthful than that on the mainland.

Hall Sound (8°50'S., 146°34'E.), E of Yule Island, affords sheltered anchorage, in 7.3 to 21.9m, mud, good holding ground, and is available to all types of vessels. The S entrance, S of Yule Island, is 1.5 miles wide but is reduced by reefs on both sides to 0.75 mile, with depths of 22 to 44m in mid-channel. The water in the channel is frequently so turbid that the reefs cannot be seen.

The N channel is 0.5 mile wide between the mud flat of Au Point and the reef extending N from the N end of Yule Island. There is a least depth of 2.7m in the fairway of this channel.

Musgrave Reef (8°53'S., 146°31'E.), 0.5 mile long, has a least depth of 4.9m near its S end, 2.5 miles SSW of Mauru Point. The reef is directly in the approach to the S entrance to Hall Sound.

Reefs extend 0.8 mile into the S entrance from Kapripata Point, a grove-covered point on the mainland S of Yule Island. Reefs also extend into the passage from the hilly point N of Delena Village, which is nearly 2miles NE of Kapripata Point. An 11m shoal lies about 6.25 miles W of Kapripata Point.

Mauru Mauru Reef (8°51'S., 146°33'E.), on the N side of the S passage into Hall Sound, is the S part of an extensive reef projecting out from the W coast of Yule Island.

The E shore of Hall Sound is a mangrove swamp into which the Bioto River and the St. Joseph River discharge; it is fronted by an extensive drying mudflat that makes the rivers accessible to boats and then only at half-flood to half-ebb. The depths shoals gradually toward this flat.

A cable area is abreast the S entrance to Hall Bay. Anchorage is prohibited in the area.

6.25 The **St. Joseph River** (8°48'S., 146°34'E.), emptying into Hall Bay, has depths of only 1.5 to 1.8m at HW. The Bioto River, also emptying into the sound has a depth of 2.7m and is narrow.

Tides—Currents.—In Hall Sound, springs rise 1.5 to 2.1m and neaps 0.6 to 0.9m. In the S entrance to the sound the flood runs NE at a rate of 1 knot and the ebb at a rate of 1 to 2 knots.

Directions.—To avoid Musgrave Reef when approaching Hall Sound from the N ,steer for Naruru Hill, 219m high and the N high peak of the range on the S side of the S entrance, bearing 106°; then, when the E extremity of Yule Island bears 025°, change course to 039° and continue on that course through the fairway into the sound.

Vessels coming from the S should steer for the W extremity of Yule Island bearing 350°, passing between Musgrove Reef and the shore reef that extends out abreast Kapripata Point. When the SE extremity of Yule Island bears 025°, steer for it until Naruru Hill bears 106°, then steer 039° up the fairway into the sound.

The reefs make night entry into the sound dangerous.

There are several villages in the Hall Sound area including the mission station Delena Village, on the S side of the S entrance to the sound.

6.26 Cape Suckling (9°02'S., 146°38'E.) lies about 12 miles SSE of Hall Sound; the intervening coast is backed by a range of hills 152 to 213m high. Mount Ripachina, 229m high, is the highest peak in the N portion and Mount Boria, 223m high and 2.5 miles NE of Cape Suckling, is the highest peak in the S portion. The latter part of the range consists of sand hills covered with scrub. The cape is low, gradually rising to Mount Boria, which, with Mount Kupata, at the termination of the range, serves to identify the cape. Mount Lolopata, 261m high and 8 miles NNE of Cape Suckling, is also a prominent landmark.

When the rivers are in flood, there are often large quantities of driftwood in the open sea off this coast and the sea has a muddy discolored appearance.

A 9.1m coral shoal is about 5.5 miles W of **Gubbins Point** (8°57'S., 146°34'E.); two shoals of 4.5m and 4.9m, respectively, are within 0.6 mile W of the same point. An 8.2m shoal is about 1.5 miles offshore, 2.5 miles S of Gubbins Point. A shoal with a least depth of 6.4m is about 1.5 miles WSW of Cape Suckling.

Pike Shoal, with a depth of 8.5m, coral, is 2.5 miles S of Cape Suckling. Two shoals, with depths of 7.3m and 9.1m are 3.75 and 4.5 miles, respectively, SE of Cape Suckling and about 2 miles offshore.

From Cape Suckling,the coast trends ESE for about 16 miles to Redscar Bay; the first 8 miles of this coast is fronted by a coral reef extending 0.5 to 1 mile offshore.

6.27 The **Aroa River** (9°04'S., 146°48'E.) discharges about 11 miles from the cape; its mouth is apparently dry at LW.

Kekeni Rocks, three in number and the highest of which is 21m high, are 1.75 miles S of the entrance to the Aroa River on the W part of a drying reef and are nearly connected with the shore flat. These rocks, showing against the low mangrove swamp at their back, are conspicuous from seaward.

Redscar Bay (9°09'S., 146°50'E.) is between Kekeni Rocks and Lagava Island, 11.5 miles to the SE. The shores of the bay are low, swampy, and thickly wooded. A light is shown from Redscar Head.

A 9.1m shoal has been reported 4.7 miles 312° from Varivari Island; the position of this shoal is doubtful. An 11m shoal is located about 9 miles WSW of Kekeni Rocks; a 9m shoal is located 12 miles SW of Kekeni Rocks. An 7.4m shoal is located about 14 miles W of Varivari Island and another shoal is reported about 16 miles WNW of the same island.

6.28 Galley Reach (9°07'S., 146°35'E.), which goes through the bar across the estuary into which the Vanapa River and other rivers discharge, is at times dangerous to boats and, being formed by the deposit brought down by the rivers, is liable to shifting. A depth of 1.8m may be found in the channel over the bar at LW. Abreast of Manumanu there are general depths of 6.1m and possibly more in Galley Reach, which is bordered by mangrove swamps.

Anchorage.—A submarine cable extends from Manumanu to the opposite shore. Anchoring or fishing is prohibited within 0.25 mile of the cable.

Directions.—Renge beacons are at Manumanu Village, and in line bearing 048°, lead across the inner end of the bar. There is a conspicuous tree on the coast about 1.5 miles W of the beacons. Vessels with local knowledge can cross the bar with the conspicuous tree bearing 359° until the beacons are in line; then they should be kept in line for about 1.25 miles. The track over the outer part of the bar leads between two reefs, about 0.3 mile apart, upon which the sea almost always breaks.

6.29 The Vanapa River drains a large part of the Owen Stanley Range and discharges into the sea through Galley Reach. The river junction with the reach is hidden by mangrove. The river has been ascended by boat for about 40 miles and found to be a rapid stream with numerous snags and boulders. Thr Laloki River also enters Galley Reach from the SE.

There is a mission station and a sawmill at Manumanu village on the S side of the entrance to the Vanapa River. There are also several villages in the clearings hidden from the river and are several rubber plantations at the head of Galley Reach.

The coast between Galley Reach and Lagava Island, 9 miles to the S, is low and swampy.

Lagava Island (9°17'S., 146°55'E.), at the SE extremity of Redscar Bay, is about 2 miles long and 0.5 mile wide; it attains a height of 110m near its center and is very conspicuous. The W extremity is a bold point rising to a hill with cliffy patches on its S side. The island is on a coral reef extending 0.3 mile from its W and SW sides; it is connected to the shore by a mangrove swamp.

6.30 Varivari Island (9°15'S., 146°53'E.), about 2 miles NW of Lagava Island, is about 0.5 mile long in an E-W direction and has at its S and W extremities two peaks, respectively, 35 and 43m high. These peaks, connected by a strip of low land, appear as two islets from a distance. The island is on a reef extending 0.3 mile NW and SE from it and to a lesser distance elsewhere. Two rocks, one of which is 28m high, are on the S part of the reef.

Several small unimportant rivers discharge through the mangrove swamps into the bight E of Varivari Island.

Anchorage.—Redscar Bay is an exposed anchorage during the Southeast Trade Winds. Vessels should not anchor in less than 18.3m and Kekeni Rocks should not bear less than 329° if in the N part of the bay. Better anchorage may be obtained, in about 10m, mud and sand, with the 77m hill on Lagava Island bearing 151°, distant 0.85 mile, with shelter during the SE trades; smaller craft may anchor closer inshore. There is considerable swell here in the Northwest Monsoon but by anchoring in the lee of Varivari Reef, fair shelter might be obtained, in a depth of about 21.9m, from 0.2 to 0.3 mile from the reef.

Caution.—Approaching Varivari anchorage or Caution Bay, to the S, a good lookout should be kept aloft when nearing the edge of the barrier reef because soundings taken in the area are very scattered. This caution applies equally to other parts of the reef.

6.31 Darebo Hill (9°16'S., 146°57'E.), 2.5 miles E of the summit of Lagava Island, is isolated and rises abruptly from the low land to a height of 160m; from the S it appears wedge-shaped, but from the N and W it has a rounded appearance.

From Lagava Island, the coast trends E to the Lealea River and then S to Boera Head, forming Caution Bay, which has not been completely surveyed. The bay is about 8 miles wide and encumbered with numerous shoals including Pullen Shoals, in its central part and on which there are depths of 1.4 to 9.8m. Reefs and foul ground are in the S and SW approach to the bay and extend from Idihi Island, marked by a light, to within 1 mile of Boera Head. Strong tide rips have been encountered about 3 miles N of the island.

Piri Patch, with a depth of 3m, is close off the edge of a shore reef N of Boera Head. A 4.5m shoal is 9.5 miles NW of Idihi Island with shallow water in places between. The shoal may be considered the beginning of a barrier reef. A 10m shoal depth and an unsurveyed shoal area are between 5.5 to 6.75 miles NNW of Idiha Island at the entrance to Caution Bay. Bavo Island, with some tall trees on it, is on a reef 3 miles E of Idiha Island. The Lealea River empties into the head of Caution Bay.

Boera Head (9°23'S., 147°01'E.), marked by a light, is a conspicuous red cliff, 50m high, at the S end of a short range of coastal hills. Because it is separated by a plain from the Pyramdal Hill Range, which rises to a height of 305m to the NE, this point is conspicuous from S.

Anchorage.—There is good anchorage, in 26m, about 1 mile NE of Idihi Island with shelter against the Southeast Monsoon. In approaching this anchorage a good lookout aloft is necessary to avoid the reef extending nearly 1 mile N from the island and a shoal spit N of the island.

A submarine cable crosses Caution Bay in a NW direction from Boera Head to a point 1 mile SW of Lagava Island. Anchorage is prohibited within 0.75 mile on either side of the cable.

Boera Village, a mission station, is just E of Boera Head, Bu-

ropada village is 2.5 miles farther SE.

A barrier reef, which begins abreast Caution Bay and extends to the E of the Louisiade Archipelago, is a remarkable line of barrier reefs about 450 miles long and composed of living coral. In many places it does not reach to the surface of the sea and in such places is known as the "sunken barrier." From 1 to 10 miles offshore, it has many breaks and passages, but still may be considered as a unit. A remarkable feature of the reef is that where it is submerged depths up to 9.1m are not uncommon. The outer edge of this barrier reef, in those places it has been surveyed, has been found to be very steep, 183m being found close to the reef.

There is passage inside the barrier reef mentioned above from Redscar Bay to San Roque Passage, about 200 miles to the ESE, but it is suitable only for small vessels with local knowledge.

6.32 From **Boera Head** (9°23'S., 147°01'E.) the coast, fringed by a coastal reef and backed by hills ranging from 122 to 183m high and which are mostly wooded, has a generally SE direction for 7.5 miles to Palli Palli Point,where it turns to the N, forming the W side of Port Moresby.

Haidana Island (9°27'S., 147°02'E.), 7.9m high and consisting of a coral plateau covered with sand and grass, is on the coral reef which fronts the coast to a distance of 2 miles. The island is about 2.75 miles S of Boera Head.

There is protected anchorage W of Haidana Island, in 14.6 to 16.4m, sand and mud, with the N extremity of the island bearing 079° and the SW extremity bearing 137°. Small craft with local knowledge can find sheltered anchorage E of the island, the only approach being from S through a break in the reef between the island and the mainland. A light is shown from the reef fronting the SW side of Haidana Island.

Clarke Patches, in the fairway SE of Liljeblad Passage and S of Haidana Island, are scattered shoals with depths of 3.6 to 5.5m.

6.33 **Idlers Bay** (9°28'S., 147°05'E.), the entrance of which is about 3 miles SE of the S end of Haidana Island is almost choked by reefs with anchorage only for coasters in the E corner. The shores of the bay are fringed with mangroves. Roku Village is at the head of the bay.

There is a channel inside the barrier reef passing from Caution Bay close along Boera Head and Haidana Island which leads to Port Moresby, but it is limited to small coastal craft with local knowledge.

A wide valley that trends NW behind the coastal hills extends from the head of Bootless Inlet to Redscar Bay and the mouth of the Lakloi River.

The coast line from Boera Head to Tupusulei Haed, about 20 miles long, has been surveyed. It has an off-lying barrier reef and includes Port Moresby and Bootless Inlet. There are several islands and islets in the area, those on the fringing coast reef are low, sandy, and rocky, with a few trees and scrub, while those which are detached are higher.

The area consists of hills, some wooded and others with patches of cultivation. They rise from the shore to heights of almost 274m on the E side of the port to 387m NW of the port.

Caution.—Dangerous mine areas laid during World War II still exist in the approaches to ports. See Pub. 120, Sailing Directions (Planning Guide) Pacific Ocean and Southeast Asia for details.

Port Moresby (9°28'S., 147°08'E.)

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6.34 Port Moresby Harbor is about 4.5 miles long and 1 to 2 miles wide with general depths of 12.8 to 21.9m. Strong SE winds drive a heavy sea into the port, but there is sheltered anchorage, in 10.9 to 14.6m, in the E part of the bay; in the bays in the N part of the harbor, the principal being Fairfax Harbor; there is secure anchorage at all times for vessels of moderate draft.

Port Moresby Container Terminal

Winds—Weather.—The town of Port Moresby, the seat of government of Papua New Guinea, is on the E side of Port Moresby Harbor between Paga Hill and Tuaguba Hill. This vicinity is considered more healthful than the neighborhood of the villages to the N.

The principal exports are rubber, copra, cocoa beans, and shell. The principal imports are machinery, agricultural products, and textiles.

The dry Southeast Trade Winds, from April to November, often blow strongly and raise a short sea in the harbor, which makes boatwork uncomfortable.

During the wet Northwest Monsoon, from October to March, strong gusty winds, known locally as "gubas," sometimes blow, generally at night.

Tides—Currents.—In August, springs rise about 2.7m; neaps rise about 1.8m. The tidal range is said to be the greatest in July and least in January. During January and February the rise is reported to be imperceptible.

The tidal currents generally are regular and vary in direction according to the positions of the openings of the barrier reef and the strength of the prevailing winds. Small tide rips may be experienced S of the Lolorua Islands, off Pyramid Point, and in the three entrance channels leading to the port.

Depths—Limitations.—The port can accommodate vessels up to 62,000 dwt, with a maximum length of 236m and a maximum draft of 10.5m.

Vessels are berthed port side-to and are normally taken to berths during daylight. The Government Wharf (Main Wharf), or Old Port, extends offshore and is T-shaped. The wharf has

Port Moresby—Main Wharf facing SE

four designated berths. Berths 1 and Berths 2 are used by large vessels and have a combined frontage of 213m, with a depth of 7.6m alongside. Its inner or S side wharfage is used by coastal and smaller craft. Berth 3A, the W inner face, is 67m lon, with a depth of 3.8m alongside. Berth 3B, the E inner face, is 113m long, with a depth of 4.5m alongside.

Close NE of the Main Wharf, the Container Terminal or the New Port, is built on reclaimed area. It has a frontage 125m long, with a depth of 10.6m alongside. The S end of the container wharf is subject to silting.

Lancron Wharf, about 0.5 mile NE from the Old Port, has a least depth of 4m along its N side.

Two mooring berths for tankers lie 1.25 and 1.75 miles NNW, respectively, of Old Port. A submarine oil pipeline extends NE to shore from each mooring area. Tankers, with a maximum draft of 13m, can be accommodated; vessels are moored on a SE heading.

An LPG berth, consisting of a steel framework manifold platform in a depth of 15m, lies about 2 miles NNW of Old Port and can accommodate a vessel up to 107m in length.

A reclaimed area behind the main wharf is to be provided and an additional berth will be constructed, giving berths 4 and 5 a total length of 390m.

Three passages, Liljeblad Passage, Basilisk Passage, and Padana Nahua Passage, lead through the barrier reef to Port Moresby.

Liljeblad Passage is between foul ground S of Caution Bay and Sinaui Reef, 8 miles W of the port and involves a circuitous route through an area encumbered with reefs, and, because of a shoal patch in the fairway, the shoals between it and the entrance to the port, the lack of any definite marks, and strong tidal currents it should be used only by shallow-draft vessels with local knowledge.

Basilisk Passage (9°32'S., 147°08'E.), abreast the port beween Sinavi Reef and Nateara Reef, is deep and clear and is the recommended channel into the port. The passage is marked by a light, from which a racon transmits, and a lighted range. A depth of 10.5m was reported, near the range of the fairway in this channel. A N set of 1.5 knots was reported on flood tide.

Padana Nahua Passage, at the E end of Nateara Reef, is about 0.5 mile wide and very deep; but, because of its inferiority to Basilisk Passage, its use is recommended only by vessels with local knowledge. The passage is partially marked by beacons.

Sinavi Reef is part of the barrier reef fronting the shore and shore reefs at an average distance of 1.5 miles between Liljeblad Passage and Basilisk Passage. Beginning about 1 mile S of the foul ground S of Caution Bay, this reef extends 9.5 miles

Port Moresby—Main Wharf as seen from the Container Terminal, with Gemo Island in the background

to the SE. The seaward edge of the reef is well defined and plainly visible in clear weather. The reef dries in places.

Daugo Island, near the middle of Sinavi Reef, is 2.5 miles long, about 0.5 mile wide and 6.1m high. This island and the smaller islands close E of it are low, flat, sandy, and covered with trees; the easternmost of the small islands is 6.1m high.

Lark Patch (9°31'S., 147°08'E.), with a least depth of 3.6m, is 0.5 mile NE of the NE end of Sinavi Reef on the W side of Basilisk Passage. Depths of less than 10.9m extend SE and E from the above 3.6m shoal within a position close NW of the entrance range.

Two small pinnacles were reported to lie 1 mile NE of Lark Patch Light, with a least depth of 16.5m.

Nateara Reef, E of Sinavi Reef and separated from that reef by Basilisk Passage, is a main part of the barrier reef fronting Port Moresby. The seaward edge of the reef is well defined except toward the SE submerged section. The reef dries in places. The NW point of the reef is marked by a light, from which a racon transmits.

A stranded wreck was reported (1993) in position 9°34'S, 147°10'E about 3 miles ESE of the light. The wreck is breaking up; large sections of the wreck are covered at HW.

A sunken rock is 0.2 mile N of the N end of the reef which forms the E side of Padana Nahua Passage.

The W side of Padana Nahua Passage is formed by the E end of the sunken barrier reef extending about 3.5 miles ESE from the drying section of Nateara Reef. Shoal depths fringe the E and NE part of the sunken reef and vessels rounding this area should exercise caution.

South Patch (9°34'S., 147°19'E.), with a depth of 2.4m and marked by a beacon, is SW of Tupusulei Head and close N of the turning point after entering Padana Nahua Passage.

North Patch (9°34'S., 147°17'E.), with a depth of 2.7m, is about 0.75 mile NNE of the beacon on South Patch.

A 9.4m shoal is about 0.6 mile SE of the beacon on South Patch. There are two 12.8m patches 0.25 mile and 0.75 mile, bearing 039° and 130° respectively, from the beacon on South Patch. Middle Patch a 6.9m shoal is 0.6 mile N of South Patch.

The S end of Hanudamava Island, on the W side of the entrance to Port Moresby, in range with the S extremity of Manubada Island bearing 297° leads close SW of South Patch.

Aspect.—From seaward **Taurama Hill** (9°32'S., 147°14'E.), above Pyramid Point, the W point of Bootless Inlet, is a pyramid-shaped hill, 183m high. **Tupusulei Head** (9°34'S., 147°18'E.), the E entrance point of the inlet is 51m high. The E side of the inlet is composed of valleys and small hills that rise gradually from the coast to the Astrolobe Range, which attains heights of 610 to 1,219m. **Mount Lawes** (9°20'S., 147°14'E.), in a plain about 9 miles N of the head of Bootless Inlet, is a conspicuous hill, 488m high.

From seaward, the coast in the vicinity of Port Moresby is not distinctive due to the mass of the Owen Stanley Range and the Astrolobe Range in the background. On the W side of the entrance to Port Moresby is Mavarololo, a conspicuous 195m high hill with a clear summit. Huhunamo, 387m high, and Lovobada, 378m high, are two conspicuous tree-covered mountains close N of the head of the bay. On the E side of the port is **Mount Pullen** (9°27'S., 147°09'E.), 254m high and nearly 2.5 miles NNE of Bogirohodobi Point. An obstruction light is shown from the summit of a hill 252m high, about 0.5 mile SSE of Mount Pullen. The white houses between Paga Hill and Tuaguba Hill are easily distinguished in clear weather approaching Basilisk Passage.

The port area gives a good radar return from a distance of 20 miles.

Pilotage.—Pilotage is compulsory. The pilot boarding area, shown on the chart, is about 1 mile SW of the entrance to Basilisk Passage. Pilots are available at all times. In bad weather pilot boards inside the passage at about 0.5 mile NW from the entrance; or with prior permission, a vessel may proceed di-

rectly to the anchorage 0.75 mile W of Manubada Island and await pilot boarding. Ship are not berthed during hours of darkness. An ETA message should be sent 24 hours and 12 hours prior to arrival and should be confirmed or amended not more than 5 hours or less than 4 hours prior to arrival. Radio frequencies used are VHF channels 6, 12, and 16.

Water, fuel oil, and some provisions are available. There is a hospital and an airport is nearby.

Port Moresby maintains a port radio station.

Anchorage.—Port Moresby is commodious and sheltered, with good holding ground of mud, and affords anchorage for classes of vessels at all seasons. Anchorage areas W, NNW, and SSW of the town of Port Moresby are shown on the chart. There is also an area marked unsafe for anchoring on the W side of Port Moresby extending S to Sinavi Reef and W to Daugo Island. Vessels navigating this area should also refer to the chart for location of a spoil area between Vahunabada Reef and Napa Napa.

A good anchorage is in the outer harbor, centered in a position with the N point of Manubada Island bearing 090°, 1,275m distant, in a depth of 27m.

The Southeast Monsoon often blows strongly and raises a short sea in the harbor making boat work uncomfortable. At this season vessels are advised to anchor as close inshore as possible under the lee of the town peninsula.

During the Northwest Monsoon season, strong gusty winds, locally known as Gubas, sometimes blow, generally at night. At this season vessels should anchor more toward the W shore, off the shipyard at **Napa Napa** (9°28'S., 147°06'E.).

Anchoring is prohibited in an area SSW from Paga Point, where an outfall extends about 1.75 miles offshore.

Directions.—Liljeblad Passage should be used only by small shallow-draft vessels with local knowledge.

Basilisk Passage is used almost exclusively and is the recommended entrance. From seaward, steer a course of 017° for the white houses at Port Moresby as soon as they are identified until the lighted beacon on Nateara Reef is made out. The range lights at Vabukori Point in line bearing 054° lead through the passage and should be followed until clear of Lark Patch. There is a dangerous wreck 0.3 mile S of Paga Point whose position is approximate. Steer into port on that range line, passing Logulu Motu Motu 0.2 mile off. When past the reef alter course for the desired anchorage.

If visibility is low when making for Basilisk Passage, the stranded wreck on Nateara Reef may be identified before getting into dangerous proximity to the reef.

Padana Nahua Channel can be used when approaching from E, but is less preferred than Basilisk Passage. Steer in with Mount Sadowa, 394m high, in range with the N extremity of Loloata Island, bearing 010°, then, when the barrier reef on the E side of the entrance is abeam, change course slightly to the E in order to bring Mount Sadowa into range with the S end of Loloata Island, bearing 006°; this course will give safe berth to the shoal fringing the E extremity of Nateara Reef. When abreast the end of that reef change course in sufficient time to bring the S end of Gemo (Hanudamava) Island in range with the S end of Manubada Island bearing 297°; this leads S of South Patch. Then pass S of Manubada Island. Proceed as directed for Basilisk Passage. Care should be taken to avoid the previously-mentioned wreck S of Bogirohodobi Point. During the Southeast Monsoon season, Mount Sadowa is often obscured by haze and vessels should proceed with caution. As noted on the chart, this area is considered unsafe for anchoring.

Caution.—See Pub. 120, Sailing Directions (Planning Guide) Pacific Ocean and Southeast Asia, for danger area in the vicinity of Port Moresby and approaches.

Port Moresby—Inside the Barrier Reef

6.35 Manubada Island (9°31'S., 147°10'E.), about 3 miles SE of the town of Port Moresby is 65m high, and is surrounded by a reef. A narrow channel with depths of 18.3 to 26m is between the island and the mainland.

Good anchorage can be obtained during the Southeast Monsoon, in 18.3m, mud, off the NW side of Manubada Island.

A shore reef, extends from about 0.1 to 1 mile offshore between Vabukori Point, close NNE of Manubada Island and Pyramid Point, about 4 miles to the SE.

Some houses in the valley NE of Kila Kila, a prominent 157m hill N of Point Vabukori, are visible from SE when approaching Port Moresby.

Walter Bay (9°29'S., 147°09'E.) is a semicircular recession in the coast between Vabukori Point and Bogirohodobi Point, 2.5 miles NW. A reef extends out 0.15 mile from the shores of the bay. Gabatu Motu Motu Islet, 13.7m high, is on this reef near the head of the bay. Danuagua Islet is in the E part of the bay, close off the shore reef. A rocky islet, 6.7m high, is about 0.5 mile NW of this last islet.

Arakuti Reef, in the W part of Walter Bay close S of Bogirohodobi Point, is separated from the mainland reef by a narrow channel with a depth of about 7.3m.

Local craft obtain good anchorage in NW weather between Arakuti Reef and the mainland reef to the N.

Gemo Island (Hanudamava Island) (9°29'S., 147°06'E.), at the W entrance point to Port Moresby, is 87m high and covered with grass and brushwood on its W side; it is connected to the mainand by a reef which also extends E from the island.

Lolorua Island, actually two small islands joined at LW, are S of Gemo Island and the S most island is 29m high. A channel, 0.13 mile wide between the island and Gemo Island, has mid-channel depths of 1.8 to 7.3m.

6.36 Bogirohodobi Point (9°29'S., 147°08'E.), 1.5 miles E of Loloru Island, is the E entrance point to Port Moresby. The point is dominated by Paga Hill, 110m high, on which there is a signal station with a flagstaff. A conspicuous building is about 0.3 mile ENE and an aeronautical radiobeacon is 2.5 miles ENE, respectively, from Paga Hill.

The entrance to Port Moresby, slightly more than 1 mile wide between Bogirohodobi Point on the E and Lolorua Island on the W, has depths of 14.6 to 26m.

North of Gemo Island, isolated reefs extend out to 0.15 mile offshore; the largest of these is Esade Motu Motu.

The W side of Port Moresby Harbor is clear of dangers at a distance of 0.6 mile offshore. Most of the E side of the port is fronted by a solid reef extending more than 0.5 mile off. Tatana Island, 126m high, is on the extension of the shore reef in the N part of the harbor and is connected to the mainland by a causeway.

Coglan Head (9°25'S., 147°07'E.) about 0.6 mile N of

Tatana Island and at the head of Port Moresby Harbor, is 78m high and fringed with mangroves. Reefs extend as much as 0.55 mile off the head and from the shore to the E; between this reef and Tatana Island there is sheltered anchorage for small vessels in all weather.

6.37 **Logolu Motu Motu** (9°29'S., 147°08'E.), a drying reef 0.15 mile long, is 0.15 mile off Elakurukuru, the N extremity of the E entrance point to Port Moresby harbor. The reef is marked by a light at each end. A 10m shoal is about 180m E of the S end of the reef.

Liberty Patch (9°28'S., 147°08'E.), about 0.5 mile NE of Logolu Motu Motu is marked by a light and is surrounded by several charted dangers.

Vahunabada Reef, a drying reef about 0.75 mile N of Logulu Motu Motu, is marked by lights and other aids. The **Elevala Peninsula** (9°28'S., 147°08'E.), a small rocky peninsula, 20.4m high projecting from the shore, is about 0.75 mile E of Vahundabada Reef. A jetty, in ruins, extends 0.25 mile SE from the peninsula; foul ground extends 0.45 mile from the peninsula.

An offshore pipeline berth equipped with mooring buoys is N of Vahunabada Reef; its use is not recommended during the Southeast Monsoon.

Fairfax Harbor (9°26'S., 147°06'E.), the NW part of Port Moresby harbor, is a landlocked basin with a 0.25-mile wide entrance between Idumava Point and Raven Rock. Depths of 6 to 10.5m are in the harbor, which is a safe anchorage in all weather; its use is not recommended, however, because of the unhealthy locality. There are several reefs in the harbor and mud banks, extending a considerable distance from the shore restricted the anchorage area. Motukea, a small islet, 54m high and covered with scrub, is in the N part of Fairfax Harbor.

The landing place and alignment of a submerged pipeline laid across the entrance to Port Moresby harbor is marked by tripod beacons about 0.3 mile N of Bogirohodobi Point.

Bootless Inlet (9°31'S., 147°16'E.) is about 4 miles wide between Pyramid Point and Tupuseleia Head. Both sides of the inlet are encumbered by reefs, but a narrow deep water channel leads to the head of the inlet between Manunouha Island, 23m high, and Loloata Islet and Motupore Islet, 41 and 61m high, respectively. Manunouha Island is locally known as Lion Island because of its resemblance to a crouching lion. Reefs lying S and W of Manunouha Island are marked by beacons. There are depths of 37m in the entrance to Bootless Inlet decreasing to 18.6m at the entrance to Bogoro Inlet, on the E side of the inlet about 0.5 mile N of Motupore Islet. The shores of Bootless Inlet are fringed with mangrove and backed by hills, except at the head, which is low-lying and foul.

6.38 **Tupuseleia Head** (9°34'S., 147°18'E.) is a long point surrounded by a reef. Tupuseleia Village is about 0.5 mile N of the head.

Bogoro Inlet, about 0.25 mile wide between the reefs on either side of the entrance has depths of about 9.1 to 18.3m in its central part. The reef on its W entrance point is marked by a beacon. The ruins of a jetty and an abandoned copper mine are on the E side of the inlet.

Directions.—A vessel with local knowledge can approach Bootless Inlet, which has been described above in paragraph 6.37, through Padana Nahua Passage. When abeam of Nateara Reef, steer NNW to bring Manunouha Islet in range about 355° with Idumava Hill, the 113m summit on the W side of Bogoro Inlet. Maintain this range until North Patch is abeam, then steer NE to the entrance of the inlet. Anchorage is available, in 21.9 to 26m, mud, in mid-channel abreast Motupore Islet.

The Astrolabe Range has a remarkable square flat-topped mountain about 7 miles ENE of Tupuseleia Head. This flat top extends about 15 miles in a NW-SE direction and terminates abruptly at each end, but from the SE shoulder a sharp ridge of barren looking hills with scrub and some trees gradually descends to Round Hill.

Near the edge of the mountain are precipitous cliffs, but on the SW side below these cliffs it slopes gently toward the sea with numerous valleys with rich vegetation. There are many villages with patches of cultivation high on this side of the mountain.

Tupuseleia Head to Hood Point

6.39 From Tupuseleia Head, a low coast with hilly points and several off-lying rocky islets, the coast trends SE 9 miles to the village and mission station of **Gaile** (9°40'S., 147°24'E.), on a sloping point of the mainland. From here the shore assumes a bolder and more regular aspect extending another 14 miles farther to Round Point. From Gaile village to Round Point extends a low coastal range, the SE and greater portion of which consists of sterile-looking sandy hills covered with shrub and stunted bushes.

Round Point (9°52'S., 147°30'E.) a flat heavily-wooded point, is not distinguishable from a position outside the reef when seen against the high dark background. Round Hill, 202m high, 2.75 miles ESE of the point, is very conspicuous from NW and looks like an island when seen from the vicinity of Port Moresby. Because of incomplete surveys in the area, vessels should proceed with caution while navigating in the area of Round Point. Round Hill is reported to give a good radar return at a distance of 23 miles.

The edge of a reef SW of Round Hill is marked by a beacon.

South of Padana Nahua Passage, the barrier reef follows the general trend of the coast at an average distance of 2.5 miles offshore to Round Point; S of Round Point the distance increases to nearly 7 miles offshore.

Immediately S of Padana Nahua Passage, there are several openings in the reef that should not be entered without local knowledge. In the vicinity of Round Hill there are two openings, the S of which is named Round Hill Entrance.

The main part of the reef up to a few miles of Round Point is awash and plainly marked by breakers. To the S the continuation of the reef is submerged but is easily discernible by the pale green color of the water over it.

Inshore channel.—The channel between the barrier reef and the mainland between Port Moresby has been found to be clear of dangers, except for a few coral shoals which are easily seen. In the vicinity of Round Point reefs are more numerous. This channel is considered navigable only by small light-draft vessels. It is stated that after passing S of South Patch the course inside the reef is 141°, with the SW side of the summit of a peak in range with Manunouha Islet bearing 321° as a stern mark.

6.40 Round Hill Entrance (9°59'S., 147°29'E.) is nearly 1 mile wide and is entered on a course of about 028°, steering on Round Hill. Because the barrier reef that forms the NW side of the entrance is always covered, the sea does not break on it in fine weather, but the reef on the SE side of the entrance is nearly awash and breakers on it distinctly point out the channel.

Anchorage.—There is good anchorage, sheltered against all winds, in 28m, 0.5 mile inside the reef on the SW side of Round Hill Entrance.

Directions.—A summit about 6 miles E by S of Round Point bearing 046° leads in through Round Hill Entrance, in a least depth of 11.6m.

A 4.9m shoal is about 0.5 mile W of the above 046° track, about 2.5 miles inside the entrance.

6.41 Beagle Entrance (10°02'S., 147°35'E.), 6.5 miles SE of Round Hill Entrance, leads to Beagle Bay. There is enough depth over the reefs for a draft of 5.8m.

Beagle Bay, close E of Beagle Entrance, affords fine anchorage. There is a village on the E shore of the bay.

Wolverine Entrance (10°05'S., 147°40'E.) is close W of Hood Point. The N side of the entrance is marked by a beacon with a radar reflector; a small detached reef lying near the S side of the entrance is also a marked beacon. A stranded wreck lies on the S edge of a drying reef located on the W side of Wolverine Entrance.

Paira Point (10°00'S., 147°38'E.), a red cliff 8.5 miles NNW of Hood Point, juts out and has a bay on either side of it. A range of barren hills extends SE from Round Head. Between these hills and the coast the land is low and wooded.

Hood Point (10°07'S., 147°43'E.), marked by a light, is a tongue of low wooded land 5 miles long. The mission station village of Hula is near its extremity. There are extensive groves of coconut palms in the area of the point. The point is encircled by a reef extending about 1.5 miles seaward, but there is a boat passage, marked by beacons, leading from Wolverine Entrance to an anchorage off Hula; this passage should only be used by shallow-draft vessels with local knowledge. The anchorage off Hula should not be used if there is any possibility of bad weather, particularly after dark.

Hood Point is reported to be a good radar target at a distance of 25 miles.

Currents have been noted setting SSE at a rate of 20 miles a day in the vicinity of Hood Point.

Hood Point to Cape Rodney

6.42 Hood Bay (10°04'S., 147°48'E.), immediately E of Hood Point, has low wooded shores. The Kemp Welch River discharges into the bay. Kalo Village stands at the head of the bay.

Hood Lagoon (10°05'S., 147°53'E.), E of Hood Bay, is almost closed by the broad point of a reef extending from its E point. Only vessels with local knowledge should attempt the narrow channel into the lagoon. Discolored water from the lagoon makes it difficult to identify the reef even from aloft.

The Macgillivray Range extends for a distance of 18 miles back of the hills behind Paira Point. The range is moderately high, scantily-wooded, and sandy at the W end. The land between it and the shore is flat and thickly wooded.

From the entrance to Hood Lagoon the flat wooded coast trends E and SE for about 9 miles to **Parama Point** (10°10'S., 148°00'E.). Mangrove swamps, extending several miles inland, begin about 3 miles E of Hood Lagoon and continue to **Keppel Point** (10°10'S., 147°58'E.).

The barrier reef in this vicinity is broken and touches the coast in many places.

Aroma Passage, an opening for small craft only is marked by beacons. It was reported the reefs in the area of the passage were incorrectly charted.

Keakoro Bay is E of Keppel Point. Reefs extend S and SE of the point.

6.43 Cape Rodney (10°12'S., 148°24'E.), a low wooded point, is not easily recognized. It lies about 25.5 miles E of Keppel Point; the intervening coast is low and slightly indented. Eaula Village, with a coconut plantation, is on the coast about 3 miles NW of the cape.

A shoal extends nearly 0.75 mile off Cape Rodney, and detached coral patches are between it and the barrier reef. A barrier reef between Keppel Point and Cape Rodney has several openings through which vessels may enter the inner waters with local knowledge. The reef fronts the coast to a distance of 9.5 miles. The waters within the barrier reef are foul and uncharted dangers may exist. The outer edge of the barrier reef is steep-to and easily seen, but the shoal ground to the N is visible only in conditions of good light. McFarlane Harbor and Cheshunt Bay indent the shores of the bay.

Anchorage.—Ships with local knowledge can find anchorage during the Southeast Monsoon by entering Toveli Entrance, W of Coutance Islet, with 78m high Toveli Hill bearing 010° and anchoring on that bearing about 1.5 miles offshore, in depths of 14.6 to 28m. Better protection will be found, in 26m, about 2.5 miles E by S of the above anchorage. Small craft can proceed to McFarlane Harbor from these anchorages with local knowledge. Caution should be taken to avoid the shoals, with least depths of 2.4m, N and NW of Coutance Islet.

A long spit extends from the W side of the entrance to McFarlane Harbor, with several shoal patches encumbering the entrance. The channel at the entrance is reported to be about 137m wide, marked by beacons on both sides, with depths between of 5.5 to 9.1m.

6.44 From McFarlane Harbor, there is a passage leading to **Marshall Lagoon** (10°03'S., 148°12'E.) marked by two sets of range beacons as far up to N of **Kupiano** (10°04.5'S., 148°10.5'E.). The passage leads between a large sandbank and some mud flats, with a least depth of 3.4m in the fairway. Marshall Lagoon is about 1.5 miles wide and shallow in the middle, narrows towards its head, where the Imila River discharges.

At Kupiano, there are two wharfs. South Wharf (Government Wharf) is for small craft only.

North Wharf (Timber Wharf) is also for small craft only. It is 31.4m long, with a depth of 4.9m alongside, with a metal face with no fenders; it was reported to be in poor condition. Vessels up to 1,000 tons are known to have entered the harbor.

The coast for the first 7 miles E of McFarlane Harbor is high and steep, but from there to Point Rodney, about 7 miles farther E, the coast is low and wooded.

Cheshunt Bay (10°10'S., 148°18'E.) is about 8 miles ESE of McFarlane Harbor. A bank which uncovers at HW extends some distance from the shore at the head of the bay. Some channels to the bay have been surveyed, marked with beacons, and swept to a depth of 10.6m. The maximum recommended draft, with local knowledge, however, is 9.1m. Anchorages have been swept to 8.8m.

Some moderately-high wooded hills at the head of Cheshunt Bay 5 to 8 miles NW of Cape Rodney are visible for a distance of 25 miles off.

Caution.—It was reported that the reefs in Cheshunt Bay are incorrectly charted and that entrance into the bay should not be attempted without local knowledge.

6.45 Sunday Entrance (10°15'S., 148°09'E.) has a navigable channel about 0.4 mile with a least depth of 14.6m. There are several reefs within the entrance.

Anchorage.—Anchorage is available inside Sunday Entrance, in 28m, about 3.5 miles N of Coutance Islet with local knowledge; it affords reasonable shelter during the Southeast Monsoon.

Paluma Entrance (10°17'S., 148°14'E.), about 6 miles ESE of Sunday Entrance, is about 0.75 mile wide. The entrance channel is deep, and an 11m swept channel, for use with local knowledge, leads to anchorage in Cheshunt Bay. The E side of the entrance is marked by a beacon with a radar reflector. The entrance and the swept lane leading NNE to the vicinity of Whitish Reef are not recommended for ships drawing over 9m.

Rodney Entrance (10°16'S., 148°26'E.), about 5 miles SSE of Cape Rodney and marked on its E side by a beacon, is about 1 mile wide, with a least depth of 18.3m. A swept channel, for use with local knowledge, leads about 2 miles NNE and then about 3.75 miles WNW to a well-sheltered anchorage, in 20.1m, about 1 mile SW of Cape Rodney.

It is said that the breakers on the reef are a sufficient guide for vessels entering and the only precaution in picking a berth is to anchor clear of the numerous coral patches inside.

Cape Rodney to Baxter Bay

6.46 Sandbank Bay (10°11'S., 148°33'E.) is about 10 miles E of Cape Rodney. The E side of the bay is low and formed of sand banks extending from a mangrove swamp. Depths of 6.4 to 9.1m are in the approaches to the bay.

Caution.—The bay has not been closely examined.

6.47 A forest of large trees lines the shore around the head of the bay. The Domara River empties into the W side of the bay. Domara Village is on the W side of the river entrance.

Anchorage can be taken, in 6.4m, in the approaches to Sandbank Bay by small vessels with local knowledge, but a sharp lookout must be kept for uncharted shoals.

From Cape Rodney, the low wooded coast continues E to Mariamata Point, where it then curves in a NE and then a SE direction to Dedele Point, forming Cloudy Bay. Low hills are in back of this stretch of coast and the water off it is apparently shallow.

Dedele Point (10°14'S., 148°44'E.), a low narrow sandy point of land fringed with coconut palms, is on the E side of Cloudy Bay. The point is difficult to distinguish, but **Table Top Hill** (10°14'S., 148°54'E.), a flat-topped elevation 9 miles E, is a good landmark for the locality.

Cloudy Bay (10°12'S., 148°41'E.), between Mariamata Point and Dedele Point, is apparently quite shallow and is being silted up by the several rivers that empty into it, including the Robinson River. The coast around the bay is low and fringed by mangroves, but near Dedele Point it is somewhat higher and has a sandy beach. Abavi Island, a low swampy island, with 60m Orchard Inlet at its E end, is close SE of the entrance to Orchard Inlet. Abau Island, close W of Abavi Island, is covered with coconut palms; a jetty with 3.0m alongside is on the E side of the island. During the Southeast Monsoon, clouds hang low over Cloudy Bay and envelop the surrounding mountains and foothills.

6.48 Rothery Passage (10°21'S., 148°41'E.), leading through the barrier reef between East Reef and West Reef, is about 0.5 mile wide and has depths of 28 to 92m. For a distance of 3 miles N of the passage, the channel leading to Dedele Anchorage appears to be clear, but uncharted dangers may exist. Above that point the area is encumbered by reefs and shoals. Rothery Passage is marked at its W end by a light on the E end of West Reef. The channel to the anchorage is partially marked by beacons.

Anchorage.—Dedele Anchorage is available for ships with local knowledge that are less than 122m long, with a maximum draft of 6.1m. There is anchorage on either side of Dedele Point. Anchorage can be taken, in 10.9m, W of Dedele Point, with Burumai Point, about 3 miles E, bearing 104°, and **Fan Reef Beacon** (10°14.7'S., 148°44.0'E.) bearing 208°.

Anchorage may be obtained on the E side of Dedele Point in Henderson Bay, in a depth of about 9.1m, with **Clay Reef Beacon** (10°14'S., 148°44'E.) bearing 269° about 0.85 mile distant. This anchorage is recommended during the Northwest Monsoon and it will accommodate larger vessels than the W anchorage.

Directions.—Approach Rothery Passage on a course of 068°; when West Reef Beacon bears 000°, steer about 042° through the middle of the passage, taking caution to avoid the sunken reefs extending SW from East Reef. When clear of these dangers, steer 000° to pass 0.15 mile W of **Chapman Reefs Beacon** (10°18'S., 148°42'E.), then steer 004°, until abeam of **Rot Reef Beacon** (10°16'S., 148°42'E.), then alter course to 035° to pass about 183m NW of **Nell Rock** (10°14'S., 148°43'E.), then steer 079° to pass 137m N of **Clay Reef Beacon** (10°14'S., 148°44'E,.) and follow this course until Burumai Point bears 104°, then steer on that bearing to the anchorage.

Vessels bound for the E anchorage follow the above directions until N of Nell Rock, when they steer to pass 183m S of Fan Reef SW Beacon (10°15'S., 148°44'E.), then steer 106° until about 0.25 mile from **Varoe Reef Beacon** (10°15'S., 148°45'E.) bearing 078°, then steer 045° to pass about 0.25 mile around **Kerwin Reef** (10°14'S., 148°45'E.) until Fan Reef SW Beacon bears 250°, then change course to anchorage.

Caution.—Entrance through Rothery Passage and the area inside the reef should not be attempted without local knowledge. Passage is advised only during daylight hours.

Baxter Bay to South Cape

6.49 Between Dedele Point and Batumata Point, about 13.5 miles ESE, the low, wooded shore forms two indentations, the eastern and larger of which is **Baxter Bay** (10°16'S., 148°51'E.); the western, Henderson Bay, has a sandy beach lined with coconut trees. Off Burumai Point, which separates the bays, are several shoals. A passage has been reported around the point through the shoals. It is only 137m wide, but is deep. A beacon stands 0.8 mile W of Burumai Point and a second beacon stands 0.2 mile S of the point.

Batumata Point (Table Point) (10°17'S., 148°58'E.) is low but well defined. About 2 miles NNW of the point stands Magaubo village, at the mouth of the Bedile River.. Anchorage may be taken off the village. It has been reported there is good shelter during the Southeast Monsoon.

The barrier reef from Rodney Entrance trends E for 12 miles to Grange Islet, with three openings between. Rothery Passage, the westernmost, is marked by a light on its W side. Mindora Passage, between East Reef and Grange Islet, has not been examined; it is marked by heavy tide rips. The E opening, between Grange Reef and Grange Islet, is fou, with a reported 2.8m depth. There is another passage E of Grange Islet which appears to be the best approach to anchorage in Baxter Bay.

Grange Islet (10°19'S., 148°53'E.), is low and wooded. It lies on an isolated part of the barrier reef 5 miles SW of Batumata Point. A reef extends E and SE about 1.75 miles from the islet.

The Owen Stanley Range trends SE from Mount Victoria for a distance of 95 miles and then turns abruptly to the NE for about 20 miles to Mount Suckling. The nearest approach of the range to the S coast is about 7 miles N of Cloudy Bay.

There is great uniformity in the profile of this mountain range between Mount Victoria and the elbow N of Cloudy Bay.

Mount Clarence (9°53'S., 148°37'E.), about 20 miles NE of Cape Rodney, rises to a height of 1,930m. Its top is perfectly flat on its W side and is the nearest high mountain to the coast.

6.50 From its nearest approach to the sea N of Cloudy Bay, the Owen Stanley Range takes a sudden turn NE for 20 miles to Mount Suckling, the summit of which is 3,422m high and flat topped on its E side. It is the second highest peak in the range.

From Mount Suckling, the range trends ESE for about 60 miles to Mount Thompson, which is 1,797m high and lies about 20 miles N of **Bona Bona Island** (10°30'S., 149°50'E.).

The only intermediate summits worthy of notice are Mount Dayman, 2,987m high, and Mount Simpson, 2,882m high. The top of Mount Simpson is round at each end, with a peak in the center.

Most of the peaks are visible up to 90 miles in clear weather, but within 20 or 30 miles of the coast their shape becomes difficult to distinguish. They are visible for the longest periods during the Northwest Monsoon; during the Southeast Monsoon, they are generally capped with clouds. No timber exists within 305m of the summit of the range.

Table Bay (10°17'S., 149°05'E.) lies between Batumata Point and the mouth of the Bailebu River. The shores of the bay are backed by the Table Top and Inskip ranges, from 2 to 3 miles inland, the space between being a tract of thick wooded level land.

From the opening about 2 miles E of Grange Islet, the barrier reef extends E across the breadth of Table Bay, with patches N and S of it. One of these, Kidd Reef, almost bare, lies about 2 miles SE of Batumata Point. Onibu Point lies about 12.5 miles E of Batumata point.

Caution.—A wreck is situated about 6.5 miles S of Onibu Point in position 10°22.4'S, 149°10.7'E. There may be other dangers in addition to those charted.

The depths in the entrance E of Grange Islet are not known, but are probably deep; the channel E of the barrier reef fronting Table Bay has a depth of 12.8m in the fairway. Caution should be taken in this area as it has only been scantily surveyed. There is shelter under the E side of the barrier reef. The village of Daroa lies at the head of Table Bay.

6.51 Kwaipomata Point (10°19'S., 149°19'E.) lies 3 miles E of the mouth of the Bailebu River. The point is bold and forms the W extremity of Selae Doudou Bay (Amazon Bay), which is shoal and fringed with reefs.

Lannokea Doudou (Mayri Bay) (10°20'S., 149°26'E.), about 1.5 wide at its entrance, affords sheltered anchorage during SE winds, in depths of 11 to 18.3m, mud. A spit extends 0.5 mile off the S entrance and the shores are fringed with coral reefs. The head of the bay is shoal and the shore is sandy.

Off-lying Islands and Dangers

6.52 Lopom Island (10°20'S., 149°19'E.), lying about 0.75 mile S of Kwaipomata Point, is low, wooded, and surrounded by a coral reef. Laluoro Island, lying 1.5 miles SE of Lopom Island, is small, low, and encircled by a reef. Sheltered anchorage will be found during SE winds NW of Laluoro Island.

Mailu Island (10°24'S., 149°21'E.) is nearly 3 miles in circumference and almost completely encircled by a reef. This island has been reported to lie 0.5 mile NNW of its charted position. The island is low but rises to a height of 123m at its center. It is covered with grass and coconut trees. A village is situated on the N side of the island. The small island of Bonarua lies 1 mile S of Mailu Island. Anchorage can be taken in a bight in the reef off the N side of Mailu Island, but is considered poor. A reef which breaks heavily lies 4 miles SW of Mailu Island. There are apparently some shoals between this reef and the island. These shoals necessitate the use of caution when approaching Mailu Island.

Eunora Islet (10°25'S., 149°28'E.) lies 5.5 miles E of Mailu Island, is small and rocky with few trees. Two high rocks lie near the islet, one close to its S side and the other, 0.75 mile to the W. The reef on which the islet stands extends 2 miles to the E, with numerous shoal water patches farther E. There are several shoals midway between Eunora Islet and Mailu Island.

Imuta Islet (10°24'S., 149°35'E.), low and wooded, is located 3 miles SE of Port Glasgow; it sits on the NW end of a 2 mile reef. A 5.6m patch lies 3 miles SW of the islet. A rock lies 2 miles ENE of Imuta Islet.

6.53 Sabiribo Doudou (Millport Harbor) (10°21'S., 149°28'E.), an excellent harbor, lies 3 miles SE of Mayri Bay, and is oval in shape. The diameter of the harbor runs E and W for a distance of 2 miles. Clumps of coconut trees and man-

grove, with white sandy beaches between, surround the shores of the harbor. A coral reef fringes its shores.

Off the E entrance point are two wooded islets and a rock; near the W entrance is an islet. In the E part of the harbor a rocky patch extends about 0.2 mile from the shore.

The entrance is about 0.5 mile wide and has a depth of 16.6m, gradually shoaling to 7.4m, the general depth over the harbor in mud. Good anchorage is obtainable in the harbor with help of local knowledge. Several small villages are situated on the shore around the harbor.

Geagea Doudou (Port Glasgow) (10°22'S., 149°31'E.), a landlocked inlet with high land all around, is 2 miles long in an E and W direction and 0.75 mile wide, it has a depth of 7.4 to 12.8m. The entrance is opened to the SE and has a depth of 14.6m.

It is the best small harbor on the coast, and is reported to be a good anchorage at all times. There is room for up to four large vessels in 14.6m of water. Two small villages are situated on the shore of the bay.

6.54 Orangerie Bay (10°22'S., 149°44'E.), between Port Glasgow and Debana Point, is about 22 miles in length and is encumbered with an extensive reef with probably some offshore dangers. The low, wooded shore forms a continuous curve from one end of the bay to the other. For the first 6 miles E of Port Glasgow the steep coast range rises from the shore, but E of these hills, a flat and wooded country extends a considerable distance inland. The greater part of this bay has not been examined.

Baibara Island (10°22'S., 149°36'E.) lies in the W end of Orangerie Bay, 5 miles E of Port Glasgow. There is a channel for small craft between the island and the mainland. The island is uninhabited, but there are small villages abreast of it on the mainland. The island is surrounded by a reef, the NE end of which is marked by a beacon.

Gadaisu Village (10°22'S., 149°47'E.) lies about 11 miles E of Baibara Island. A reef extends 1 mile S from the shore of the village and is marked by a beacon on its SW side.

Debana Point (10°30'S., 149°55'E.) is 11 miles SE of Gadaisu village. The point marks the W entrance to Mullins Harbor.

Mullins Harbor (10°29'S., 149°59'E.), located just E of Debana Point, is 10 miles long and about 5 miles wide. There are depths of 3.7 to 12.9m in the entrance and 3.7 to 5.6m within the harbor. A charted mud bank lies in the middle of the harbor. Vessels with local knowledge can anchor in the harbor.

6.55 Bona Bona Island (10°30'S., 149°51'E.), lying about 4 miles W of the entrance to Mullins Harbor, is hilly and nearly 3 miles in length and width. The island is thickly wooded, and in most parts rises abruptly from the sea to its summit, which is 402m high. A number of villages are situated about the island.

There are several detached rocks near the NW side of the island. The largest is 49m high and lies 0.75 mile W of the islands NW point. A rock, with less than 1.8m of water, lies 1 mile E of the NE extremity of Bona Bona Island.

The SW part of the island is connected with Delami Island, which is 126m high. The islands are connected by a reef which dries nearly its whole extent.

There are a number of shoals off the W and NW coast of Bona Bona Island. It has been reported that the sea breaks heavily over these shoals.

Anchorage.—A readily accessible anchorage, sheltered against the Southeast Monsoon, will be found W of the reef connecting Bona Bona Island and Delami Island, in a depth of 21.9m, mud. This anchorage is somewhat restricted by the fringing reef that extends 0.5 mile from Bona Bona Island.

The best anchorage is 0.5 mile NE of the high rock off the NW point of Bona Bona Island. It can be easily reached by passing close along the N side of that rock.

6.56 San Roque Passage (10°31'S., 149°50'E.) is located between the SE coast of Bona Bona Island and the mainland. It is part of the entrance into Mullins Harbor. The passage is 0.75 mile wide and has depths of 12.8 to 18.3m. Toua Island lies on the S side of the passage fairway, about 1 mile N of Eagle Point. There is anchorage in San Roque Passage, in depths of 14.6 to 18.3m.

Hazard Rock (10°29.7'S., 149°52.5'E.), 0.5m high, lies in the middle of San Roque Passage.

Eagle Point (10°33'S., 149°51'E.) is the W extremity of the promontory of the mainland S of Debana Point. Eagle Point is easy to pick up as a target. About 0.5 mile W of the point is Eagle Rock, which from seaward has the appearance of a vessel under sail. Just N of the point is Argyle Bay.

Argyle Bay (10°32'S., 149°52'E.) affords good anchorage with a muddy bottom, sheltered against the Southwest Monsoon. Because of the rocks NE of Toua Island, vessels approacing the anchorage in the bay should pass S of the island.

A vessel of 1,100 grt reported anchoring, in a depth of 12.8m, with Eagle Point bearing 237° and the N entrance point bearing 303°.

The barrier reef from SW of Eagle Point to S of South Cape, a distance of about 25 miles, has depths of 7.4 to 11m. Caution is necessary when approaching the barrier reef because of irregular depths. The area between the reef and the shore has been sketchily surveyed and breakers have been reported at times.

The coast line in this same vicinity is irregular and broken by lengthy bays and inlets. The country consists of wooded valleys and hills. A steep, lofty coast range trends E to Mount Gugusari, 1,351m high, 10 miles N of South Cape. When seen from the S the mount has a well-rounded peak, but is not remarkable in shape from other directions.

Tides—Current.—During the Northwest Monsoon, a SE current sets up along the SE side of this part of Papau New Guinea; during the Southeast Monsoon, there are NW currents at a rate of 0.25 to 1.5 knots, varying with the strength and duration of the wind.

6.57 Ava Point (10°34'S., 149°53'E.) is 2 miles SE of Eagle Point. A light is shown from a white concrete tower situated on the summit of a 183m hill above Ava Point.

Kau Kau Bay (10°33'S., 149°55'E.) lies about 2 miles E of Ava Point and has good anchorage, in 18.3m, mud.

Gabusuaiaru Bay (10°35'S., 149°56'E.) lies E of Ekutoro Point about 2.75 miles E of Ava Point. Paupauri Island lies on the W side of the entrance to the bay. A village stands at the head of the bay.

Gabusunarea Bay (10°35'S., 149°57'E.), the next inlet to the E, is 3 miles in length and has depths of 7.4 to 18.3m. A

sunken reef lies in the fairway of the entrance to the bay. A bank, in a depth of 3.6m, lies in the S approach to the bay, about 1.5 miles SSW of its W entrance point. Several small villages lie on the shores of the bay.

Gabugoghi Bay (10°36'S., 149°58'E.), the next bay to the E, is small but contains good anchorage, with shelter from all winds. A prominent rock lies E of the entrance, it is a good guide for entering the bay. There are a few small villages about the shores of the bay.

6.58 Fife Bay (10°38'S., 150°00'E.), located E of Gabugoghi Bay, is about 2.5 miles in length and 1.25 miles in width. It is divided into two passages, the E about 0.2 mile wide and the W about 0.25 mile wide, by Opea Islet and Seuseu Islet, which are joined by a reef. Several other islets lie off the SE side of the entrance. Geduna Islet stands on a reef at the head of the bay. A reef lies on the E shore of the bay. A number of reefs and shoals lie in the bay and can best be seen on the chart of the bay.

About a dozen or so villages are situated on the shores of the bay. A number of buildings and a flagstaff are situated on the E side of the bay. Two small jetties extend from the S side of Isuleilei Point.

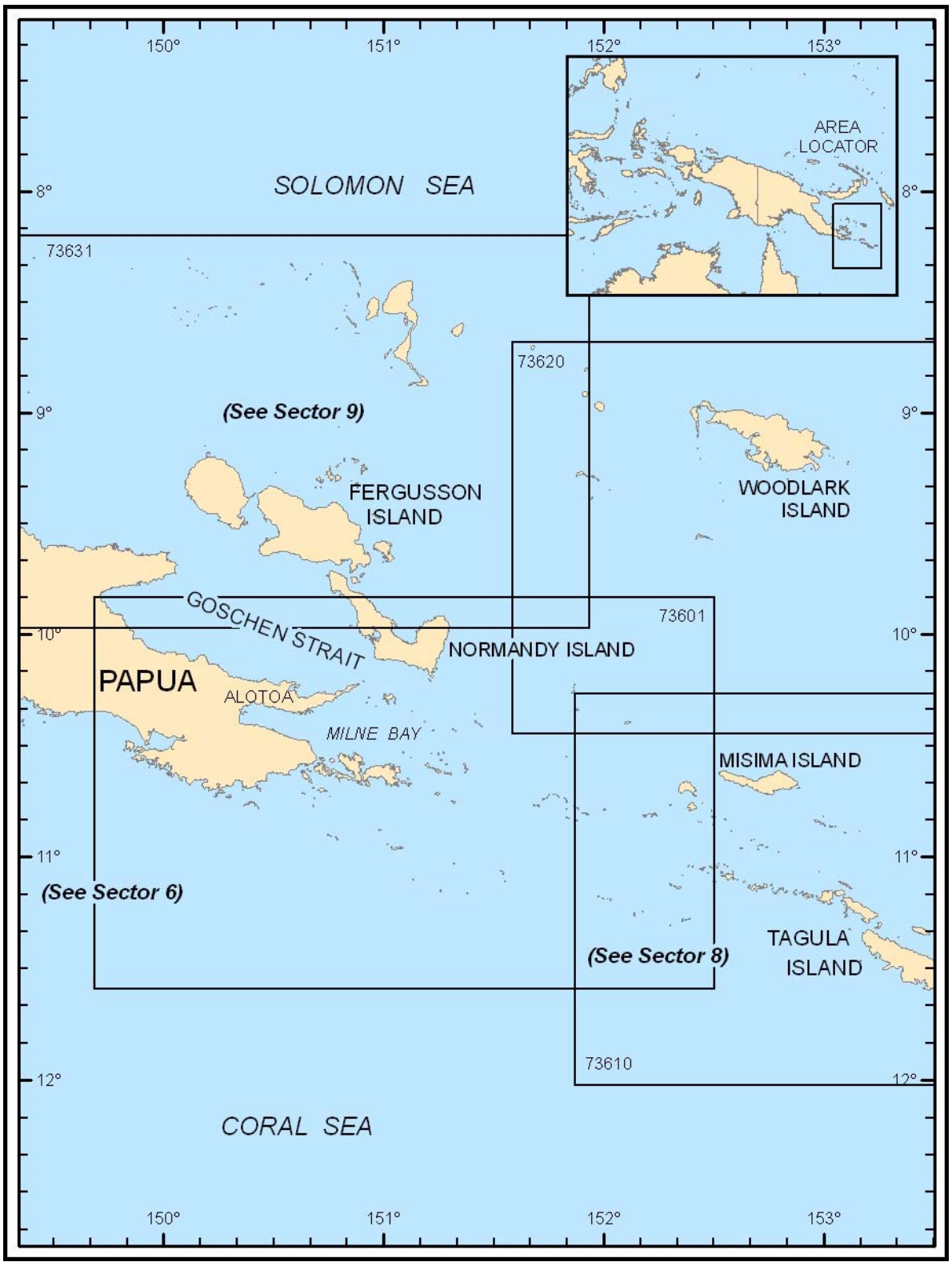
Anchorage in Fife Bay is considered poor. There is always a swell during both monsoons and SW winds raise a sea in the bay. Vessels can find good anchorage off Geduna Islet. There is a depth of 16.5m, mud, about 0.5 mile off the NW point of Geduna Islet, bearing 336°.

Lawes Bay (10°38'S., 150°03'E.) lies between Loua Point and Bouta Point. The bay has numerous reefs and shoals best seen on the chart.

6.59 Baxter Harbor (10°40'S., 150°09'E.) is a deep inlet 4 miles wide at its entrance between Tree Point and Guna Isu, which is a bold, steep headland that rises to 536m high and is conspicuous when seen from the W. The N shore of the bay is low and wooded, rising to a small coast range of cultivated nature. A shoal spit projects nearly 1 mile offshore about 2.75 miles NE of Tree Point.

Anchorage has been taken, in 31m, mud, just inside the entrance. This anchorage maintains calm water during the Southeast Monsoon.

South Cape (10°44'S., 150°14'E.) lies about 2.75 miles ESE of Guna Isu. The point is the S extremity of Suau Island, which is described in paragraph 7.2.



Additional chart coverage may be found in NGA/DLIS Catalog of Maps, Charts, and Related Products (Unlimited Distribution).

SECTOR **7** — CHART INFORMATION

SECTOR 7

EASTERN PAPUA NEW GUINEA—SOUTH CAPE TO EAST CAPE

Plan.—This sector describes the SE extremity of Papua New Guinea from South Cape SE to Deirina Islet then NE through West Channel and China Strait to Isulailai Point. Milne Bay lies N and NW of Isulailai Point and is discussed in order, then the coast trends NE to East Cape.

The islands and channels that are adjacent to the coast are described in order of occurrence in the W to E direction.

Guna Isu to Isulailai Point

7.1 The coast trends in a general ENE direction from Guna Isu for a distance of about 31 miles to Isulailai Point. It preserves the same broken character as the land to the W, but the mountain range E of the cape, closely following the bends of the coast, rises to heights of from 305 to 610m and slopes steeply toward the sea.

Caution.—The reef passes South Cape at a distance of 4 miles. The reef with a least depth in this area of 9.7m, SSE of South Cape extends in a ESE direction toward the Louisiade Archipelago. Thea description of the Louisiade Archipelago begins in paragraph 8.1.

Breakers have been observed about 5 miles SSW of South Cape in the vicinity of the Barrier Reef.

The Sunken Barrier Reef has not been surveyed up to date and in some sections uncharted dangers may exist.

7.2 Suau Island (10°43'S., 150°15'E.) rises to a height of 239m, about 2.75 miles E of Guna Isu. The island is fronted by a reef which extends up to 183m in places on its N side. A bay lies NE of South Cape, the S extremity of the island, that has isolated patches of 1.8 to 5.5m. The island is separated from the mainland by a channel 0.13 mile wide at its narrowest part, with a least depth of 9.1m in the fairway. Vessels should not use the pass without local knowledge.

Vehi, a small islet 42m high, lies close SSW of South Cape and Baibesiga, 182m high, lies 2.5 miles E of the same point. The SE side of Baibesiga is steep-to, but a shoal extends 0.2 mile from the SW extremity of the island and breaks with any swell. Baibesiga is remarkable for having a rounded peak at either end.

Modewa Bay (10°41'S., 150°20'E.) is entered 3 miles ENE of Suau Island. The depth in the entrance of the bay is 20.1m, but then the depth gradually decreases toward the head of the bay. Coral reefs, which partly dry, extend from each entrance point of the bay and narrow the entrance to about 1 mile. These reefs are steep-to on the seaward sides with off-lying patches in places.

There are several small villages on the E shore of the bay; behind the villages the land rises steeply to several peaks, with the highest one having a height of 442m.

The Gara River discharges into the NW side of the bay and is joined a few meters above its mouth by the Modewa River. The delta of the river is cleared and several villages are situated in the locality.

The reef which extends 1.5 miles SE from the W entrance point of Modewa Bay dries 0.3m. There is an extensive reef off the E entrance point of the bay which also dries 0.3m; a sand cay 3m high stands on the N side of this reef.

There is sheltered anchorage in Modewa Bay with the sand cay, mentioned above, in range with the summit of Badila-bedda-bedda-bonarua bearing 155°, in a depth of 14.6m, mud.

7.3 Off-lying islands and dangers.—The Brumer Islands are a group of five small basaltic islands lying about 7.5 miles E of South Cape and about 4 miles offshore. Between the reefs off the mainland and the islands, there is a channel 2 miles wide that has depths of from 26 to 48m. The shoals and reefs on the N side of the channel should be approached with caution, as they do not always break.

Badila-bedda-bedda-bonarua (10°46'S., 150°23'E.), the farthest W of the island group, has a remarkable castellated peak, 120m high, in its W extremity. A light, shown from a concrete tower 7m high, stands on the highest point of the island.

Harikoia, the second largest island in the group, lies 0.75 mile ESE of Badila-bedda-bedda-bonarua; this island is 165m high. The other islets of this group lies close SE of Harikoia.

Rae Patches are coral reefs that lie off the S side of the Brumer Islands group; there are charted depths of 7.3m over the reefs.

Brooke Banks (10°46'S., 150°31'E.), coral, with depths of from 9.1 to 16.4m, lie from 5 to 10 miles E of Harikoia, and are apparently steep-to.

There is a deep passage through the barrier reef SW of the Brumer Islands. The summit of Baibesiga bearing 350° leads through the channel; at night, the light on the summit of Badila-bedda-bedda-bonarua bearing 047.5° also leads through the channel.

7.4 The coast E of Modewa Bay is fronted by reefs to a peninsula 4.5 miles distant. There are three grassy conical hills on the peninsula; the highest one rises to 105m. Northeast of the peninsula are Bira Bira Bay and Guaugurina Bay.

Mount Brainble, with a double peak 396m high, is located 5.5 miles NNE of the peninsula. The land between these points falls sufficiently to permit a view of the country behind.

Mount Bossim (10°37'S., 150°33'E.), also on the coastal range, is a conspicuous peak, 425m high, on the N side of the approach to China Strait.

Deirina Island, 85m high, lies on the coastal bank close S of the above-described peninsula. A smaller island lies on the reef close S of Deirina. The bright green color of Deirina, in contrast with the dark green of the wooded hills on the mainland, helps identify the island.

Bira Bira Bay (10°41'S., 150°26'E.), open E, is entered between Deirina Island and a point 2.75 miles NE. Its shores are fringed by coral reef to a distance of 0.5 mile. There are several small openings in the reef that lead to the mangrove-covered

coast.

Good anchorage, in a depth of 16.4m, over mud, will be found in the S part of Bira Bira Bay, N of Deirina Island, between the island reef and the shore reef.

To enter Bira Bira Bay, steer for the N summit on the peninsula NW of Deirina Island on a course of 279°. This course will lead S of a 7.3m shoal 1.5 miles SSE of the bay's NE entrance; then bring the SE point of the peninsula in range with Brumer Islands Light, bearing 215°. Anchor when the N and E extremities of Deirina Island are in range 136°.

Tides—Currents.—In Bira Bira Bay, spring tides rise 1.7m and neaps rise 1.1m. Guaugurina Bay, the bay NE of Bira Bira Bay, is 5 miles wide, with depths of 22 to 24m near its center. The shores of the bay are fringed with coral in places.

A rock, 9.1m hig,h lies 1.25 miles E of the S entrance of the bay and a similar rock 6.1m high, lies 1.75 miles W of its N entrance. The depths extending 0.5 mile offshore of the 9.1m high rock are between 5.5m and 7.3m. Jones Patch, with a least depth of 5.2m, lies 1.5 miles S of the 6.1m high rock.. The approach to the bay lies between the S entrance point and Jones Patch.

7.5 **Quilty Patch** (10°41'S., 150°33'E.), with a least depth of 4.3m, lies 2.25 miles SE of Jones Patch. A 5.2m patch lies midway between Jones Patch and the N entrance to Guaugurina Bay; a shoal with a least depth of 7.9m lies 1.75 miles ESE of the N entrance point.

The land inside the coast from Guaugurina Bay to Isulailai Point, 10 miles NE, rises steeply to a considerable elevation with deep ravines. Both the summits and the sides of these mountains are covered with thick forests.

This coast forms the N shore of West Channel and China Strait.

Islands and Reefs Southeast of China Strait

7.6 The sunken barrier reef S of the islands off the SE end of Papua New Guinea, continues in an ESE direction beyond the Stuers Islands and are discussed beginning in paragraph 8.2. The shallowest parts are on a narrow ridge, broken in places by channels.

Tides—Currents.—On the submerged barrier reef, the tidal currents run at a rate of from 1 to 2 knots; their general direction is NE and SW, but at neap tides they are liable to be considerably modified by the wind. In the neighborhood of Wari Island their direction inclines more to the N and S; over Siriki Shoals they run strongly causing heavy tide rips.

The **Stuers Islands** (11°06'S., 151°08'E.) lie 46 miles SE of the Brumer Islands on the sunken barrier reef; there are two islets in the group. Marai is 20m high and Tauwewai, 1 mile NE, is 12.2m high. A reef, which dries 0.3m, lies 0.5 mile W of Marai. A large reef, which dries in places, lies 0.5 mile SE of Marai Island.

Uluma Reef (11°06'S., 150°59'E.), about 8 miles W of the Stuers Islands, dries 0.3m. The reef lies about 3 miles seaward of the barrier. During a month-long survey surf broke continuously on the reef, but it has been reported that in calm weather the reef is not indicated by surf.

The stranded wreck situated on the SW side of Uluma Reef is a good radar target from a distance of 12 miles.

An unexamined 14.6m shoal is reported to lie about 4 miles SW of the stranded wreck.

Blight Patch, of coral, in 11m of water, lies on the barrier reef 5 miles NW of the Stuers Islands. Heavy swells are reported on the patch and in the vicinity of a 4.5m shoal close N. The tidal currents in this area reach rates of 2 and 3 knots.

7.7 **Wari Island** (10°58'S., 151°04'E.), lying about 10 miles NW of the Stuers Islands, has a narrow range of hills traversing its entire length that terminates in a well defined peak at each extremity; the W peak is 117m high. In the center the hills dip considerably. A large reef lies parallel to the S coast of the island; the sea always breaks on this island. An islet lies on the E end of this reef and similarly an islet 15.2m lies off the NW extremity of the reef. These two islets have grass-covered summits.

Ikaikakeino Islet, 81m high, lies 0.75 mile NW of the W extremity of Wari Island; Mamaramamaweino Rock, 133m high, lies 1.5 miles farther NW. This is a steep mass of grey rock that is steep-to on all sides, and the summit and NW side have a scattered growth of trees. A bank with a depth of 16.5m extends for 0.6 mile off the rock's SW side.

This gray rock affords an excellent mark from all directions; its shape and isolated position make it appear larger and loftier than it actually is and from the dark color of its foliage it frequently shows when Wari Island can not be distinguished.

A small steep-to rock, 9.1m high, lies 0.5 mile N of the W extremity of Wari Island. There is convenient anchorage on a ridge of sand and coral, in a depth of 14.6m, between this rock and Wari Island, with the rock bearing 333° and the rock W of the island bearing 237°, but during N winds it is exposed and unsafe.

The tidal current runs with great strength between Ikaikakeino Islet and Wari Island.

Siga Islet (10°51'S., 151°08'E.), lying 7.25 miles NNE from the E extremity of Wari Island, is 29m high; it is an excellent landmark and is easily identified by its shape. A bank, with depths of from 7.3 to 14.6m, extends 2.5 miles in a NW direction and is generally marked by tide rips. Temporary anchorage may be obtained on the bank extending 2 miles NW from Siga Islet.

Close NE of Siga Islet, the current sets NNW up to 2 knots.

The Lebrun Islets, consisting of Rika-rika, 109m high, and Dogigi, lie 6.5 miles NW of Wari Island.

Siriki Shoals, occupying the greater portion of the area between Wari Island, the Lebrun Islets, and the Dumoulin Islets, are composed of narrow ridges of bright colored sand. There are patches with a least depth of 5.5m on the shoals. Shellard Ridge, the SE extremity of the shoal, lies 3 miles W of Wari Island, and has depths of 12.8 to 18.3m. Mariners are advised to not cross this shoal as other shoal patches may exist.

Caution.—Over Siriki Shoals, tidal currents run strongly, causing heavy tide rips.

7.8 The **Dumoulin Islets** (10°55'S., 150°46'E.) are comprised of a group of four islets and two rocks located 16 miles WNW of Wari Island. From S, the islets white cliffs show at times, great distinctness, forming a good landmark for vessels approaching China Strait from the S.

Baiiri Islet, 112m high, the largest and westernmost of the

group, is bold except on its NW side. The islets highest point is a conical peak.

Ana Karu Karua, the farthest E, lies 3 miles ESE of Baiiri. It is covered with grass and has a flat top 69m high.

Caution.—The depths off the S sides of these islets are irregular and vessels should not pass between them.

7.9 The Castori Islets is comprised of three islets. **Ilei Islet** (10°46'S., 150°41'E.), the southernmost and largest of the islets, rises to a height of 82m; the islet is fairly steep-to and is covered with scrub. The farthest N of this group, is a dome-shaped islet 47m high, that lies 2 miles N of Ilei Islet. The other islets and rocks of this group, lie about midway between the two larger islets. A bank, with a depth of 9.1m, extends 1 mile E from this middle group.

The Arch Islets are two small islets that lie 3 miles NW of the center of the Castori Islets. The largest of these two islets rises to a height of 105m. The islets, which lie close together, are wooded and are surrounded by a reef, which extends to a distance of 183m.

A shoal, with a depth of 11m, is charted 1.5 miles SSW of the Arch Islets.

Sapikunuri (10°42'S., 150°36'E.) is a rocky islet 7.6m high lying on the SE side of West Channel, about 2 miles NW of the Arch Islets. Shallow water extends all around the islet and a 9.1m patch lies about 1 mile NE of it.

Nasariri (10°44'S., 150°45'E.), on the S side of East Channel, is a rocky, wooded, and beehive-shaped islet, 70m high. Nasariri lies on a shoal, with a depth of 11m near its SW extremity, about 9.5 miles ESE of Sapikunuri.

7.10 Doini Island (10°42'S., 150°43'E.) lies about 2 miles NW of Nasariri Islet; it is about 2 miles in length and about 1 mile in breadth. The island rises to a height of 155m in its NE part. Except on the SW side, the island is fringed with a reef.

A ridge with shallow water extends 0.5 mile off the S extremity of the island. A rocky islet, with a few trees on it, is located near the outer end of this ridge. Tuyam, a grassy islet 49m high, lies on the outer extremity of a reef, 0.55 mile E of the eastern point of Doini.

Sheltered anchorage may be obtained off the village of Baibai (10°41.3'S., 150°42.9'E.), near the N extremity of Doini Island, where there is a break in the reef, in a depth of 22m, about 0.3 mile offshore.

An islet, 75m high, lies 1.25 miles NW of the W extremity of Doini. A rock lies about midway between these two islands.A shoal, consisting of two 5.5m patches, lies about 1.25 miles W of the 75m high islet; a reef, with a rock 3m high on it, is located 1 mile NNE of the same islet. There is a 11m shoal 1.25 miles S of Tuyam Island.

7.11 Rogeia Island (10°38'S., 150°39'E.), located on the SE side of West Channel, is about 4 miles long in a NW and SE direction and about 1.25 miles wide. There are two peaks in the NW part of the island that appear saddle-shaped when viewed from the E or W. The SE peak is the highest and rises to a height of 370m.

The SW side of the island is clear of off-lying dangers but on the NE side there are several.

A reef extends 0.33 mile SE from the S extremity of the island; there are three prominent rocks on this reef.

A reef, which dries 1.2m, lies 0.85 mile NE of the S extremity of the island and a wooded islet is located 0.65 mile NW of the drying reef, with foul ground between them.

Anchorage may be obtained in the bay on the E side of Rogeia Island, in depths of from 18.3 to 22m, sheltered from the SE winds.

A crescent-shaped island, 0.75 mile in length, lies N of Rogeia Island and is separated from it by a channel, 183m wide. The NW point of this island is a steep, wooded, knoll with a red cliff, facing West Channel.

A narrow rocky bank with depths of 3.7 to 7.3m extends 0.5 mile NW from the red cliff. There are current swirls and eddies over this bank and when the wind is in a contrary direction there are heavy overfalls.

A rock, in a depth of 1.8m, lies about 1 mile E of the red cliff. It has depths of from 9.1 to 11m N and S of it but there is less water off the NW end. The rock is easily seen from aloft and occasionally breaks.

Mount Bossim, on the mainland open N of the red cliff, bearing about 268°, leads N of the rock.

7.12 West Channel (10°40'S., 150°35'E.), the SW approach to China Strait, lies between the mainland and Rogeia Island, which lies 1.75 miles offshore. It is free from dangers except for the 7.9m shoal that lies 2.25 miles SW from the W extremity of Rogeia Island, and Weku una (Wekuuna), a rock, fairly steep-to, which dries 0.6m. Weku una lies on the W side of the fairway, 1.25 miles NW of Rogeia Island.

A light is shown ,at an elevation of 7m, from a white column on a concrete base on Weku una.

East Channel (10°39'S., 150°43'E.), the SE approach to China Strait, lies between Rogeia Island and Sariba Island, 2 miles NE. Samarai Island and a smaller island lie in the middle of the channel at its NW end. Vessels crossing the barrier reef E of Uluma Reef might find it advantageous to use this channel.

Samarai Island (10°37'S., 150°40'E.) lies about 1 mile NE of Rogeia Island. The island rises to a height of 47m in its SE part. There is a deep channel on either side of the island, and it is fringed by a reef except on its NW side where there is a wharf. The reef dries about 137m off the NE side and about 0.1 mile off its SW side. A circular shoal, with a least depth of 3.9m, lies about 137m N of the main wharf. A light is shown from a steel pile structure, 6m high, situated approximately in the center of this shoal. A 5.5m patch is located about 36m SW of the light structure.

A thickly-wooded islet lies about 0.5 mile NW of Samarai Island; it is fringed by a reef extending about 91m from its W side.

7.13 Samarai (10°37'S., 150°40'E.) (World Port Index No. 53170) is the settlement on the NW side of Samarai Island. The Main Wharf (No. 1) is 93m long and 13m wide, with a depth of 7.8m alongside. Vessels are advised to berth port or starboard side-to by port officials. Ship's equipment is used for cargo work. Tankers also berth at this wharf.

A private coastal wharf operates W of the main wharf.

Tidal currents between Samarai and the islet 0.55 mile NW, are reported to be irregular and often attain a velocity of 6

knots; there is hardly any slack water, but the full strength of the current only lasts about 1 hour. A strong tide rip extends about 0.2 mile from the N end of Samarai.

The spring tides rise 1.8m and the neaps rise about 1.1m.

Pilotage is not available. VHF channels 6, 8, 12, and16 are available. Limited water, marine diesel fuel, and some provisions are available. Bunkering is supplied by pipeline. Air service is at nearby Gurney.

The International flag "N" is placed on the end of the wharf from which the tidal currents flow. Slack water is indicated by placing the flag at the center of the wharf.

Anchorage may be taken about 0.3 mile W of Samarai Light, in a depth of about 33m, or 0.8 mile SW of the light, in a depth of about 29m, coral and sand.

Caution.—Care is needed while berthing as patches, with a depth of 6.7m over them, lie 91m NNW of the N end of the main wharf.

7.14 Sariba Island (10°36'S., 150°42'E.) lies on the N side of East Channel and is separated from Papua New Guinea by China Strait. The island is irregular in shape, about 5 miles in length in a NW and SE direction, and 2.5 miles wide at its widest part. The island rises to a height of 296m in its W part.

Anchorage may be taken in the bay S of the 296m height, in a depth of 22m, mud, with the W entrance point of the bay in range 281° with the N extremity of Samarai Island.

A thickly-wooded islet connected to Sariba Island by a reef lies close N of the W extremity of the island. A 4.5m shoal, steep-to, is located 0.4 mile NNE of the islet.

Anchorage may be taken E of above-described shoal, in a depth of 13 to 16.4m, mud, with the light on the N extremity of Sariba Island bearing 030°, 0.8 mile distant. A shoal, with a least depth of 7.6m, lies close N of the anchorage.

A reef-fringed islet lies on the E side of China Strait, 1 mile NNE of the N extremity of Sariba Island. A smaller mangrove islet stands on the S side of the reef. The W side of the fringing reef has been reported to be extending farther W.

Igwali Island, larger than the islet described above, 1 mile NE of the N extremity of Sariba, is thickly wooded and rises to a height of 122m.

7.15 Ito Island (10°34'S., 150°46'E.), about 1.5 miles in length, lies 1.5 miles E of Igwali Island. It is indented on its NW and S sides, and rises to a rounded peak 152m high. Its shores are, for the most part, composed of mangroves, and the underbrush is so thick as to be almost impenetrable. A belt of coral fringes the island.

A shoal with a least depth of 7.3m lies 0.4 mile E of Igwali Island and a 3m spot lies about 0.2 mile NW of the N extremity of Ito Island.

An islet, fringed by reef, lies about 0.75 mile E of the light on the N extremity of Sariba Island. There is a bay between this islet and the light but it is not advisable to anchor here, owing to the strong tidal stream eddying around the islet. There is a rock with a depth of 0.3m in the mouth of the bay.

An island 108m high, with a rounded summit, lies 1 mile SSE of Igwali Island, 0.15 mile off the NE side of Sariba Island. Between these two islands are several shoals with depths of from 3 to 7.6m.

A prominent double-topped hill, 192m high, lies near the NE end of a peninsula, 0.8 mile SE of the above island. A shoal with a least depth of 1.2m, lies 1.5 miles ENE of the double-topped peak. A rock 12.2m high, lies about 1.5 miles SE of the same peak. A reef extends 0.15 mile N of the rock.

A channel 91m wide, with a depth of 9.1m in the fairway, separates the SE end of Sariba Island from the W extremity of Sideia Island. The tidal currents in the channel attain a rate of 7 knots, with dangerous overfalls and eddies, rendering navigation hazardous except at SW.

7.16 Sideia Island (10°36'S., 150°50'E.), lying E of Ito Island, and Sariba Island, is about 8 miles long in an E and W direction and is about 7.5 miles in breadth in a N and S direction. Jenkins Bay indents the W side of the island to a distance of about 6.75 miles.

The land rises to narrow thickly-wooded hills. Mount Kopaki, 393m high is the highest point in the island.

Jenkins Bay opens toward China Strait. The area NE and E of Sariba Island in the vicinity of Jenkins Bay has not been surveyed.

The S side of Sideia Island is fronted by East Channel; it is steep-to and indented by several bays. Bagamoti Islet, covered with scrub, is located 3 miles SE of the W extremity of the island.

Margaret Island (Populai Island) (10°40'S., 150°53'E.), located 0.5 mile off the SE point of Sideia Island, has a fairly level thickly-wooded summit, 152m high.

The channel between these two islands has depths from 12.8 to 37m. At spring tides the current runs strongly through this channel; it is advisable to close Margaret Island shore in passing through.

The SE extremity of Sideia Island is fringed by a coral reef extending 183m offshore. The E coast of the island extends N from the SE extremity and is indented by two bays near the N end of this stretch, which are dangerous to enter; these two bays are fronted by an islet. Negro Head is located about 3.5 miles NW of the islet. A reef extends 4 miles E of Negro Head; breakers are distinctly seen on this reef.

7.17 Challis Head (10°32'S., 150°48'E.), the NW extremity of the island, lies 3.25 miles W of Negro Head and, like the former, has a coral reef which extends 0.25 mile from it in an E direction. The bay which lies between these points is fouled with coral reefs.

Caution.—The N side of Sideia Island has not been closely surveyed, and due caution must be used when navigating here.

A chain of rocks and shoal water extends 4 miles WNW of Challis Head to the E side of China Strait. At the outer end of this chain there are three patches with depths of 1.2m or less. These patches show distinctly, but rarely break. About 0.75 mile SE of these patches there is a triangular reef which dries. Within 0.5 mile radius N to E of the NE point of the triangular reef, there are five drying reefs. A depth of 4.6m lies 1 mile E of the triangular reef.

These dangers may all be seen on the chart.

7.18 Basilaki Island (10°38'S., 151°00'E.) is separated from the SE side of Sideia Island by Fortescue Strait. The strait is about 0.2 mile wide at its S end, opening to a width of 1.5

miles at the N end.

Basilaki Island is 10 miles in length in an E and W direction and has an average width of 3.5 miles. The higher grounds are covered with a thick forest of tropical trees. Mount Fairfax, one of three peaks on the ridge that forms the backbone of the island, has a knob shaped summit, 503m high, that is conspicuous from all directions.

A small conical islet lies close off the SW extremity of Basilaki Island; it is connected to the mainland by a sunken reef.

Weitoa Island (10°40'S., 150°56'E.) is separated from the SW peninsula of Basilaki Island by a channel 0.2 mile wide. An unexamined shoal with a depth of 11m, coral and sand, lies about 2.5 miles SW of Weitoa Island.

Hoop Iron Bay lies on the SW side of Basilaki Island, N of Weitoa Island. Good anchorage, protected from winds except those from the E and SE, may be found, in a depth of 24m, stiff mud, in the small bay on the NE side of Weitoa Island, with the N entrance point of the bay bearing 313°; it is out of the influence of the tidal current.

There is also anchorage in the same depth in the NW part of Hoop Iron Bay.

In the channel between Weitoa Island and Basilaki Island, the flood current sets to the W and the ebb current sets to the E. Many tide rips and eddies occur in this vicinity at springs when the tidal current attains a velocity of more than 4 knots.

The coast between the E entrance point to Hoop Iron Bay and a point lying 4 miles ESE is indented by five sandy coves, separated by rocky points. A rock, which generally breaks, lies 0.5 mile off the coast, 1.5 miles SE of the E entrance of Hoop Iron Bay.

Rocky Islet, 24m high, is a dark-colored rock with a thin covering of grass on its summit, that lies 2 miles W of South Point. The islet appears to be steep-to on all sides.

7.19 South Point (10°41'S., 151°02'E.), in the S extremity of Basilaki Island, is a well-defined bluff. The rocky and steep coast trends NE 1 mile from South Point to the S point of a bay. A coral reef extends 0.15 mile from the N shore of this bay and a reef, which dries, runs parallel to the N shore and around the NE entrance point of the bay for a distance of 1.5 miles. Foul ground continues to within 1 mile of the S entrance point of Pitt Bay.

Haines Island (10°41'S., 151°04'E.) lies close off the SE extremity of Basilaki Island. The island has a saddle-shaped summit, which rises to a height of about 76m. These two peaks are steep and covered with trees on the W side, but show a grassy slope to the E.

Kaiti Island (Connor Island), located about 1 mile NE of Haines Island, rises to a height of 172m near its center. The NW side of the island is steep-to and the SE side of the island terminates in a small pyramid-shaped rock, almost detached.

The channel between Kaiti Island and Haines Island is about 1 mile wide and has depths of more than 37m. A black rock, about 1m high, is located near the NW end of the channel and vessels making for Pitt Bay should pass E of this rock. The current in the channel has been estimated at 3.5 knots at spring tides.

An islet 101m high, lies about 0.5 mile E of Kaiti Island and Babagarai Island, 24m high, lies on the same reef about 0.5 mile farther E.

Kita-bona-bona Island, about 1 mile NE of Kaiti Island, is thickly wooded and about 27m high; it is surrounded by a strip of sandy beach. The channel between these two islands is fouled by a steep-to sunken coral patch, in 3.7m; its use is not recommended.

7.20 Pitt Bay (10°38'S., 151°04'E.), the largest bay on the E coast of Basilaki Island, has depths that vary from 26 to 33m, sand and coral, but detached shoal areas with depths of 0.3 to 9.1m lie within 0.75 mile of the NW side and head of the bay.

The N entrance point to Pitt Bay is well-marked by a conical brown rock 7.6m high that resembles a can buoy. There are rocks, dangerous to navigation extending 0.75 mile offshore within the bay about 1 mile SW of the brown rock.

Pitt Bay affords good anchorage except during strong NE to E winds, in 22m, coral and sand, with the conical brown rock, bearing 040°. Vessels approaching the bay from the NE should take care to avoid the 5.5m shoal lying about 1.25 miles 110° from the conical brown rock.

The coast of Basilaki Island trends N from the N entrance point of Pitt Bay, about 1.75 miles to Cape Lookout, the NE extremity of the island. Mount Fairfax has a succession of regular, conical peaks, gradually decreasing in height as they approach Cape Lookout. These peaks are remarkable in appearance when viewed from the NW of SE.

7.21 North Point (10°35'S., 151°02'E.), 2.5 miles WNW of Cape Lookout, is the W entrance point of a bay that is divided in two arms by a tongue of land. An islet, encircled by a coral reef, lies close N of this tongue of land. A patch with a least depth of 6.4m lies 0.75 mile ENE of the islet.

Vessels may obtain anchorage in the E arm of the bay, in a depth of 29m, mud. Good anchorage may also be obtained SW of the islet, in depths of 26 to 29m, mud, but local knowledge is required.

Hewoli Point lies 2 miles WSW of North Point and White Point lies 5 miles farther W. Steep-to coral patches with depths of from 3.7m to 5.5m lie from 0.5 to 1.25 miles off the N coast of Basilaki Island between Hewoli Point and White Point.

Grant Islet (10°33'S., 151°02'E.), located about 1.75 miles NNE of North Point, is composed of coral. The islet is surrounded by reefs extending 0.25 mile offshore.

West of Grant Islet, discolored water, in which depths of 7.3 and 9.1m were obtained, extends toward North Point and Sideia Island.

Caution.—The N coast of Basilaki Island is not closely surveyed and caution must be used in navigating this area.

China Strait—Northwest Side

7.22 Gesila Island (10°35'S., 150°38'E.), lying about 2.5 miles NE of Weku una and 1.75 miles NW of Samarai, is located 0.4 mile offshore and nearly parallel with the coast NE of it. The island, thickly wooded at its NW end, is 67m high and steep-to on its S side. The 11m line lies about 0.2 mile off its SE extremity. The island is used as a quarantine station.

A shallow bay lies 1 mile N of Weku una, and a bay, with soft mud at its entrance, lies NE of Gesila Island.

A steep-to point is located on the mainland about 2 miles NE of the E extremity of Gesila Island. A depth of 10.3m lies about

160m SE of this point. A rock, with a depth of 0.9m, lies 0.5 mile NE of this point and about 0.2 mile offshore. There are depths of 16.4 to 18.3m off the S side of this rock and 11 to 14.6m between the rock and the shore. This danger lies in the way of a vessel passing along the shore to avoid the tidal currents and only shows well under favorable conditions. The water is discolored by a stream which discharges 0.4 mile W.

7.23 Isulailai Point (10°34'S., 150°42'E.), a low point, is the SE extremity of Papua New Guinea. The land 0.5 mile W of the point rises to a hill 146m high. A reef extends about 183m SE of the Point.

A light is shown from a white column on a concrete base, 3.7m high, on the point. A conspicuous yellow windsock 0.4 mile SW of Isulailai Point is a useful landmark.

A coral patch, with a depth of 7m, lies about 0.25 mile offshore, 0.45 mile N of Isulailai Point. A 7.3m patch lies 0.13 mile farther N. These two patches are not generally visible from aloft.

An island, 18.3m to the top of the trees, lies close offshore, 5.25 miles NNW of Isulailai Point. The island is fringed by a reef to a short distance only, with deep water beyond.

A shoal, with a least depth of 2.4m, lies 0.3 mile E of the S end of the island.

Caution.—Dorasi Shoal (10°31'S., 150°42'E.) is a narrow ridge of sand about 1.5 miles in length in a NW to SE direction, with a least depth of 3.6m near its center, which lies 3 miles N of Isulailai Point Light. The shoal is steep-to on its N and S sides, but it only shows when the light is favorable.

China Strait

7.24 China Strait is the narrow deep-water channel between the SE extremity of Papua New Guinea and Sariba Island. It is about 4 miles in length in a NE and SW direction, and about 0.75 mile in width at its narrowest part, which is at its N entrance. Depths in the fairway exceed 26m, except for the previously-described dangers.

During the Southeast Monsoon season, the positions of the higher mountains, which on a clear day would be visible, are indicated by a thick cloud hanging over the land. In these conditions, while yet outside the barrier reef, the Brumer Islands show clearly. The most conspicuous peak on the Brumer Islands is the castellated summit on the W island; farther N the bright green hills of Deirina Island are visible against the darker coastal hills.

When a vessel is near the fairway over the sunken barrier reef, Rogeia Island is visible against the coastal mountains of the mainland. Sariba Island is visible over the SE part of Rogeia Island. The double-topped island of Doini and the peaks of Basilaki are also visible from the fairway.

Tides—Currents.—In the narrow part of China Strait, the currents run from 3 to 6 knots, decreasing to 2 or 3 knots in the wider parts and approaches. The NE current commences about 3 hours before HW by the shore and runs until about 3 hours after; the SW current runs for the remainder of the 12 hours. The currents, however, vary 1 hour or more on either side of the times given. Strong E winds retard the NE current considerably.

In West Channel, the currents follow, approximately, the trend of the coast. At quarter flood at Samarai Island the SW current is slackening; shortly afterwards the NE current begins to make itself felt outside West Channel and, meeting the opposite current, causes tide rips in the vicinity of Weku una. There is comparatively little current in the bight N of Weku una.

In East Channel, the tidal currents set strongly through the passes between Rogeia Island and Doini Island, but they are not nearly as strong as those in West Channel. The SW current through China Strait, impinging on Rogeia Island, runs partly through West Channel and partly through East Channel along the island's shore, while close along the S shore of Sariba Island there is no current.

The NE current impinging on Sariba Island is partly deflected to the NW and, uniting with the NE current from West Channel at springs, causes heavy tide rips and overfalls at the N entrance of China Strait.

A strong eddy will be found on each side of China Strait, and near the shore NW of Isulailai Point. It should be remembered that the ebb current sets obliquely on this point.

On the sunken barrier reef to the S of China Strait the tidal currents run with a force of from 1 to 2 knots and in a general direction of NE and SW, but at neap tides they may be considerably modified by the wind. In the neighborhood of Wari Island their direction inclines more to the N and S. Over Siriki Shoals the tidal currents run strongly, causing heavy tide rips.

In the vicinity of the Brumer Islands, the currents are less strongly felt; during the Southeast Monsoon season an almost constant current appears to set toward the W, although it is distinctly affected by the ebb and flood currents.

Directions.—China Strait may be entered from the S by passing either through West Channel or East Channel. In approaching the strait from the southward it is recommended to make the Dumoulin Islets, about 20 miles SE of Papua New Guinea, which frequently show clearly when the other islands can not be seen. There are several good approaches through the barrier reefs W of these islets, then to West Channel.

Vessels with a draft not exceeding 7.6m may approach from the W, with the summit or the light on Badila-bedda-beddabonaru bearing 093°. This course will lead across the barrier reef and leads close S of a 9.8m patch and N of a 10.1m patch. When in a position about 2.5 miles from the light a vessel should steer 071° to pass 0.75 mile N of the island then steer on Sapikunuri until the light astern bears 245°, then steer a course of 065° to West Channel. The 065° course leads over a 11.9m patch and close N of a 11.6m patch.

The track from SW leads, in deep water, through the barrier reef in a position about 5 miles from Badila-bedda-beddabonarua, with the light bearing 047°30'; when about 3.5 miles from the light, steer 000° to join the track from the W. This same break in the reef may be crossed with the summit of Baibesiga Island in range 350°.

A good approach that can also be used crosses the barrier reef with the Arch Islets bearing between 033° and 001°.

Approach West Channel on the 065° course until the light on Weku una bears 019° when that course should be steered. This course will pass E of a depth of 7.9m. Once past this depth mid-channel courses may be steered through China Strait, taking care to avoid the previously-described shoals and steer to pass E of Dorasi Shoal, at the N entrance.

In entering China Strait from the N these directions must be

reversed.

East Channel, which leads N of Doini Island, is free of dangers, except for the reef off the E extremity of Rogeia Island.

A vessel, having cleared the Lebrun Islets, may steer to pass midway between Samarai Island and Sariba Island to China Strait, then as directed above under West Channel.

Caution.—The land in the vicinity of China Strait is frequently obscured by rain.

Milne Bay

7.25 Milne Bay is about 7.5 miles wide between Saraoni Island, the S entrance point, and Killerton Point, the N entrance, and extends W about 20 miles to its head. To the W of Saraoni Island, the S shore of the bay continues bold and steep and is slightly indented by a succession of bights.

At the head of the bay a thickly-populated plain extends 4 or 5 miles inland to a low mountain range, and then to the W the Owen Stanley Range rises. Running parallel to the latter range and separated by extensive valleys is the Stirling Range, extending along the N coast of the island.

The N shore of Milne Bay is also mountainous, rising to heights of over 914m. The coast is indented by a series of bights and the E entrance is fronted by the Killerton Islands. The bay has charted depths over 549m.

Milne Bay—South Side

7.26 The bold shore line rises quickly to a height of 305m, at distances from 0.75 mile to 2 miles inland, however, W of Discovery Bay it is over 2.5 miles inland and N of this height the land is relatively low and flat to the coast. Mount Allemata, 678m high, is located about 2 miles inland, 18 miles WNW of Saraoni Island.

The coastal water along the S coast of Milne Bay is free of charted dangers as far W as Discovery Bay, except for a dangerous rock charted at the mouth of the Dawa Dawa River, about 10 miles WNW of Saraoni Island.

Saraoni Harbor (Kana Kopi Bay) (10°29'S., 150°39'E.) is entered between the W edge of Saraoni Island and a point about 0.2 mile W. The bay has general depths of 18.3 to 27m to within 183m of its head, and extends for about 0.4 mile in a southerly direction. At the head of the bay there is a dock and a pier.

Discovery Bay (10°25'S., 150°24'E.) (World Port Index No. 53195) from seaward appears low and wooded; it may be identified by the bright green trees in the background. The W part of the bay is distinctly marked by a reef, which is partly awash.

An L-shaped wharf is situated at the E entrance point of the bay. There is a depth of 5.2m along its NW face and a depth of 11.3m alongside its SW face.

The village of Waga Waga is situated at the head of the bay. Several ruined wharves lie on the E shore and at the head of the bay.

Anchorage may be taken in the middle of Discovery Bay, in depths of 22 to 26m, sand and mud. The E shore should be favored by entering vessels, since it is steep-to. The reef on the W side should be avoided, as its inner portion is not always discernible.

Between Discovery Bay and the SW extremity of Milne Bay, the shore is fronted by reefs and shoals extending as far as 0.3 mile offshore in places.

From Saraoni Harbor, the coast trends in a WNW direction about 15 miles to the E entrance of Discovery Bay.

Milne Bay—North Side

7.27 From **Killerton Point** (10°21'S., 150°38'E.), close W of the Killerton Islands, for about 13 miles W to Stringer Bay, the N shore of Milne Bay is steep-to and indented by a series of small bays along the foot of the Stirling Range.

Lihitabu Point lies 2.5 miles W of Killerton Point. There are several small inlets between these two points that are fronted by shoal water. A 9.1m depth lies about 0.2 mile S of Lihitabu Point.

Alotoa (Sanderson Bay) (Alotau) (10°19'S., 150°27'E.) (World Port Index No. 53165) is situated on the N shore of Milne Bay 8.5 miles WNW of Lihitabu Point. The district administrative headquarters is situated here. The port is marked by a light. The tidal range is approximately 1.1m. The largest vessel to visit this port had a length of 205m and draft of 8.0m.

On the W entrance point of the bay there is an L-shaped wharf with a head 36m long, having a depth of 6.7m alongside.

Off Kopi Point lies Berth No. 1 (Overseas), a wharf for ocean-going vessels, is the southernmost wharf in the harbor. The wharf has a length of 93m and a depth of 8.4m alongside, and can handle containers, general, and bulk cargo. A berthing dolphin is to be added. Berth No. 2 (Coastal), just N of the Berth No. 1, can handle tank vessels. The wharf has a length of 56m and a depth of 4.9m alongside. A barge ramp is situated just N of the Berth No. 2 and has a width of 8m.

Approximately 120 vessels visit the port annually. There is a bunkering facility and water is seasonally available.

Pilotage is not compulsory for Alotoa, however, if pilotage is required, a request via Port Moresby radio (P2M) should be made, giving 48 hours notice of ETA. The vessel's arrival should be sent not less than 12 hours via Port Moresby radio and is to be confirmed not more than 5 hours or less than 4 hours prior to arrival, again via Port Moresby radio. The pilot boards about 0.6 mile SSW of the light.

Milne Bay—Head

7.28 The head of the bay extends in a general N and S direction and is about 5 miles in length. The N shore of the head of the bay is low and featureless, with dense groves of coconut palms backed about 2 miles inland by heavy jungle.

The head of the bay is fronted by numerous mud banks which extend up to 0.45 mile offshore. There are several rivers which discharge into the bay in this area and after rain, torrents of water flow into the bay and discolor the water for some distance from shore, producing the appearance of shoal water.

Stringer Bay (10°18'S., 150°24'E.), on the N side of the bay, 2.5 miles W of Alotoa, affords anchorage, in depths of 11 to 36m.

The Aleford Islets, a group of four small islets, lie from 1 to 2 miles offshore at the head of the bay. They are surrounded by reefs, but the depths E of them increase from 18.3m at 0.5 mile off to 37m and 55m from 1.5 to 2.5 miles off.

A rock, with a least depth of 3m, lies 1.75 miles SSE of the

Alotoa

easternmost islet of the Aleford Islets; a shoal patch with a depth of 2.1m lies about 0.9 mile NW of this rock. Shoal patches, with a least depth of 2.1m, lie 0.5 mile to 1 mile S of this rock.

Giligili Anchorage (Gili Gili Anchorage) (10°25'S., 150°22'E.) lies in the NW part of Milne Bay, close W of a small islet that lies about 0.15 mile offshore SW of Stringer Bay. The anchorage provides good holding ground, in 9.1 to 37m, gray mud. Should protection from SE winds, which blow strongly at times, be desired, anchorage can be taken W of the NW islet of the Aleford Iselts.

A shoal of coral formation, with a depth of 14.6m, lies about 0.8 mile NNE of the NE islet of the Aleford Islets.

Waga Anchorage is situated in the SW part of Milne Bay and affords anchorage for several vessels.

Killerton Point to East Cape

7.29 From Killerton Point, the coast trends in an ENE direction about 16 miles distant to **East Cape** (10°14'S., 150°52'E.). Mount Geragera, 506m high, rises 3.75 miles NE of Killerton Point; Mount Killerton, 491m high, rises 1.5 miles farther ENE. From the SE and NW, the summit of Mount Killerton shows as three round knobs; the middle one is highest. Towards East Cape, the E extremity of Papua New Guinea, the valleys between the hills become deeper, giving the point, the appearance of islands, when seen from a distance.

Killerton Bay (10°21'S., 150°40'E.) is entered between Killerton Point and a point nearly 4 miles NE. The shores of the bay are low, wooded, and partly cultivated.

The Killerton Islands, located in the SW part of the bay, consist of three principal islands and four smaller islets. They are wooded and lie in a general E and W direction. The islands of this group are surrounded by reefs and shoal water. There are deep water passages between the larger islands of the group, but local knowledge is required to transit them.

Waga Tu Maiawa Island, the westernmost of the group is fringed by a reef and is separated by Mahabarina Island (0.5 mile NE), the northernmost, by a deep channel 0.2 mile wide in the middle of which lies Messum Rock. A shoal in a depth of

Alotoa

3.8m lies about 0.4 mile WSW of the SW point of Waga Tu Maiawa Island.

The coast between Killerton Bay and Nuamuri Point, 4.5 miles ENE, forms several sandy bays, with foul ground extending up to 0.5 mile off them.

Kubui Point (10°15'S., 150°50'E.), bold and steep, and backed by a hill with a double summit 123m high, is located 5 miles NE of Nuamuri Point. From Kubui Point the coast trends NE for 3 miles to East Cape.

Caution.—Sullivan Patches (10°22'S., 150°45'E.), with a least charted depth of 5.5m, lie 3.5 miles S of Nuamuri Point. Yunnan Shoal, with a charted depth of 2.7m lies, 1.25 miles S of the same point. A 9.1m shoal lies about 0.8 mile NNE of Yunnan Shoal.

A depth of 7.3m has been reported to lie 1 mile SW of Kubui Point.

As the waters in this area have not been completely examined, on no account should vessels pass N of Sullivan Patches.

East Cape

7.30 **East Cape** (10°14'S., 150°52'E.) is the E extremity of the peninsula forming the N side of Milne Bay. About 0.3 mile SW of East Cape there is a double peak, 128m high, that is the termination of the range along this peninsula. This peak is wooded on the NW and S sides but is cultivated on the NE side.

Discolored water was reported to exist about 1.5 miles SW of East Cape.

There are several islands and dangers lying in the approach to Goschen Strait when coming from the S or E. The main channels have sufficient water, but are not marked by buoys. Most of the channels may only be navigated with the sun in a favorable position.

Meimeiara Island (Mei-Mei-ara Island) (10°13'S., 150°53'E.) is thickly wooded and lies on the shelf that extends ENE of East Cape. Near the middle of the island a grassy mound rises to a level with the top of the trees.

A fringing reef extends 0.25 mile from the N side of the island and 183m from its W side. Foul ground and numerous shoals exist within a radius of 1 mile S through NE of the island. There is a light on the S coast of Meimeiara island.

Caution.—The light is obscured ENE of Boia-boia-waga Island.

7.31 Meimeiara Island is separated from East Cape by Hornbill Channel, which will accommodate vessels of 3.7m draft. There is a considerable tidal current through the channel and with a SE wind a breaking sea extends across the passage. The passage may be made keeping close to the reef on the E side of the channel. Local knowledge is essential to make this passage.

Jackdaw Channel is about 0.2 mile between the 5.5m lines on either side, with a least depth of 6.1m in the fairway. This channel passes between Meimeiara Island on the SW and Boia-boia-Waga Island on the NE. Mount Fairfax, on Basilaki Island in range 165° with the W tangent on an islet in the Obstruction Islands leads through Jackdaw Channel clear of the dangers.

Boia-boia-waga Island (10°13'S., 150°54'E.), 1.25 miles NE of Meimeiara Island, is wooded and surrounded by a fringing reef. A sand bank, awash at HW, lies 0.5 mile W of the island. There is a depth of 4.6m charted about 0.3 mile S of the sandbank and a depth of 5.2m about 0.4 mile SSW of the same bank. These depths lie on the E and W sides, respectively, of Jackdaw Channel.

Taodovu Reef, about 1.5 miles long in a N to S direction, lies 2 miles E of Boia-boia-waga Island. There are depths from 1.8 to 3.7m over the reef. A steep-to patch with a depth of 2.5m lies about 0.5 mile NW of the N end Taodovu Reef.

Messum Channel is about 0.2 mile wide and lies between two reefs. The W reef lies with its center bearing 100°, 2 miles distant, from the light on Meimeiara Island. A shoa,l with a least depth of 1.2m, lies 0.25 mile S of this reef and is a hazard in the approach to Messum Channel.

Messum Channel lies at right angles to the direction of Raven Channel and is a valuable alternative route to Goschen Strait from the S. The least known depth in Messum Channel is 8.5m. The channel should be used only with local knowledge.

There are three islets that are important for the transit of Messum Channel; two of them are in the Obstruction Islands. Lelei-Gana Islet lies 5.5 miles distant bearing 156° from the light on Meimeiara Islet. Togisi Islet, the smaller of these two, lies about 0.3 mile N of Lelei Gana Islet. Hibwa Islet, the third of these three islets, lies on a reef E of Raven Channel, 6.5 miles distant, bearing 098° from Meimeiara Islet Light.

Directions for Messum Channel.—Approach Raven Channel from the SW; when Togisi Islet and the E tangent of Lelei-Gana Islet come in range 175°, bring this mark astern to the S entrance of Messum Channel. There are no marks for the channel. When between the two reefs on the E and W side of the channel steer as required to clear the dangers. When clear N of the reefs alter course to 006°. When Hibwa Islet bears 119°, make good a course of 299°, which leads midway between the reef extending NE of Boia-boia-waga, and the patch off the N extremity of Taodovu Reef, then into Goschen Strait.

In Messum Channel, the tidal currents set NE and SW.

Dana-gedu is an extensive reef about 4.75 miles in extent that lies in a general NE and SW direction that is parallel to, and lies about 3 miles off the E peninsula of Papua New Guinea. Raven Channel is approached W of this reef.

7.32 Iabama Islet (10°17'S., 150°56'E.), 69m high, is the N islet of the Obstruction Islands and lies 1.75 miles E of Dana-gedu.

Raven Channel, the best passage through the reefs N of the Obstruction Islands, lies on a general E and W axis. The channel lies about 4 miles ESE of East Cape and is difficult to navigate; great caution is necessary. The reefs on either side are steep-to and have shallow depths of only a few feet over them, but their edges show distinctly from aloft when the sun is favorably located. The channel between the reefs is about 0.2 mile wide at its narrowest part.

A shoal, with a least depth of 4.9m, lies 2 miles bearing 009° from the summit of Iabama Islet; a 9.1m patch lies 2 miles N of the same summit.

Directions for Raven Channel.—Vessels approaching the channel from the SW steer for East Cape bearing 023°, giving the SW extremity of Dana-gedu a berth of about 1 mile. When the S extremity of Lelei-Gana Islet bears 093°, change course to 046° and make this course good for a distance of about 4 miles, until Hibwa Islet bears 083.5°. Alter course to 083.5° with Hibwa Islet ahead to pass through the center of Raven Channel. There is a light on the reefs on each side of the channel and a light on Hibwa Islet. This course passes through the 9.1m patch and close to the N edge of the 4.9m shoal patch. When Lelei-Gana Islet bears 213°, course should be altered to 033° with that islet astern. This course will lead into Goschen Strait clear of all dangers.

It has been reported that the current in the W approach has a northward flow as strong as 5 knots at times. An E current from 1.5 to 3 knots was reported in the channel.

The best time to navigate Raven Channel is in the early daylight hours.

7.33 The **Obstruction Islands** (10°19'S., 150°57'E.) take their name from the position they occupy SE of East Cape. In addition to the islets in the group that were described with Messum Channel (paragraph 7.31) and Raven Channel (paragraph 7.32), there are several other islets and reefs in this group.

Walters Reef (10°21'S., 151°00'E.), a patch of sunken rocks, is the E extent of this group of dangers. About 1.25 miles SSW of Walters Reef there is a patch of sunken rocks with two 5.5m coral heads close NE of it.

About 1.75 miles SW of Walters Reef, there is a reef that is the southernmost of the dangers lying in the immediate vicinity of the Obstruction Islands. There are two sand banks on this reef which dry 0.9m; they are nearly always marked by breakers. A thickly-wooded islet, with a conical summit 49m high, is located 2.25 miles NNW of this reef.

Caution.—This area has not been adequately surveyed and less water may exist than charted.

7.34 Nuakata Island (10°17'S., 151°01'E.) rises to a wooded conical height of 327m. This is the principal island in the vicinity of East Cape and lies about 8 miles SE of it. This island is a conspicuous mark for vessels navigating in the locality.

There are three anchorages in the various bays on the N and W sides of the island. Anchorage may be taken in the bay on the N side of the island, in a depth of 35m sand, with the W entrance point of the bay in range with East Cape bearing 288° and the E entrance point bearing 049°. This position is exposed to NE squalls which are sometimes experienced. A reef extends 1 mile N of the NW extremity and a rock awash is NW of the E entrance to the bight on the N side of this island.

A shoal, with a depth of 9.1m, extends 0.5 mile WSW of the W extremity of the island. Anchorage may be taken 0.4 mile N of the W extremity in 31m sand. This anchorage is protected from all winds E of S. The bay on the SE side of the W extremity affords anchorage, in 33m, sand, during the Northeast Monsoon, with the W extremity bearing 293° and the SE entrance

point bearing 170°.

The S extremity of Nuakata Island terminates in a wooded bluff, 46m high, W of a depth of 4m, 0.4 mile S. A sunken coral reef extends 0.4 mile SW of the point and 0.75 mile SE of the point is another reef, awash, with a rock which dries 0.9m. A sunken rock, or shoal, lies about 1.25 miles NNE of the point.

7.35 Fallows Reef (10°14'S., 151°00'E.), with a depth of 1.8m, lies 1.75 miles N of the NW extremity of Nuakata Island. Hibwa Islet, 0.9m high and sandy, lies 0.75 mile SW of Fallows Reef. A 1.5m patch lies close E of the S extremity of the reef.

A reef, with a least depth of 0.3m, is charted 1 mile ENE of the N extremity of Nuakata Island.

Boirama Island is separated from the E part of Nuakata Island by a narrow channel; its summit is about 157m high; the vivid green grass covering the summit is conspicuous when approaching from the S.

Diawari Island, located about 0.5 mile S of Boirama Island, is conical shaped and rises to a height of 149m; the peak is covered with thick grass. The island is fringed by a reef which extends 0.75 mile S and 0.4 mile to the E and N. The bright green summit of the island makes an excellent landmark when approached from the S.

Mid Sand Bank (10°24'S., 151°03'E.), located about 5.5 miles S of Nuakata Island, dries 1.2m. A reef, with a depth of 2.1m, lies about 1.5 miles W of the bank; the reef sometimes breaks.

There are four detached reefs, with depths from 2.1 to 5.8m, that lie on a line 1.75 miles NNE to 0.75 mile SE of Mid Sand Bank.

A line of reefs and shoal water with several small islets located on them, extend in a SE direction about 15 miles from Diawari Island. The depths on the reefs vary from 2.4 to 6.1m.

Grace Islet (10°21'S., 151°07'E.), 27m high to the top of the trees, lies 5 miles SE of Daiwari Island. The islet is composed of coral and is thickly wooded. A shoal, which dries 0.9m, and a small islet, 12.2m high, lie, respectively, 3 miles WNW and 1.75 miles W of Grace Islet. A shoal 11.5m is reported to lie about 3 miles SW of Grace Islet.

Hull Islet, 31m high to the top of the trees, lies 4.5 miles SE of Grace Islet.

Blakeney Islet (10°26'S., 151°13'E.), a low thickly-wooded islet, 38m high to the tops of the trees, lies 3 miles SE of Hull Islet. This islet occupies a central position in the main approach route to Goschen Strait from the S. The previously-described reef extending SE of Diawari Island terminates in a 6.1m patch, 2.75 miles S of Blakeney Islet.

Mesley Patches, with depths of 3.7 to 8.2m, lie 3.5 to 5 miles W of Blakeney Islet.

7.36 Gallows Reef (10°17'S., 151°09'E.) is located in the fairway at the E end of Goschen Strait and leaves a navigable channel about 1.75 miles wide on either side of it. The reef is an extensive horseshoe-shaped ridge of coral, open W; the greater part of it is awash. A few spots at the E end of the reef dry. The reef is marked by a lighted beacon.

The sea breaks heavily on the SE side of the reef, which is steep-to; no bottom was found at 219m. The entire reef is steep-to and a reef at the N extremity dries 0.6m.

Tidal currents in the channel N of Gallows Reef are E and W and attain a rate of about 2 knots although influenced by the prevailing wind. The current is usually N in the area of Gallows Reef.

Shortland Islet (10°32'S., 151°05'E.) is an oval-shaped islet, about 35m high to the top of the trees, located 10 miles SW of Blakeney Islet. Encircling the islet are Shortland Reefs, extending 0.5 mile from the W side of the islet and 3.5 miles E. There are occasional sand cays on the reefs, with bushes on them. There is a light on the NE side of these reefs.

Between Shortland Islet and Grant Islet, 3 miles WSW, there is a channel about 1.25 miles wide between the reefs. The middle of the passage was reported to have a depth of 22m.

A heavy tidal race is almost always found in this passage.

Byron Islet, low and covered with trees, lies 2.25 miles SE of Shortland Islet. This islet is nearly joined to S extremity of Shortland Reefs and is a good mark for that danger.

7.37 Slade Island (10°35'S., 151°12'E.), the farthest W of the Engineer Group, lies 4.5 miles SE of Byron Islet. The other islands in the group extend ESE about 4 miles. Slade Island rises to a height of 197m near its center. A well-defined green bluff marks the W point of the island. Butchart Islet, 46m high, lies off the N extremity of the island, and a rock 6.1m high lies close off its SE extremity.

Skelton Island, located close SE of Slade Island, is 174m high.

Watts Island, the SE island of the Engineer Group, is 130m high near its W end. Toward the center the island dips considerably and near the E end rises to a tableland about 107m high, which terminates in steep cliffs on the S side.

The channel between Watts Island and Skelton Island is about 0.5 mile wide and, not having been thoroughly examined, it should be avoided.

7.38 Bright Islet (10°32'S., 151°12'E.) is located 3 miles NNE of Slade Island. This is the farthest W of a group of six small islets that lie N of, and parallel to, the islands of the Engineer Group. Several coral patches lie between Bright Islet and Shortland Reefs, 4 miles W; their position may be seen on the chart. There is a light on Bright Island.

Ridge Shoal, with a depth of 11m, lies 2.25 miles N of Bright Islet.

Good Islet and Deeds Islet lie, respectively, 2 and 3.5 miles E of Bright Islet. These low wooded islets are located in a reef encumbered area.

Haszard Island (10°35'S., 151°22'E.), about 18.3m high, lies 6.75 miles SE of Deeds Islet.

Caution.—A dangerous area extends from a position about 1.5 miles E of Deeds Islet SE to Haszard Island. These waters have not been thoroughly examined. Discolored water was reported about 4.5 miles E of Deeds Islet.

7.39 Hummock Island, 1 mile S of Haszard Island, is almost connected to it by a coral reef. Hummock Island has a low hill at its N end, is low in the center, and then rises to a remarkable hill, 59m high, at its S extremity.

There is shoal area and several small islets that lie N of the Engineer Group and S of Good Islet and Deeds Islet, whose

position may best be seen on the chart. No vessel should attempt to pass through this area except in fine weather and with a good lookout aloft.

Night Bank (10°34'S., 151°23'E.), with a least depth of 5.5m, is located 1.25 miles NE of Haszard Island. A tide rip generally marks its position.

The tidal currents charted E of Night Bank run at the rate of 2.5 knots at springs; the flood sets N and the ebb S.

7.40 **Bentley Island** (10°43'S., 151°15'E.), 5 miles S of Skelton Island, is fringed by a reef which extends 0.75 mile from its SW side. The hill on the island is divided in two parts, each part being about 107m high.

Mudge Island is located about 3.5 miles ESE of Bentley Island. This low thickly-wooded coral island is surrounded by a reef.

The **Hardman Islets** (10°26'S., 151°19'E.) are two low islets, 38m high to the top of the trees, which lie 5.5 miles E of Blakeney Islet. An extensive coral reef surrounds the islets.

There are several patches of discolored water, and a patch of 11.6m depth between the Hardman Islets and Haszard Island; this area as well as that E of the Hardman Islets NE to the Laseinie Islands have not been completely surveyed.

The **Laseinie Islands** (10°24'S., 151°25'E.), located about 7 miles ENE of the Hardman Islets, consists of six islands and islets lying on a reef. Dawson Island, the largest of this group, rises to a height of 137m. When the summit of this wooded island is seen from the E or W it appears flattened, but if seen from the N or S it appears conical.

Two islets lie within 1.5 miles SE of Dawson Island; NW of the island, about 2.5 miles distant, are three islets in the Kegawam Islands, which are part of the Laseinie Islands. There is a light, obscured by trees in certain directions, on the NW side of the reef connecting the Kegawam Islands.

A coral reef appears to connect the whole group; there are a few sand cays on this reef.

The sea W of Dawson Island has been seen to break.

Caution.—A dangerous rock lies 7 miles SSE of the southernmost islet of the group. This area has not been completely surveyed.

Normanby Island—South Coast

7.41 The N side of Goschen Strait is fronted by the S coast of Normanby Island, from Cape Ventenat at the E entrance to Cape Prevost 16.5 miles WNW at the W entrance.

Cape Ventenat (10°12'S., 151°13'E.), the SE extremity of Normanby Island, is wedge shaped and well defined when seen from E or W. The cape gradually rises to a height of 1,097m, 6 miles NNW. A strip of sandy beach borders the cape, and a coral ledge extends about 0.2 mile S of it.

Grind Reef skirts part of the coast from a position 3 miles SW of Cape Ventenat, in a NNE direction for about 9 miles distant. There is a sand bank on the reef, which dries 0.9m; there are depths over the reef of 0.6 to 4.3m.

The Ventenat Islets are two wooded islets with well-defined summits which lie inside the barrier, 1 mile SW of Cape Ventenat. The SE islet is 77m high and the NW islet is 47m high.

Centipede Bay lies 3 miles NW of Cape Ventenat and is open S. The head of the bay is 0.5 mile wide and has a sandy beach fronting a lagoon.

Make-ia Point, 1.75 miles W of Centipede Bay, is fringed by a coral ledge. The coast W of this point continues steep and without any marked features for a distance of 2.75 miles to Makumaku Point, which is also fringed by a coral ledge.

The coast continues in a W direction from Makumaku Point for about 9 miles to Cape Prevost. This coast is steep-to. A depth of 20.1m is charted 2.75 miles WNW Makumaku Point.

Cape Prevost (10°06'S., 150°57'E.) is steep and well defined. The mountain range rises steeply within the cape and a height of 1,067m is charted 3.25 miles ENE of the cape.

Goschen Strait

7.42 **Goschen Strait** (10°10'S., 151°00'E.) lies between East Cape, the NE extremity of Papua New Guinea, and the island and dangers SE of this cape; the N side of the strait is formed by the S shore of Normanby Island. The strait is about 16 miles in length in an E and W direction and 6.75 miles wide between Cape Prevost and Boia-boia-waga Island.

The mountains on the N side of the strait are covered with dense tropical forest and descend in steep slopes to the waters edge.

Tidal currents between Grind Reef and Gallows Reef set E and W at a rate of about 2 knots; between the islands to the W it is no doubt stronger and is probably much influenced by the prevailing wind. It has been reported that the tidal currents in the vicinity of Gallows Reef are strong and that the current usually sets N in this area.

Directions for vessels approaching Goschen Strait are variable and vessels may select the approach which is most appropriate.

A vessel can cross the sunken barrier reef NE of Uluma Reef and pass between that reef and the Stuers Islands in depths of 10.1 to 16.5m with Mamaramaweino Rock, 2.25 miles NW of the W end of Wari Island, bearing 344°. When nearing the rock, course should be altered to pass 1 mile W of it, and when abeam of it steer to make good a course of 029° so as to pass 1 mile E of Baba-garai Island. When abeam Baba-garai alter course to pass 1.5 miles W of Slade Island, and when the W extremity of Slade Island is in range with the W extremity of Bentley Island bearing 161°, astern, this course leads between Bright Islet and Shortland Reefs. When Shortland Reefs Light bears 249° astern and the S point of Dawson Island bears 069°, steer that course, but note that it leads over a depth of 6.1m, 2.75 miles S of Blakeney Islet. When Blakeney Islet bears 310°, alter course to 356° and make that course good, which lead up to about 2 miles E of Gallows Reef. Keep a good check on the vessel's position, as the tidal currents sets at the rate of about 2 knots to the E or W in the approach to Goschen Strait. When the N extremity of Nuakata Island bears 268°, then shape a mid-channel course through Goschen Strait.

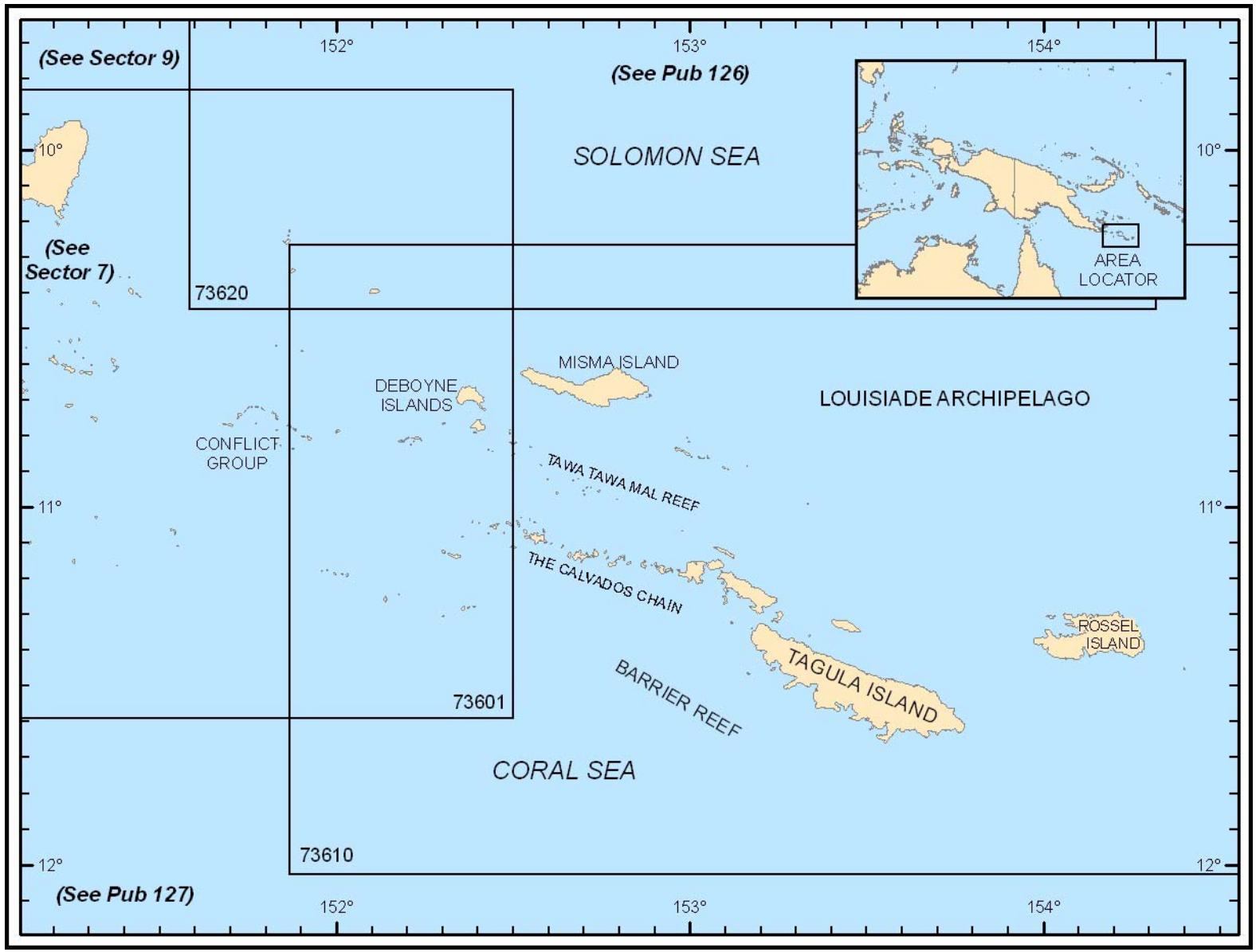
An alternate route may be followed from Baba-garai Island, by shaping a course to pass in mid-channel between Grant Islet. and Shortland Islet. It should be borne in mind that the tidal currents in the passage between Grant Islet and Shortland Islet are very strong and a vessel should be conned from aloft. When clear of the islets, steer for Nuamuri Point, 8 miles SW of East Cape, then through Raven Channel or Messum Channel, as previously directed in paragraph 7.32 and paragraph 7.31, respectively.

Vessels may also pass between the Lebrun Islands and Siga Islet, then WNW to East Channel and follow previously-described routes to Goschen Strait.

Vessels are recommended to make the NE passage in the afternoon and the SW passage before noon, so the sun will be in its most favorable position for seeing the reefs.

Vessels proceeding NE, after clearing China Strait, may steer to pass through the passage S of Blakeney Islet on a course of 087°. When Bright Islet comes in range with the W end of Slade Island, a course of 029° leads clear N. When fixing position from China Strait E, bearings of the land to S have been satisfactory. Due to the tidal currents, frequent fixes are advised.

Caution.—No exhaustive survey of Goschen Strait has been made and the passage should only be made in favorable light conditions and with a lookout aloft.



Additional chart coverage may be found in NGA/DLIS Catalog of Maps, Charts, and Related Products (Unlimited Distribution).

SECTOR **8** — CHART INFORMATION

SECTOR 8

THE LOUISIADE ARCHIPELAGO

Plan—This sector describes the ten volcanic islands and numerous coral reefs lying within the parallels of 10°10'S and 11°45'S, and the meridians of 150°55'E and 154°25'E, with the exception of Basilaki and several small islands lying close E of it. The arrangement is from W to E.

General Remarks

8.1 The Louisiade Archipelago is part of Papua New Guinea. The islands of **Tagula** (10°30'S., 153°30'E.), Pana Tinani, Rossel, and Misima are high and mountainous. The remaining islands in the archipelago are small. The main portion of the group is encircled by a barrier reef, through which there are numerous passages. Rossel Island is surrounded by a separate reef of considerable extent. A large portion of the archipelago has been surveyed. Little is yet known in the area at the W end of the archipelago, and between that archipelago and **Woodlark Island** (9°00'S., 152°50'E.) with its adjacent islands, and the **D'Entrecasteaux Islands** (9°00'S., 151°00'E.). Vessels must exercise caution while navigating in this area.

These islands possess considerable natural wealth. Alluvial and reef gold have been found, and for many years gold mining yielded the largest returns. Production has now dwindled due to the exhaustion of the alluvial deposits. Numerous beds of pearl shell exist, but the great depth in which they are found prevents the fishery being extensively prosecuted.

Barrier Reef—East of the Stuers Islands

8.2 The barrier reef extends in an E direction for nearly 60 miles between the **Stuers Islands** (11°06'S., 151°08'E.) and Jomard Entrance. The reef is awash and steep-to on the seaward side with openings in places. The waters to the N of this part of the reef have not been sufficiently explored to render them safe for navigation.

Quessant Island (Tariwerwi Island) (11°09'S., 151°15'E.), a low wooded island, lies on the NE end of a reef forming a portion of the barrier reef, in a position about 7.5 miles ESE of Stuers Islands. Three reefs occupy nearly the whole space between the Stuers Islands and the Quessant Islets. A large reef lies close SE of the island and a patch of discolored water lies 0.75 mile further SE.

Vessels can take anchorage, sheltered from SE winds, under the lee of the reefs lying between Quessant Island and the Stuers Islands. The anchorage is not good. The bottom consists of coral, with irregular depths of from 11 to 40m. There are depths of from 12.8 to 16.5m N of Quessant Island, but there is no shelter, as the swell sets through the openings between the reefs on either side.

Imbert Islet, located about 8.5 miles N of Quessant Island, is low and wooded with a reef extending about 0.5 mile S of it. Two reefs, awash, lie, respectively, about 1.5 miles S and 2 miles SW of the islet. There is a reef awash 1.25 miles S of Imbert Islet and a crescent shaped reef 2.5 miles SW of this islet.

Rapid Patches are two shoals, with depths of 10.9m and 7.3m, lying, respectively, about 5.5 and 8 miles E of the Imbert Islets.

8.3 The **Sable Islands** (11°11'S., 151°21'E.) are three sand cays on the NW edge of a reef lying about 5.5 miles ESE of Quessant Island. The SW cay has a few trees on it. The sand cay at the NE end of the reef was covered with vegetation, the middle one being bare, but possibly is now overgrown like the others. There is an opening about 3.5 miles wide between the Sable Islets' reef and the reef lying close SE of Quessant Island. Discolored water and heavy rollers, appearing like a shoal, were observed in this opening.

Vessels can take anchorage during the Southeast Monsoon in a position about 0.5 mile NW of the NE Sable Islet.

Anchorage Reefs (11°11'S., 151°27'E.) are two reefs extending about 7.5 miles E of the northeasternmost Sable Islet. The W reef is separated from Sable Islet reef by a channel, about 1 mile wide, with a least depth of 12.8m.

Kosmann Island (Maragili Island) (11°04'S., 151°32'E.), low and wooded, lies about 11 miles NE of the northeasternmost Sable Islet. The island is surrounded by a number of small reefs.

Several dangerous shoals lie SW of Kosmann Island.

The best anchorage off Kosmann Island lies about 1 mile NW of the island, in a depth of 10.9m, coral.

8.4 **Long Reef** (11°10'S., 151°39'E.), an extensive atoll, lies with its SW end close E of Anchorage Reef. The lagoon, which appears navigable, but has not been surveyed, is enclosed on its N and S sides, and at its E end, by an almost continuous barrier reef. On the N side the reef is always above water and has several sand cays and much driftwood on it. Several cays with mangrove bushes lie near the W extremity of the reef about 3 to 4 miles SE of Kosmann Island. There are some rocks above water near the center of the reef on the S side. No openings could be found into the lagoon from the S or E, but it is probable there are passages between the patches which stretch across its W end.

There is a narrow opening between the SW extremity of Long Reef and Anchorage Reefs, but it has not been surveyed.

There is an opening in the barrier reef from 2 to 3 miles wide between the E end of Long Reef and the atoll forming Bramble Haven. Tidal currents run at a considerable rate through this passage. No bottom could be found with a 183m sounding in the passage or in the waters S of Bramble Haven. This opening is reported to be a good passage. Vessels must exercise caution because the reefs are difficult to see and there are no islets in the S entrance.

Lejeune Island (11°10'S., 151°49'E.), low and wooded, lies on the N side of Long Reef, about 3 miles W of its E extremity.

Vessels can take anchorage during the Southeast Monsoon in the bay formed between the patches which lie at the W end of Long Reef, Anchorage Reef, and Kosmann Islet, the water be-

ing smooth and depths regular.

8.5 **Bramble Haven** (11°14'S., 152°00'E.) is the lagoon of an atoll, which is about 10 miles in length in an E-W direction and 6 miles in breadth. The depth in Bramble Haven, as far as it was sounded, were found to be from 10.9 to 37m, sand and coral. The water was smooth and sheltered from every direction by the surrounding reefs awash.

Bramble Haven has four entrances, but the only safe one is at the SW corner, which is 0.75 mile wide, with depths of from 10.9 to 18.3m.

The Duperre Islets, consisting of five low wooded uninhabited islets and a sand cay, lie on the N side of Bramble Haven. The middle islet is located about 11 miles E of Lejeune Islet. Punawan, the E islet, is about 30m high to the tops of the trees.

Vessels can take good anchorage about 0.25 mile NE of the middle of Duperre Islet, in depths of from 12.8 to 18.3m.

The E part of Bramble Haven reef was reported to lie 0.3 mile E of the charted position.

The **Jomard Islands** (11°15'S., 152°08'E.), consisting of two wooded and uninhabited islands, lie at the S end of Jomard Entrance.

Pana Waipona, 26m high, is the largest and westernmost of the islands. A steep-to reef, with two partially submerged wrecks on it, extends about 1 mile S of the island. The fringing reef extends about 91m from the W side of the island.

A light stands on the W extremity of Pana Waipona Island.

A bank, with a depth of 37m, was reported to lie about 2.75 miles WNW of the light structure.

Pana Rai Rai, the E island, lies 2 miles ENE of Pana Waipona Island. The island lies on the NW end of Uruba Reef. A shallow spit, with submerged rocks off the end, extends about 0.7 mile NNW from the island.

8.6 **Jomard Entrance** (11°15'S., 152°07'E.) is deep clear channel between the E part of the barrier reef surrounding Bramble Haven and the W side of Uruba Reef. It is used by vessels trading between Australia, China, and Japan.

The passage is about 5 miles wide, with depths of over 183m. Pana Waipona Island lies toward the E side of midchannel, with depths of less than 274m between it and Uruba Reef.

The tidal currents run through Jomard Entrance at the rate of 3 to 4 knots; the flood sets S by E, the ebb N by W. The currents cannot be allowed for with absolute certainty. In the NW part of the entrance are tide rips.

Discolored water was reported about 60 miles S of Jomard Entrance.

Directions.—Deep-draft vessels heading N through Jomard Entrance may pass on either side of Pana Waipona Island and should then steer to pass between Lunn Island and **Pana niu** (10°49'S., 152°11'E.), the westernmost islet of the Torlesse Group. Vessels should then pass E of Bunora Island, and W of Hastings Island, then to Bougainville or Goschen Straits. The courses and distances along this track can best be seen on the chart.

Barrier Reef—East of Jomard Entrance

8.7 East of Jomard Entrance, the barrier reef encircles many of the islands of the Louisiade Archipelago. One part of the barrier reef extends in an E direction for about 30 miles as a much broken and partly submerged obstacle. There are some islands and reefs near Jomard Entrance. The Sunken Barrier, is a reef lying E of these islands with considerable depths in places. The character of the reef changes completely E of this submerged portion, and for over 80 miles runs in an ESE direction, maintaining a solid and almost unbroken front, to a point 12 miles E of Tagula Island.

The other part of the barrier reef runs in a NE direction for about 36 miles from Jomard Entrance. Then it runs in a SE direction and eventually connects with the first branch E of Tagula Island.

Tides—Currents.—The tidal currents run with considerable force through the passages in the reefs and generally set straight through. West of Jomard Entrance the South Subtropical Current generally sets W. However, the currents in this area are variable with rates up to 2 knots and the direction may be influenced by the Northwest Monsoon.

On the Sunken Barrier, E of the **Duchateau Islands** (11°17'S., 152°22'E.), the currents were observed to run as much as 4.5 knots, the strength of the flood setting SSW and the ebb NNE. This velocity was only apparent during strong SE winds. The rate, at other times, is about 2 knots.

On the Sunken Barrier, the first portion of the flood sets about SW, gradually changing its direction to the S, the last quarter running to the SE; then, with only a short period of slack water, the first of the ebb makes to the NE, gradually changing to N and NW. The change of current coincides very nearly, with the times of HW and LW, but in the passages the currents may continue to run for perhaps 1 hour longer. It was reported, that under certain conditions of wind, the currents in the passages may overrun HW or LW at the shore by as much as 3 hours. The currents cannot be allowed for with absolute certainty.

In the E part of the Louisiade Archipelago, the flood current runs SW and the ebb in a contrary direction, but these are modified by the reefs and the trends of the coast. The current turns, approximately, at HW and LW by the shore.

Through the narrow openings the tidal currents run from 3 to 5 knots; this is more especially the case in the passages through the outer barrier reefs, where they cause overfalls and tide rips. From three days before to three days after full and new moon there is not much change in the strength of these currents. During this period they have their maximum strength and there is little or no interval of SW. In the intervening period their rate diminishes considerably and suddenly.

8.8 The **Montemont Islets** (11°18'S., 152°18'E.) are two small bush-covered islets lying on the barrier reef in a position about 7 miles SE of Pana rai rai.

Iataui, the W islet, 12.2m high, lies on the N edge of a small coral reef. A smaller reef lies 1.5 miles W of Iataui Islet. It is surrounded by foul ground except on its S side. The passage between these two reefs, which are steep-to on their S sides, should not be attempted as the bottom is uneven, with heavy overfalls and tide rips.

A reef, with a least depth of 7.3m, lies about 1.5 miles N of Iataui Islet.

Pana Boba, the E and larger islet, is 15.2m high and lies in

the center of a larger crescent-shaped reef. Rocks and foul ground extend about 1 mile from the N and NW sides of Pana Boba Islet. The E edge of the crescent-shaped reef, on which the sea breaks heavily, is 1 mile from the islet; foul ground extends 0.25 mile farther E.

There is a channel across the barrier reef between the SE end of **Uruba Reef** (11°16'S., 152°12'E.) and the small reef about 3 miles SE of it, with depths from 10.9 to 14.6m. The channel is narrowed to a width of 1.5 miles by a spit with depths of 7.3m or less, extending E from Uruba Reef. A reef, with a depth of 9.1m lies in the SE part of the channel.

Vessels can take fair anchorage off the N side of the Montemont Islands, outside the limits of the rocks and foul ground, in depths of from 22 to 28m, sand and mud.

8.9 The **Duchateau Islands** (11°17'S., 152°22'E.), lying NE of the Montemont Islands, consist of three low wooded islets, which are inhabited.

Panabobaiana, the westernmost and largest islet, is 23m high and fringed by a sunken reef. This reef extends about 0.25 mile from the SE side of the islet and 183m from the N side. The NW side of the reef is broken, affording landing on the sandy beach.

Hacker Patch and Ellery Patch, two reefs with depths of 7.3m, lie, respectively, about 1.25 and 0.75 mile N of the N extremity of Panabobaiana.

Panarurawara and Kukuluba, the two E islets, lie on the N and NW edges of a reef, which dries, located about 0.5 mile E of Pana bobai ana. Foul ground lies off the N and NW sides of this reef.

A narrow channel lies between the reefs surrounding Panabobaiana Islet and Panarurawara Islet, with depths of from 7.3 to 10.9m. The channel is poor, because of the heavy swell and overfalls caused by the strong tidal currents. A reef, with a depth of 3m, lies in the N entrance.

There is a channel about 1.75 miles wide between the edges of the reefs surrounding Panabobaiana Islet and the E Montemont Islet. It is clear of dangers, the charted depths are between 10.9m and 20m. Tide rips occur at the S end of this channel.

Vessels can take anchorage, sheltered from the Southeast Monsoon, about 0.5 mile N of Panarurawara Islet, in depths of from 31 to 35m, sand and shells.

The change of the tidal currents coincides very nearly with H and LW, but in the channels the currents may continue to run for perhaps 1 hour after H and LW by the shore.

The flood current sets to the S ; the ebb current sets to the N.

Anchor Patches (11°20'S., 152°34'E.), consisting of three patches with a least depth of 7.3m over them, lie about 11 miles ESE of the Duchateau Islands. Shoals, with depths of from 3.7 to 9.1m, lie between Anchor Patches and the reef, awash, at the SE end of Sunken Barrier, about 5.5 miles SE.

It is not advisable to cross the barrier reef E of Anchor Patches unless quite certain of the vessels position.

Duchateau Entrance (11°18'S., 152°28'E.) is the best approach from the S and W to the inner waters N of the barrier reef is over the Sunken Barrier between the Duchateau Islands and Anchor Patches. The edge of the reef surrounding the easternmost Duchateau Island may be clearly seen, and immediately E of this reef the barrier may be crossed in depths of from 12.8 to 29m. Duchateau Entrance, with a least depth of 14.6m at its S end, lies about 5.5 miles E of the Duchateau Islands. Another passage, with depths of more than 18.3m, lies about 2 miles farther E. The depths over other parts of the Sunken Barrier are from 7.3 to 18.3m.

The Calvados Chain

8.10 The **Calvados Chain** (11°10'S., 152°45'E.) is a long succession of mountainous islands extending in a general ESE direction from **Panasia Island** (11°08'S., 152°20'E.) and terminating with Hemenahei Island, about 43 miles E of Panasia.

The larger islands are densely wooded, especially on their S sides. They are sparsely populated with most of the villages situated on the N sides of the islands.

Vessels must exercise caution when navigating among these islands, as the reefs are all difficult to see except in very good light conditions.

There is a passage, with depths of over 9.1m, leading into the inner waters of Louisiade Archipelago. It is about 3 miles wide and lies between the reef extending N from Pana Rai Rai, the E of the Jomard Islands, and the reef extending 9 miles SW from Panasia Island, about 11 miles NE.

Mabb Patch, with a depth of 5.5m, lies in the middle of the above navigable channel in a position about 2.5 miles N of Pana Rai Rai Island.

Kei Keia Reef, 3.5 miles in length and 2 miles in breadth at its SW end, lies in a NE and SW direction. The NW side of the reef is steep-to, but foul ground extends about 2.5 miles from its S and SE side. The area should be avoided.

Kei Keia Reef is separated from Panavaravara Islet Reef, located E of it, by Howai Tinua Passage, which is heavily encumbered with shoals and useless as a channel.

Panavaravara Islet (11°08'S., 152°18'E.), lying 10 miles NE of Pana Rai Rai, is rocky and wooded, with a sharp summit 105m high. A sand spit extends from the N end, on the E side of which there is a village and a good landing place. The islet stands on the SE end of a reef. A channel about 0.5 mile wide lies between Panavaravara Islet and Horrara Gowan Reef. This channel is clear of dangers, though somewhat tortuous, with depths of from 12.8 to 33m. The channel is not recommended for general use, because the S approaches are encumbered with reefs extending 2 miles SE of Panavaravara.

Vessels passing through the channel should keep to the SW edge of the fringing reef off Panasia Island in order to avoid the foul ground farther to the SW. There are shoals with least depths of 1.8m in this area.

The tidal current sets through this channel with great strength, forming strong eddies.

8.11 **Panasia Island** (11°08'S., 152°20'E.) is rugged and composed of cliffs, nearly perpendicular, with ravines between them. The summit, 161m high, is near the center of the island. The island is 2 miles in length and 0.5 mile in width at its E end. The other portion of the island is narrow, terminating in a rocky point at the W end.

Horrara Gowan Reef (11°06'S., 152°18'E.) extends about 4 miles NW of Panasia Island and is 1.5 miles in width. The drying outer edges enclose a lagoon in which there are numerous shoals. The E side of Horrara Gowan Reef is broken and not

safe to approach when transiting Cormorant Channel.

Ehiki Islet, 15.2m high and wooded, lies near the N end of this lagoon. Nasakoli Islet lies on the W side, about 1 mile N of the W extremity of Panasia Island.

Tawal Reef (11°04'S., 152°21'E.), an extensive horseshoe-shaped reef, lies separated from Horrara gowan Reef by Cormorant Channel. The enclosed lagoon is open to the S, but the entrance is encumbered by several reefs. One of the Sloss Islets lies on its NE edge.

No ina Islet (11°05'S., 152°21'E.), small and wooded, lies on the NE side of Cormorant Channel and 3.25 miles N of the E end of Panasia Island. It is located on the W end of a small reef separated from Tawal Reef by a channel 0.4 mile in width.

A reef, with a least depth of 7.3m, lies about 1 mile SSE of No ina Islet. During flood current there are heavy overfalls over this reef.

Cormorant Channel (11°05'S., 152°20'E.), about 1.5 miles wide, lies between Tawal Reef and Horrara Gowan Reef. The least depth is about 28m. A reef, with a depth of 9.1m, lies nearly in mid-channel, about 2 miles NNE of the E side of Panasia Island.

The tidal currents run through Cormorant Channel with considerable force, with the flood setting SE and the ebb setting NW.

The **Sloss Islets** (11°03'S., 152°23'E.) are two wooded coral islets lying about 1 mile apart in an E and W direction. Rara, the W islet, 35m high, lies on the NE edge of Tawal Reef. Panaroba the other islet, 33m high, lies on the NW edge of the reef lying between Tawal Reef and Utian Island Reef.

8.12 West Brooker Passage (11°03'S., 152°24'E.), separating the two reefs on which the Sloss Islets stand, has a width of about 0.3 mile in the middle, but widens from 0.7 to 0.8 mile at each end. The reefs on either side of this channel are steep-to, except W of Panaroba Islet, where shoal water extends a short distance into the passage.

In the S half, on the W side of the channel, a narrow ridge with depths of 7.3m or less extends about 0.75 mile SSE of the SE extremity of Tawai Reef. Foul ground extends about 0.5 mile S from the S end of the reef forming the E side of the channel. These spits are usually marked by overfalls and tide rips.

Utian Island (Brooker Island) (11°03'S., 152°27'E.), 140m high at its S end, conical and wooded, lies about 4.75 miles ENE of No ina Islet. The island is located in the middle of a lagoon enclosed by a coral reef, the edges of which, generally, dry. There are two bays on the N side of the island. A ridge traverses the island throughout its length, rising to a height of 106m at the W end. There is a boat channel into the lagoon SW of the W extremity of the island. This channel, though encumbered with reefs, has depths of from 12.8 to 18.3m.

East Brooker Passage (11°03'S., 152°26'E.) lies between the reef surrounding Utian Island and the reef on which Panaroba stands. The S half of this channel is divided by a pear-shaped reef, which may be passed on either side. Shoal water extends 0.33 mile S and SE of the reef. The preferred passage lies to the W of this reef, with depths of from 51 to 59m.

The tidal current runs through East Brooker Passage at the rate of from 5 to 6 knots at springs, the flood setting SSE and ebb in the opposite direction.

Caution.—Approaching from S, it is not desirable to take either of the Brooker Passages on the ebb, as the vessel is likely to become uncontrollable. The shoal water off the S edges of the reef render caution necessary, as they cannot always be seen. The W passage is the better of the two, being wider and, therefore, having less strength of current.

Anchorage is not available in the vicinity of the islands and reefs described above. The N, or lee sides are too steep and the S sides too exposed to wind and sea during the Southeast Trade Winds. In the channels, these disadvantages are aggravated by the strength of the tidal currents.

8.13 Panarora Island (11°07'S., 152°30'E.), about 4 miles SE of Utian Island, is rocky with a 164m peak near its E end. The island is conspicuous from E, appearing as a lofty conical tower. The island is fringed by a reef extending farthest offshore on the NW side, where there is a village.

Haikuiri Shoal, with a depth of less than 1.8m, coral, lies about 1 mile NW of the NW end of Panarora Island. It breaks heavily with any swell. The shoal is steep-to on its SE side, with a deep channel between it and the reef surrounding Panarora Island. Shoals, with depths of 9.1m and 2.7m lie, respectively, about 0.5 mile N and 0.75 mile NNE of Haikuiri Shoal.

A shoal, was reported to lie about 1 mile S of the E extremity of Panarora Island.

Panauduudi Island (11°03'S., 152°29'E.), 119m high, lies about 1.25 miles E of Utian Island. Toloi awa Islet, 73m high, lies close off the SE end of the island.

Two reefs, separated by a deep channel, extend about 2 miles S from Panauduudi Island.

The **Spire Islets** (11°05'S., 152°29'E.) are two small coral islets, standing on a small reef close off the SE corner of the reef surrounding Utian Island. The islets are 0.25 mile apart and covered with bushes from 6.1 to 9.1m in height.

A deep channel, which is from 0.3 to 0.5 mile in width and 3 miles in length, lies in a NNW and SSE direction between the reefs encircling Utian Island and Panauduudi Island.

The best entrance to this channel from the S is close E of the Spire Islets, avoiding Haikuiri Shoal and the shoals N and NNE of it. The tidal currents in the channel run very strong, the flood setting to the S and the ebb to the N.

8.14 Gulewa Island (11°03'S., 152°31'E.), lying about 1 mile E of Panauduudi Island, has a peak near each end. The S peak, 96m high, is covered with trees. The N peak is low and bare. The island is cultivated and has a village in the cove on the SE side.

Tobaiam Islet, 44m high, lies close off the S extremity of Gulewa Island. Sibumbum Islet, 23m high, lies about 0.75 mile NE of the N extremity of the same island.

Aiwa Buna Reef (11°02'S., 152°31'E.) forms the N side of the lagoon in which lie Panauduudi Island and Gulewa Island. It is 4 miles in length and steep-to on its N side. In the lagoon, which has not been closely examined, there are depths of from 18.3 to 26m and numerous reefs throughout. Two passages lead into the lagoon, one with a depth of 7.3m to the N of Panauduudi Island and the other to the W of Tobaiam Islet, but neither of them can be recommended for a vessel.

Hana Hawawan Reef consists of series of reefs extending about 2.25 miles in a NNE direction from Tobaiam Islet, leav-

ing a narrow passage between its N end and the E end of Aiwa Buna Reef.

8.15 Saru nom nom Islet (11°02'S., 152°33'E.), 15.2m high and wooded, is located on the N end of a reef which lies E of Gulewa Island.

Pana Tatoni Islet (11°03'S., 152°34'E.), 26m high, is located about 0.8 mile SE of Saru nom nom and on the W edge of a reef about 0.6 mile in length.

Horakiraki Passage (11°01'S., 152°33'E.), an opening in the barrier reef about 0.5 mile in width, lies close E of Aiwa Buna Reef. The E part of the passage is encumbered with reefs, but there is a fairway on the W side which may be used with safety by small vessels with local knowledge. The only danger is a reef, with a depth of 3.6m, lying 183m N of Hana Hawawan Reef.

Directions.—The central and highest tree on Pana Tatoni Islet, in range with the summit of **Panua Keikeisa Islet** (11°06'S., 152°36'E.), bearing 141°, leads directly through the channel. The E extremity of Pana Tatoni Islet in range with the S extremity of **Ninan Islet** (11°04'S., 152°35'E.), bearing 138°, leads close SW of the coral heads on the NE side of the passage, but rather close to the NE corner of Aiwa Buna Reef. This reef is steep-to, distinctly visible, and can be rounded by eye. This latter range is probably preferable, as the summit of Panua Keikeisa is not easy to see over Pana Tatoni.

Caution.—The narrowest part of the channel is between this reef and a coral head, with a depth of 5.5m, lying 0.15 mile to the E. Here the tidal current runs with considerable strength in a somewhat oblique direction, necessitating strict attention to the range marks, and a careful lookout for the patches, which will usually be visible.

8.16 Howaho aimo Passage (11°03'S., 152°32'E.) leads into Horaki raki Passage, between the SE side of Hana Hawawan Reef and the W side of the reef on which Saru nom nom Islet stands. There is a small reef, which nearly dries, in the middle of the channel, about 0.75 mile SW of the S extremity of Saru nom nom Islet, which narrows the channel to 0.2 mile. The edge of the reef on the E side is fairly steep, and on this side is the best passage. A tongue of shoal water extends 0.15 mile in a NW direction from the N end of Saru nom nom Islet Reef.

The E extremity of Pana Rora Island, in range with the W extremity of **Venariwa Island** (11°04'S., 152°32'E.), bearing 203°, leads through the channel between the reef and the edge of the reef on the E side.

Moturina Island (Motorina Island) (11°05'S., 152°34'E.) rises to a pyramidal hill, 301m high, at its W end. It is densely wooded, and of irregular shape. The hill is most conspicuous when viewed from the SE. It appears flat-topped from the SW.

The SE side of the island forms a bay, fringed by a reef, on which the sea breaks heavily. A reef, lies about 0.5 mile off the middle of this side of the island. Several villages are situated on the shores of the bay. The E side, which is fringed by a reef, but without any off-lying dangers, is exposed to the prevailing wind. There are depths of 3.6m and 7.3m extending 1 mile offshore in the middle of the N coast. On the SW side, about 0.5 mile NW of the S extremity, there are submerged rocks, some of which break, with other shoal depths, about 0.2 mile NW of it. There is an anchorage in this area, in 7.3m.

Vessels can take sheltered anchorage in Riman Bay, on the NW side of Moturina Island, in a depth of 18.3m, sand. Vessels should bring Moturina Peak in range with a rocky point about midway between the entrance points, bearing 159°, and the NW point of Moturina Island in range with the W summit of Ululina Island, bearing 241°. This anchorage is the best in this part of the Calvados Chain, and is out of the influence of the tidal currents.

Anchorage is also available on the SW side of Moturina Island between the reef fringing shore and off-lying shoals, in depths from 11 to 18m.

Ninan Islet (11°04'S., 152°35'E.) lies about 0.5 mile N of the NE point of Moturina Island. The islet has a peak at each end; the N and higher, is wooded with an elevation of 53m. Shoals, with a depth of 5.5m, lie between Ninan Islet and Moturina Island.

Ululina Island (11°05'S., 152°32'E.) lies W of Moturina Island, from which it is separated by Ara gum gum Passage, which is about 0.25 mile in width. The wooded summit, 99m high, stands on the E end of the island. On the W end of the island, where a village is situated, there is a grassy peak, 51m high.

A reef extends about 0.7 mile W from the W end of the island. A shoal, with depths of from 5.5 to 7.3m extends 0.2 mile from the NE side of the island. Foul ground, which does not break in calm weather, extends 0.4 mile S from the SE side of the island. A dangerous rock lies between the W end of Ululina Island and the S side of Venariwa.

8.17 Ara gum gum Passage (11°05'S., 152°33'E.) is 0.2 mile wide at the S end between the foul ground extending S from Ululina Island and the reefs lying off the SW side of Moturina Island. The passage is 0.15 mile wide between the islands, with depths of from 12.8 to 16.5m.

The tidal currents set strongly through Ara gum gum Passage; the ebb sets to the N and the flood sets to the S. The range marks are good, and the channel presents no great difficulty.

Directions.—Vessels approaching Ara gum gum Passage from the S should keep the E extremity of Ululina Island in range with the SW end of Saru Nomnom Islet, bearing 002°. This range leads 183m E of the foul ground lying S of Ululina Island, and between it and the shoals to the SE, crossing the connecting barrier in a depth of 12.8m. When the SW extremity of Ululina Island is in range with the NE point of Utian Island, bearing about 298°, steer 015°. When the SW point of Moturina Island bears 167°, bring this point astern on this bearing, which leads midway between the fringing reef on the Moturina side and the shoal extending from the NE side of Ululina Island, in depths of 5.5 to 7.3m.

8.18 Venariwa Island (11°04'S., 152°32'E.), lying NW of Moturina Island and close N of Ululina Island, is covered with grass and 152m high. The island presents a sharp peak when seen from the NW or SE, but from other directions it appears more or less flat-topped.

The S and W sides of the island are fringed by a reef. A rock, which dries 1.5m, lies about 91m S of the S extremity of the island. There are rocky patches lying awash 0.2 mile SW of this drying rock.

Gowan Passage between Venariwa Island and Ululina Island is only 91m wide between the rocks, awash, off the SW end of Venariwa Island and the edge of the shoal, with depths of 3.6 to 5.5m, extending N and W from Ululina Island. The passage is not recommended.

Gua awana Passage (11°04'S., 152°32'E.), lying between Tobaiam Islet and Venariwa Island, about 0.85 mile SE, is deep in the fairway.

The tidal currents run with considerable strength through Gua awana Passage. The flood setting S and the ebb to the N. These general directions are modified by the trend of the reefs.

Emerald Shoal (11°08'S., 152°33'E.), with a least depth of 4.5m, lies about 1.5 miles S of the S extremity of Moturina Island. It lies in the fairway of vessels making for Boi U Passage from the W, and must be approached with care, as there is no good clearing mark for it.

Two shoals, with depths of 10.9m, lie 0.25 mile apart, about 3.25 miles SE of Emerald Shoal, in the SW approach to Migemma Gemma Passage.

Bramble Patch (11°10'S., 152°30'E.), with a least depth of 4.9m, lies about 5 miles SW of the S extremity of Moturina Island. A shoal, with a depth of 7.3m, lies about 2.5 miles SE of Bramble Patch. A bank, with a least depth of 16.5m, lies about 5 miles WSW of Bramble Patch.

The S peak of **Gulenwa Island** (11°03'S., 152°31'E.), open E of Pana rora Island, bearing 000°, leads E of Bramble Patch, and W of the 7.3m shoal.

8.19 Panua Keikeisa Islet (11°06'S., 152°36'E.), wooded and 40m high at its N end, lies about 0.75 mile ESE of the SE point of Moturina Island. The islet is surrounded by a reef extending 0.5 mile E from its NE extremity, with a rock, 15.2m high, on its outer edge. Shoal water extends about 0.5 mile S from the islet. In the middle of the passage between Panua Keikeisa Islet and Moturina Island there is rock, 0.9m high, lying on the N end of a bank about 1.25 miles long, with a least depth of 7.3m.

Laiwan Islet (11°07'S., 152°38'E.), lying about 1.75 miles E of Panua Keikeisa Islet, is flat-topped and wooded, and 30m high to the tops of the trees. A bank, with a depth of 5.5m, on the outer edge of which there is a rock 18.3m high, extends about 0.5 mile SW from the SW end of the islet. A bank, with depths of 3.6 to 5.5m, extends 0.4 mile NNE from the NE end.

Boi U Passage (11°07'S., 152°37'E.), between Panua Keikeisa Islet and Laiwan Islet, is about 1.25 miles wide between the reefs on either side. A shoal, with a depth of 20m, lies near the middle of the S end of the passage. A shoal, with a depth of 12.8m, lies about 1.5 miles NE of the NE extremity of Laiwan Islet.

The tidal currents set strongly through this passage, causing heavy overfalls and tide rips, frequently dangerous to boats.

Bonna wan Island (11°08'S., 152°39'E.), 102m high, and covered with grass, lies on the N end of a reef, lying about 1.75 miles SE of Laiwan Islet. A reef extends 0.5 mile W from the SW point of the island and the same distance S from the S extremity. Shoal water, with depths under 5.5m, extends 0.5 mile SE from the extremity of the latter reef. A detached islet, 9.1m high, lies on the reef off the SW point of the island.

Migemma Gemma Passage (11°08'S., 152°39'E.), between Laiwan Islet and Bonna wan Island, is about 1.25 miles wide, deep and clear of dangers. Tidal currents set strongly through this passage, causing heavy overfalls and tide rips, frequently dangerous to boats.

8.20 Bagaman Island (11°08'S., 152°41'E.), the E part of which is named Paba baga, lies close E of Bonna wan Island. It is thickly wooded, except on some of the N slopes, and there is a village on its W side. The W part of the island rises to an elevation of 219m, the E part to 149m.

Aurobu Islet, 45m high, rocky and wooded, lies about 0.4 mile S of the E entrance point of the bay on the S side of the island. A rock, 8.2m high, lies 183m S of the W entrance point of the same bay.

Pana mun Passage (11°08'S., 152°40'E.), between Bonna wann Island and Bagaman Island, is about 0.3 mile wide between the fringing bank on either side. Depths of 7.3 to 9.1m are found in the narrow channel. The tidal currents set strongly through this passage.

Vessels can take anchorage in the NE part of Pana mun Passage, off a village on the W side of Bagaman Island, in a depth of 20m, sand. Vessels should anchor with the two points on the SW side of the island in range, bearing 198°, and the N point of Bonna wan Island in range with Laiwan Island, bearing 302°. This anchorage is not affected by the tidal currents, but frequently heavy squalls come off the land.

Vessels can also obtain anchorage in the middle of the E part of the bay on the N side of Bagaman Island, in depths of from 26 to 29m, sand and coral. Vessels should anchor with the NE entrance point of the bay in range with the N point of Bobo eina Island, bearing about 065°. The bay on the S side of the island is too exposed for safe anchorage, and the approach to it is partially obstructed by a sunken reef extending E from Bonna wan Island. This reef extends 2.25 miles SE of Bonna wan Island and includes a depth of 4m and a rock, awash.

Gedge Shoals (11°12'S., 152°41'E.), divided into two parts by a deep channel, lies about 2.5 miles S of Bagaman Island. On the SE side there is a least depth of 5.5m, and on the NW part, 6.4m.

Webb Patch (11°13'S., 152°39'E.), with a depth of 6.4m, lies about 4.5 miles SSW of the S extremity of Bagaman Island.

Yule Patches (11°15'S., 152°42'E.) consist of three coral reefs, the easternmost of which has a least depth of 3.6m and lies about 5.75 miles S of the E entrance point of the bay on the S side of Bagaman Island. The W and middle reefs, with depths of 7.3m, lie about 2 miles SW and 3.75 miles WSW of the 3.6m shoal mentioned above.

8.21 Bobo Eina Island (11°08'S., 152°44'E.), thickly wooded and 243m high, lies 1 mile E of Bagaman Island.

Gilia Islet, 79m high, and covered with grass, is connected by a reef with the W side of Bobo Eina Island. A clear passage about 0.2 mile wide lies between Gilia and Bagaman Island. A rock, which breaks, lies about 183m SW of Gila.

Wori wori Patches (11°06'S., 152°44'E.), with depths of 5.5m and 7.3m, sand and coral, lie within 0.75 mile NNW of Hana Manawi Point, the N extremity of Bobo Eina Island. Depths of 24 to 28m, between the point, which is steep-to, and the two patches. These patches always show well.

Stanton Patch (11°05'S., 152°43'E.), with a depth of 5.5m,

lies about 1.75 miles NNW of Hana Manawi Point.

Two reefs, with depths of 7.3m and 6.4m, lie, respectively, about 1.25 miles S and 1.5 miles SW of Bobo Eina Island.

Vessels can take anchorage on the W side of Bobo Eina Island, in a depth of 26m, sand and coral. Vessels may anchor, with the E extremity of Gilia Islet bearing 187° and the N extremity of Bagaman Island in range with the summit of **Moturina Island** (11°05'S., 152°34'E.) bearing 285°. This anchorage is affected by the tidal currents, as they set strongly through the passage and over the reef on either side of Gilia Islet.

Mabneian Islet (11°08'S., 152°46'E.), wooded and 73m high, lies on the N end of a reef, about 1 mile E of Bobo Eina Island. Pana Kuba and Leiga are two wooded islets, 64m and 47m high, respectively, and 0.15 mile apart, lying on the S end of the same reef. Shoal water extends about 0.3 mile SW from Leiga Islet.

8.22 Kivi Kivi Passage (11°08'S., 152°45'E.), lying between Bobo Eina Island and Mabneian Islet, is a safe channel, about 1 mile wide. The tidal currents set strongly N and S through the passage. These tidal currents sweep round Mabneian Islet, causing a breaking sea in the passage.

Pana Numara Island (11°10'S., 152°47'E.), 131m high, lies 0.5 mile SE of Leiga Islet. The shores of the island are generally steep-to, except at the W end, from which shoal water extends 183m. A small village stands on the NE side of the island. Kurupan Islet, 45m high, lies close off the NE extremity of Pana Numara Island.

Bahil Passage, between Leiga Islet and Pana Numara Island, is over 0.5 mile wide, and clear of dangers.

Vessels can take good anchorage in Hoba Bay, on the N side of Pana Numara Island, in a depth of 27m, sand. This anchorage is sheltered from the prevailing wind and not affected by the tidal currents.

8.23 Yaruman Island (11°09'S., 152°48'E.), 87m high, and densely wooded, lies about 0.6 mile NE of the NE point of Pana numara Island.

Panangaribu Island (11°08'S., 152°49'E.) 90m high, and densely wooded, lies about 0.2 mile E of Yaruman Island. The channel between these islands is clear of dangers in mid-channel. The tidal currents run through this channel with considerable force, causing a heavy breaking sea.

Nunuan Islet, 61m high, and wooded, lies about 183m S of Panangaribu Island.

Panantanian Island (11°09'S., 152°50'E.), 125m high and densely wooded, lies about 1 mile SE of Panangaribu Island. Shoal water extends about 0.3 mile N from the N end of the island. There is a village on the NW side, but landing is difficult, except at HW, when the reef is covered.

Pornani Passage (11°09'S., 152°49'E.), lying between Nunuan Islet and Panantanian Island, is about 0.75 mile wide, with depths of from 22 to 29m. The shores of the passage are steep-to, but when the tidal current is against the wind there is a heavy breaking sea.

Pana Krusima Island (11°10'S., 152°52'E.), wooded and 109m high near its S end, lies about 1.75 miles E of Panantanian Island. The S part is fringed by a reef, which on the E side, is steep-to, and extends about 0.35 mile offshore. There are some islets on the reef, one which is 4.5m high, lying about 0.4 mile S of Su waian Point, the N extremity of the island. A reef, with depths of from 3.6 to 7.3m, extends 1 mile S from the island. The summit of Bagaman Island in range with the S extremity of Pana numara Island, bearing about 287°, leads SW of this reef.

Pori Passage (11°09'S., 152°51'E.) lies between Pana Krusima Island and Panantanian Island, about 1.75 miles W. A shoal, with a least depth of 9.1m, lies near the middle of the S entrance of Pori Passage, about 0.6 mile SE of the SE extremity of Panantanian Island. Another shoal, with a depth of 11m, lies 0.5 mile SSE of this 9.1m depth. The N approach is encumbered by Reiga Shoals.

8.24 Reiga Shoals (11°08'S., 152°51'E.) lie on a crescent-shaped bank, which connects the N point of Panantanian Island with the N point of Pana Krusima Island. The shallowest part, with a depth of 7.3m, lies about 1.5 miles N of Panantanian Island. A shoal, with a depth of 9.1m, lies about 1 mile NW of the N point of Pana Krusima Island.

The bank, which has general depths of from 12.8 to 18.3m, is marked by heavy tide rips. The shoal spots should be avoided, as the depths may be less than charted.

Tauara Shoal (11°07'S., 152°54'E.), with a least depth of 2.7m, coral, lies about 1.75 miles NE of the N extremity of Pana Krusima Island. This shoal shows clearly in a good light.

Dawson Banks (11°12'S., 152°48'E.), consisting of three banks extending for a distance of 5 miles in a WNW and ESE direction. A shoal, with a least depth of 3.6m, lies about 3 miles SSW of Panantanian Island. Shoals, with depths of 7.3m and 5.5m lie, respectively, near the NW and SE ends of the bank.

Dayman Banks (11°15'S., 152°49'E.), consisting of three shallow banks, lie S of and parallel to Dawson Banks. The central and largest bank, with a least depth of 2.7m, lies about 5.25 miles S of Panantanian Island. The other two banks, with depths of 5.5m and 7.3m lie, respectively, about 4.5 miles SSW and 6.5 miles SSE of Panantanian Island.

8.25 Sullivan Patch (11°16'S., 152°47'E.), with a least depth of 4.5m, lies about 6 miles S of Pana numara Island. A shoal, with a least depth of 5.5m, lies about 2.25 miles SE of Sullivan Patch.

Kuanak Island (Abaga gaheia Island) (11°10'S., 152°55'E.), 181m high near its S end, lies about 1.75 miles E of Pana Krusima Island. A ridge extends N from the summit terminating in a sharp, wooded hill, about 167m high. The S shores of the island are bold and cliffy.

Gigila Island (11°10'S., 152°57'E.), 128m high and wooded, with some grassy slopes on the N side, is connected to the SE part of Abaga gaheia by a reef. The two islands form a bay on the N side, but is not a good anchorage.

Waia Islet, 50m high, lies close S of the E extremity of Gigila Island.

A reef, with a depth of 5.5m, lies about 0.75 mile S of Waia Islet.

Uli Bonna Bonna Passage (11°10'S., 152°58'E.), between Gigila Island and Yakimoan Island, located about 0.75 mile E of it, is clear of dangers, except for a reef which extends about 0.15 mile from the SE side of Gigila Island. It is reported to be

a good passage.

Taifaur Islet (11°09'S., 152°54'E.), 82m high and covered with grass, lies 0.15 mile NW of the NW extremity of Abaga gaheia Island, and is connected to it by a reef.

Einamu Islet, 42m high, and wedge-shaped, lies about 0.5 mile W of the S extremity of Taifaur Islet. Shoal water extends about 183m N and E from the islet, but the channel on either side is clear of dangers.

Vessels can take anchorage in the outer portion of the W bay on the N side of Abaga gaheia Island, known as **Robinson Anchorage** (11°09'S., 152°55'E.), in depths of from 24 to 29m, sand and coral. Vessels anchor with the two N points of the island in range, bearing 097°, and the W hill 99m high, bearing 221°. The shores of the bay are fringed by a reef. A rock, with a depth of 1.8m, lies about 183m off the point on the SW side of the anchorage.

Ward Rock (11°07'S., 152°56'E.), with a depth of 2.7m, lies 2 miles NE of the N extremity of Taifaur Islet.

Power Patch, a coral head with a depth of 5.5m, lies about 3 miles NNE of Taifaur Islet.

Musters Patches (11°15'S., 152°53'E.), consisting of three shoals, with depths of from 6.4 to 9.1m, lie about 4.75 miles SSW of the S extremity of Abaga gaheia Island.

8.26 **Conflict Patches** (11°14'S., 152°55'E.), with depths of 3.6 to 4.5m, lie about midway between Musters Patches and Abaga gaheia Island. They extend in a WNW and ESE direction for a distance of 3.5 miles. The NW patch lies about 1.75 miles S of the S extremity of Abaga gaheia Island.

Pana Wina Island (11°10'S., 153°01'E.), the largest island of the Calvados Chain, is about 1.25 miles E of Gigila Island. Two ridges of hills, one on either side of the island, run N and S, the highest part being near the S end, where the W ridge rises to an elevation of 288m, and the E to 243m.

A bay, with depths of from 22 to 31m, lies on the S side of the island. It appears that the creek at the head of this bay runs to the N and connects with the bay on the N side, thus dividing the island.

A reef extends about 183m from Boiama Point, the E entrance point of the bay and S extremity of Pana Wina Island. A spit, with a depth of 3.7m, extends about 183m beyond the reef. Koia kun, a conspicuous hill, 243m high, lies about 0.5 mile N of the point.

Pipidai Point, the SE extremity of Pana Wina Island, is low, bold, and covered with grass. Foul ground extends about 0.5 mile NE and 0.25 mile SE from the point.

The N coast, which is generally lined with mangroves and fringed by a reef about 0.3 mile wide, is indented by a shallow bay.

On the NW side of the island is another bay, with depths of from 12.8 to 22m. The bay is sheltered from the SE winds. The tidal currents run with considerable force in the area, the flood setting to the SW and the ebb in the opposite direction. The island is inhabited.

Yakimoan Island, 91m high, is separated from the W extremity of Pana Wina Island by Ui gari Passage. A fairly steep-to reef, with Taval Rock on its outer extremity, extends about 0.4 mile NE from Yakimoan Island.

Ui gari Passage, about 0.25 mile wide, is narrow, with a steep-to reef extending from both sides. The tidal currents run with considerable strength through this passage.

Vessels can take anchorage about 0.35 mile N of Yakimoan Island, with the N extremity of Gigila Island bearing 263°, in a depth of 14.6m, sand. Though protected from the wind and sea, this anchorage is, to some extent, exposed to the strength of the tidal currents.

8.27 **Beagle Rock** (11°13'S., 153°00'E.), with a depth of 1.8m, lies about 1.5 miles WSW of Boiama Point, the S extremity of Pana Wina Island. The S peak of Pana Krusima Island, bearing 291°, just open S of Abagagaheia Island, leads N of this danger.

Hemenahei Island (11°10'S., 153°04'E.), the easternmost of the Calvados Chain, lies 0.3 mile E of the NE point of Pana Wina Island. The island is surrounded by mangrove swamps, the only convenient landing place being on the NE side.

A ridge of grassy hills, from 61 to 73m high, traverses the island. The island is considered unhealthy.

A shoal, with a depth of 1.8m, lies about 0.5 mile ENE of the E extremity of the island.

Barrier Reef—North of the Calvados Chain

8.28 The barrier reef extends from Horaki raki Passage in a NE direction for about 10 miles, where it reaches its northernmost point; thence it extends in an ESE direction to Sabari Island, a distance of about 26 miles.

Pana sagu sagu Islet (10°58'S., 152°37'E.), low, wooded, and 36m high to the tops of the trees, lies on the barrier reef, about 6 miles NE of Horaki raki Passage.

A clear passage, about 0.35 mile wide, lies immediately N of the reef on which Pana sagu sagu Islet stands.

Shoals, with depths of 5.5m and 9.1m lie, respectively, about 0.5 mile E and 1.25 miles ESE of Pana sagu sagu Islet. Vessels using this passage should pass N of these two shoals, as the depths are more regular on that side, and the edge of the barrier is steep-to.

The tidal currents run with considerable strength through this passage, the flood current setting toward the reef on which Pana sagu sagu Islet stands.

The **Bushy Islets** (10°56'S., 152°39'E.), a group of wooded islets, from 13.7 to 20m high, lie on the outer edge of the N extremity of the barrier reef, which is steep-to on its NW and W sides. The NE islet lies about 4 miles NE of Pana sagu sagu Islet, and on the NW side of Debagarai Passage.

8.29 The **Basses Islands** (10°57'S., 152°43'E.) are a group of low coral islets, with trees from 18.3 to 30m high, lying on the E side of Debagarai Passage. Gumaian, the easternmost and largest island, lies 7 miles E of Pana sagu sagu Islet, and forms the NW side of Wuri wuri Passage. Aba evara, the W islet of the group, is located about 2.25 miles W of Gumaian. A small reef, with a depth of 5.5m, lies about 0.5 mile SW of Isu raua raua, the S islet, located about 0.5 mile S of Aba evara.

Debagarai Passage (10°56'S., 152°42'E.), the opening in the barrier NW of the Basses Islands, is 1 mile wide between the reefs on either side. The passage is obstructed in the middle by a large shoal, with depths from 7.3 to 11m, and possibly less. There is a deep but narrow passage between this shoal and the edge of the reef on the NW side of the channel. The tidal cur-

rent swirling over the point of the reef makes it difficult to distinguish the edge of the shallow water.

In the channel SE of the shoal there are two patches, with depths of 5.5m and 9.1m, located, respectively, about 0.2 mile N and 0.5 mile NW of Aba evara Islet. There may be less water on these shoals, and as the tidal currents are strong, with heavy overfalls, the channel should only be used under very favorable conditions.

8.30 Tawa tawa mal Reef (11°04'S., 153°00'E.), the NE portion of the barrier reef, extends from the Basses Islands in a ESE direction for 39 miles to Hudumu Iwa Passage. The reef dries in patches and has numerous boulders on its outer edge, some of which are from 0.9 to 4.5m high. The N side of the reef is steep-to, but the S or inner side has, in many places, shoals extending for some distance.

There are three ship channels through Tawa tawa mal Reef between the Basses Islands and the NW extremity of Sabari Island, namely, Wuri wuri Passage, Duna labwa Passage, and Chubudi Passage. The reef SE of Sabari Island is impenetrable to ships of any size until Hudumu iwa Passage is reached.

Wuri wuri Passage (10°58'S., 152°46'E.), between Gumaian Island, 27m high, and Leiga Islet, 3 miles ESE, is the safest and easiest opening to enter in this part of the barrier reef. A shoal, with a least depth of 3.6m, lies near the middle of the passage, dividing it into two parts. In the channel NW of this shoal the depths are irregular and the tidal currents are strong. A detached reef lies SW of, and parallel with, the reef on which Leiga Islet lies, and a bank, with depths of 9.1 to 10.9m, lies within 0.6 mile W of the NW end of the detached reef. There is a deep channel, about 1 mile wide, between this bank and the shoal near the middle of the passage.

Pearce Patch, with a depth of 5.5m, lies in the S fairway of Wuri wuri Passage, about 2.5 miles SW of Leiga Islet.

8.31 Siwai wa Island (11°03'S., 152°57'E.), 12.2m high with some bushes, lies on the NW extremity of a reef, about 2 miles W of Duna labwa Passage. Shoals, with depths of from 4.5 to 5.5m lie, about 1.75 miles S of Siwai wa Island. A shoal 1.8m deep lies 1 mile SW of this island.

Duna labwa Passage (11°04'S., 152°59'E.), about 0.3 mile, with a depth of 10.9m in the fairway, lies about 2 miles E of Siwai wa Island. It may be recognized by a sand cay with some bushes on it, 3m high, located on the reef which forms the E side of the passage. The reef on the W side of the passage is steep-to.

The tidal currents set directly through the channel, forming heavy tide rips and overfalls on the bar.

Myriad Shoals (11°06'S., 152°59'E.), a group of coral heads, with depths of 2.1 to 9m, lie from 1 to 2.75 miles S of the reef on the E side of Duna labwa Passage.

Sabari Island (11°07'S., 153°06'E.), the NW end of which lies 8 miles ESE of Siwai wa Island, is 4 miles in length by 0.5 mile in breadth. The island is low and densely wooded, the tops of the trees having an elevation of about 55m. There is a village near the SE end of the island.

The coast line of the island is low and cliffy, with an occasional small sandy beach. Near the middle of the island, on the S side, there is a shallow basin, with a reef extending across its entrance. Northwest of this opening a chain of islets fronts the coast.

Mabu Islet and Pana kuba Islet, 30m high, lie at the outer end of a chain of islets and rocks extending 0.4 mile NW from the NW extremity of Sabari Island. The Rara haiwa Islets are two islets, located close off the SE end of Sabari Island.

8.32 Chubudi Passage (11°06'S., 153°02'E.), about 2 miles NW of the NW extremity of Sabari Island, is about 0.2 mile wide. A reef, with a least depth of 2.7m, lies in the SE part of the passage. The fairway, which is deep, lies W of this reef.

The tidal currents set directly through the passage and cause tide rips and overfalls.

Hiscock Reef (11°07'S., 153°01'E.), which nearly dries, lies about 1 mile SW of the S extremity of the reef located on the E side of Chubudi Passage, and in the fairway of the S approach to the passage. Reefs, with depths of 3.6m, lie, respectively, about 1 mile N and 0.25 mile E of Hiscock Reef. A reef, with a depth of 5.5m, lies about 0.25 mile S of Hiscock Reef, with foul ground between.

Hanover Rock (11°08'S., 153°00'E.), with a depth of 1.8m, lies about 1.25 miles NNW of the N point of Pana Wina Island.

Blind Rock (11°08'S., 153°01'E.), with a depth of 2.7m, lies 0.8 mile NNE of the N point of Pana Wina Island. A rock, with a depth of 1.8m, lies between Blind Rock and the fringing reef of Pana Wina Island. The depths between Hanover Rock and Blind Rock are about 7.3m as charted.

Galley Rock (11°08'S., 153°02'E.), with a depth of 2.7m, lies about 1.75 miles NNE of the N point of Pana Wina Island.

Tides—Currents.—West of Pana Wina Island, the flood current sets SW, with a velocity of 1 knot; the ebb sets NE, with a velocity of 0.75 knot. North of the island, the flood current sets SE, with a velocity of 1 knot; the ebb sets WNW, with a velocity of 0.5 knot.

Directions.—The dangers described above render navigation S and E of Chubudi Passage somewhat intricate. The best track for vessels bound E of Chubudi Passage, is N of Hiscock Reef. Vessels from the SW, and proceeding E should use the passage between Hanover Rock and Hiscock Reef. A vessel using this passage should steer for the N extremity of Hemenahei Island, bearing 105°, which leads between Blind Rock and Galley Rock. When the SW end of Hemenahei Island bears 153° and is open clear of Pei-i Point, the NE extremity of Pana Wina Island, a vessel should steer for the SE extremity of Sabari Island, bearing 094°, which leads 0.5 mile N of the N extremity of Hemenahei Island. These directions should be used with the greatest caution because of the limited survey and numerous uncharted dangers.

Caution.—Vessels using these passages through the barrier reef must exercise caution, because of the limited surveys, and strong tidal currents and rips passing through them.

Pana Tinani Island

8.33 Pana Tinani Island (11°14'S., 153°10'E.), the W end of which lies 3 miles E of Pana Wina Island, is 10.5 miles in length by 2 to 3 miles in breadth. A ridge of hills extends the whole length of the island, with the exception of about 2 miles of low wooded land near its NW end. These hills rise abruptly

from the S coast and slope down gradually to the N and NE. The island is well wooded, with numerous groves of coconut palms near the sea. The island is inhabited.

Mount Guyuba, 338m high, lies about 4 miles W of the E extremity of the island.

The NE coast is mostly flat, with the exception of four slight indentations, behind each of which the land is flat and swampy toward the foot of the hills. This coast is difficult to approach, owing to the fringing reef and the numerous patches along its whole length.

The SE coast of Pana Tinani Island is comparatively bold and backed by a steep range of hills.

Pana muti Point, the E extremity of the island, is covered with mangroves and has a ridge sloping down to it. A reef extends about 0.65 mile E from the point and foul ground about 183m beyond.

Heihuti Bay, located on the SE side of the island, is fringed by a narrow reef, which, toward the head, extends about 0.25 mile offshore.

Vessels can take anchorage during the Northwest Monsoon in Heihuti Bay, in depths of from 22 to 24m, sand and clay.

The SW coast of the island is irregular, consisting of four projecting hilly points with several bays between them. Vessels can take anchorage in these bays. The coast is fringed by reefs and there are some off-lying islets and dangers.

The Gudau Peninsula, the S extremity of the island, is 83m high. Hatilawi Harbor lies close W of the peninsula.

Vessels can take anchorage during the Southeast Monsoon in Hatilawi Harbor, about 0.35 mile N of its S entrance point, in depths of 16.5 to 18.3m, mud.

Ni Eivi Reef (11°18'S., 153°10'E.) lies S of the Gudau Peninsula and is separated from it by Doga Siu Siu Passage. A sand bank, which dries, is located on the SE end of the reef.

Doga Siu Siu Passage, which is clear of dangers, has a least depth of 20m, and is 0.75 mile in width.

The tidal currents run through this passage at a velocity of 2 to 3 knots, with the flood setting to the WNW and the ebb setting to the ESE.

Directions.—The S extremity of **Osasai Islet** (11°21'S., 153°20'E.) in range with the S extremity of **Hei wok Islet** (11°19'S., 153°14'E.), bearing 112°, leads through Doga Siu Siu Passage, in a depth of 14.6m. This range leads rather close to Ni Eivi Reef; a vessel will be more in the fairway by bringing the S extremity of Osasai over Hei wok and keeping in a depth of 20m.

8.34 Bounce Point (11°14'S., 153°06'E.), the W extremity of an islet, 134m high, located 5 miles NW of Hatilawi Harbor, is a reddish-colored cliff 21.3m high. A cut channel lies between the above islet and the mainland, to which it was attached by a low neck of land.

A grass-covered islet, 44m high, and a grassy peaked islet, 61m high, lie, respectively, off the E and S side of the above islet.

Imadi Bay, 3.5 miles NW of Hatilawi Harbor, provides anchorage in the SE part of the bay about 0.25 mile, 339° from the E entrance point, in depths of from 16.5 to 18.3m, mud.

A reef which dries, lies 1 mile WSW of the E entrance point of Imadi Bay. There are depths of 2.7m just N of this reef.

Pana Tinani Island—Southwest Coast

8.35 From Bounce Point, on the islet close offshore, the coast trends in a NW direction 2.25 miles to **Haugili Point** (11°12'S., 153°05'E.), the W extremity of Pana Tinani Island. Haugili Point is bold and descends abruptly from a flat-topped grassy hill 85m high.

The coast between these two points recedes 1 mile and forms a bay which is divided into two parts by a grass-covered islet 84m high. The islet is connected with the mainland by a reef; the bay N of the islet is encumbered by foul ground extending 0.9 mile S from Haugili Point.

That part of the bay SE of the islet is called Buvara Bay; it is fringed by a reef which extends from a few meters to 0.15 mile from the shore, skirting the shore 0.25 mile N of Bounce Point.

During the Southeast Monsoon vessels may obtain anchorage in the S portion of Buvara Bay, in depths from 18.3 to 22m, sand and clay. The best berth, out of the tidal influence, is with Bounce Point bearing 165°, distant 0.35 mile.

Bridge Shoals (11°13'S., 153°04'E.) is comprised of a series of coral patches with depths of from 2.7 to 5.5m, lying from 1 to 1.5 miles SE, S, and SW of Haugili Point. They impede the approach to Buvara Bay when coming from the N or W.

About 0.75 mile NW of Bridge Shoals are two rocky patches with depths of 3.7m; 0.5 mile farther NE is the extremity of shallow water extending from Pana Tinani Island.

Sibumbum Islet, bearing 143°, leads 0.5 mile SW of Bridge Shoals.

A narrow wooded islet, 30m high, is located on the fringing reef off the NW point of Pana Tinani Island, about 1.25 miles NNE of Haugili Point. A reef, awash at LW, lies 0.6 mile W of the islet. A tongue of shoal water, with depths of from 7.3 to 9.1m, extends 0.3 mile SW from the reef.

8.36 Maga Maga Passage (11°11'S., 153°04'E.) leads between Hemenahei Island and Pana Tinani Island. There are depths of 11 to 18.3m in the fairway over a width of 183m, between the edge of a bank, with patches awash, lying 0.5 mile N of the N extremity of Pana Tinani Island and a bank with depths of 3.7 to 5.5m, located on the N side of the fairway about 0.2 mile farther N.

This passage should only be used by vessels having local knowledge. Vessels from S should bring themselves to a position midway between Bridge Shoals and the point about 2 miles WNW; steer 024° until within 0.2 mile of the edge of the fringing reef S of Hemenahei Island, then alter course to the NE keeping at a distance of 183m off this reef which is always plainly visible. As soon as the N point of Pana Tinani Island opens N of the islet lying W of it, bearing about 097°, the course may be altered to 075° until the E extremity of Hemenahei bears 007°, when a 052° course will lead out through the N entrance.

Vessels coming from the NW are cautioned to give a berth to the depth of 1.8m located 063° 1 mile distant from the E extremity of Hemenahei Island.

Note that the tidal currents run through this passage with a velocity of 2 to 4 knots and have very short periods of slack water; the flood current sets SW and the ebb current sets NE. The passage should not be attempted during the first 3 hours of either flood or ebb.

Islands and Dangers Southwest of Pana Tinani Island

8.37 Wanim Island (11°16'S., 153°06'E.) rises to a height of 119m at its N end. This island, which is encircled by reefs, lies 4.75 miles W of Hatilawi Harbor.

A bay is formed on the W side of the island where anchorage may be taken, in a depth of 29m, coral and sand, with the SW extremity of the island bearing 187°, distant 0.35 mile. This anchorage is out of the tidal influence, and during the Southeast Monsoon the water is smooth, though strong gusts of wind come down over the land.

Sibumbum Islet, lying 0.5 mile S of Wanim Island, is located in the center of a reef, 0.3 mile in diameter. The islet has an elevation of 29m; there are a few trees on it. In the channel between the surrounding reef and the reef extending S from Wanim Island there is a 9.1m patch; the depth is probably less than that charted.

An islet, 116m high and wooded, lies at the S end of Pakabuk Reef, 2.75 miles S of Sibumbum Islet. Except off the NW end of Pakabuk Reef where a spit extends for 0.2 mile, the reef is steep-to; there is a sand cay near the middle.

Popomweni Passage, between Sibumbum Islet and the N extremity of Pakabuk Reef, is 1.5 miles in width. It is encumbered with Green Patch, with a least depth of 4m, on the N side of the fairway, about 0.6 mile S of Sibumbum Islet and by a 3.7m patch 1.5 miles SSE of the islet.

Sei Hauho Reef lies 1.5 miles W of Pakabuk Reef and is separated from it by a deep channel. Sei Hauho Reef, dries in patches at LW and is steep-to on its E side. Shoal patches, with a patch, awash, extend 1 mile S and foul ground extends 1.5 miles W of the reef.

Brierly Reefs (11°18'S., 153°00'E.) lie W of Sei Hauho Reef and extend in an E and W direction about 5 miles. The general depth over the reefs are from 2.7 to 9.1m, and some spots dry at LW. These reefs form the E part of the N extremity, of a large area that has not been examined. There is a 3.7m shoal between Sei Hauho Reef and Brierly Reefs.

Owen Stanley Bank, located W of Wanim Island, lies 2.25 miles N of Sei Hauho Reef and Brierly Reefs and is parallel to these reefs. A reef lying at the E end of the bank dries at LW, and Sandfly Rock, 4 miles W, at the W end of the bank, has a depth of 1.8m. Other dangers than those charted may exist, therefore mariners are cautioned not to cross the bank.

The N extremity of Wanim Island in range with the 338m high peak on Pana Tinani Island, bearing 093° leads close N of the bank; Sibumbum Islet, in range with the southernmost peak on Pana Timani Island, bearing 096°, leads S of the bank. There are two rocks, dangerous to navigation, on the N side of the Owen Stanley Bank, just S of the above mentioned bearing.

Tagula Island

8.38 Tagula Island (11°30'S., 153°26'E.), the NW end of which lies 1.75 miles S of Pana Tinani, is the largest of the Louisiade Archipelago, being 39 miles long and 8 miles wide. A wooded mountain range extends the length of the island, with the summit near the center.

Mount Madau (11°22'S., 153°12'E.) is the most conspicuous landmark on the NW end of the island. It is thickly wooded and rises to a height of 296m high. Ridges extend N and W from it, and beyond these ridges, the land is flat, wooded country intersected by numerous streams. To the E the main ridge extends as the backbone of the island. There are deep valleys where streams flow through rocky gorges and discharge into Coral Haven, some of these being navigable by small boats for a distance up to 1 mile.

Mount Gangulua (11°25'S., 153°16'E.), lies 5 miles SE of Mount Madau. It is 439m high and thickly wooded.

Mount Riu (11°31'S., 153°26'E.) is the summit of the island and rises to a height of 806m high. It is the largest mountain in the range.

Mount Arumbi (11°34'S., 153°41'E.), the southeasternmost mountain of the range, is doubled topped, 350m high, and slopes gradually down to Cape Siri, the SE extremity of the island. Southwest of the mountain, the hills slope gradually to the sea, with drainage into the Iyuba River, a stream which discharges into Dumage Bay.

8.39 Coral Haven (11°19'S., 153°19'E.) is an extensive harbor bounded to the N and E by Tawi Reef and Rawa Reef and to the S and W by Tagula Island and Pana Tinani Island. The haven offers good shelter and affords a good anchorage, but it is encumbered with islands and reefs, making navigation somewhat intricate.

The haven is accessible from the N by Hudumu Iwa Pass, from the NW by the lagoon channel N of Pana Tinani, from the W by the channel between that island and Tagula Island., and from the E by Yuma Passage, which leads into Gold Rush Channel.

Nimoa Island (11°19'S., 153°15'E.), the largest island in Coral Haven, lies about 1.5 miles SE of Pana Tinani. This well wooded and fertile island attains an elevation of 139m and has a few villages on its shores. There is a 3.7m patch 1.25 miles E of the S point of Nimoa Island. A rock, 0.9m high, lies 0.5 mile further W.

Pana Hoba Islet, 14.7m high and rocky, is located on the middle of a reef which extends 1.5 miles E from the NE extremity of Nimoa Island. There are a few trees on its summit. About 0.5 mile N of the islet is a coral patch, awash; another 3.7m patch lies 0.5 mile NE of it.

8.40 Middle Reef (11°17'S., 153°17'E.) is about 1 mile long and 0.25 mile wide. It lies in the NW part of Coral Haven. Except at the W end, the edges are foul and shoal water extends 0.8 mile S from the reef toward Pana Hoba Islet, leaving between them a navigable channel 0.4 mile wide. A coral patch, awash, lies in the center of this channel.

Anchorage may be taken off the W side of Nimoa Island. The bay should not be entered farther S than to have Sibumbum Islet in range with the S point of the Gudau Peninsula, bearing 281°, or farther E than to have the E extremity of Pana Tinani in range with the N point of the bay, bearing about 002°. In this position there is a depth of 20.2m, sand and clay, with good shelter from SW winds.

Caution.—Vessels should not get E or S, respectively, of these alignments as the shores of the bay are much encumbered with reefs and coral patches.

8.41 Bulami Passage (11°19'S., 153°11'E.), the W en-

trance to Coral Haven, is divided into passages by Ni Eivi Reef. Doga Siu Siu Passage, the N passage, was previously described in paragraph 8.33. Bulami, the S passage, is 0.5 mile wide between the S side of Ni Eivi Reef and the reef extending 1 mile W from Bobo-hai Point, the NW extremity of Tagula Island. It is deep and clear of dangers. The tidal currents set at the rate of 2 to 3 knots.

The coast from **Bobo-hai Point** (11°20'S., 153°12'E.) to Nepenthes Point is bordered by mangroves and a narrow fringing reef. There is a small wharf on the N coast of Tagula Island, with a least depth of 4.6m alongside, about 1 mile ESE of Bobo-hai Point. A ridge of low bare hills, the outer peak and lower slopes of which are wooded, terminates at Nepenthes Point. West of the point is a bay having depths of from 12.9 to 22m close up to the fringing reef, but its N part is obstructed by reefs. A small reef lies close N of Nepenthes Point, and a patch, awash, lies about 0.7 mile, bearing 300° from the same point.

Muhua Bay (11°22'S., 153°18'E.) lies close E of Nepenthes Point. In the E part of the bay, the shore reef projects 0.4 mile N from the mangroves and is broken up into patches. The Sahai River flows into the bay. Anchorage may be obtained in the bay, in a depth of 22m, mud.

McGregor Reefs (11°21'S., 153°16'E.), lying about halfway between Nepenthes Point and about 1 mile off the coast of Tagula Island, comprise a cluster of coral patches which is partly dry and extend 0.75 mile in an E and W direction. A bank, with depths of 14.7 to 16.6m, extends 0.75 mile E of these reefs; between them and the coast is a ridge having depths of 11.1 to 16.6m.

8.42 Minister Patch (11°20'S., 153°16'E.), with a depth of 6.4m, lies 0.4 mile N of the E end of McGregor Reef. A bank with a depth of 17.4m extends 0.75 mile E from the patch.

Hely Bank (11°21'S., 153°20'E.), on which there are two coral heads with depths of 2.7 to 4.6m, has general depths of up to 18.4m and lies 1.5 miles NNE of Nepenthes Point.

Escape Rock (11°21'S., 153°20'E.), a coral head with a depth of 2.2m, is located 2 miles NE of Nepenthes Point and at the W extremity of a line of patches extending 1.5 miles W of Rawa Reef. There is a 5.5m shoal 1.5 miles, bearing 030°, off Nepenthes Point.

Rawa Reef (11°20'S., 153°24'E.), which is about 4.5 miles in length, forms the SE side of Coral Haven. Foul ground extends 0.5 mile from the inner edge of the reef. The reef curves E at its N end and fringes the S side of Yeina Island.

Osasai Islet (11°21'S., 153°20'E.) is 69m high and located on the SW end of Rawa Reef.

Yeina Island (11°20'S., 153°27'E.) is 5 miles long and 1.5 miles wide; it lies between Rawa Reef and Tawi Reef. A grassy ridge extends along the length of the island and attains a height of from 37 to 79m. The island is fringed with mangroves, but the E end is rocky with sandy beaches. There is a village on the NE coast.

Meiwa Islet, 24m high, lies 0.35 mile off the E extremity of Yeina Island. There are two rocks, 3.1m high, the same distance E of the islet.

Tawi Reef, the W part of this reef ,forms the NE limits of Coral Haven. It is a continuation of Tawa Tawa Mal Reef, from which it is separated by Hudumu Iwa Passage. The inner edge almost connects with Rawa Reef; several patches extend 1 mile W from the channel which separates them. The N edge of the reef is broken and irregular and has narrow passages through which boats may pass.

Romilly Bank, lies immediately within Hudumu Iwa Passage. The bank, a narrow ledge of coral, extends 1.25 miles in an E and W direction and has depths of 2.8 to 4.6m.

8.43 Hudumu Iwa Passage (11°15'S., 153°19'E.), the N entrance to Coral Haven, is divided into two channels by a detached reef with foul ground extending S from it. The W channel, the better of the two, is about 183m in width and carries depths of 14.7m, but the reefs on either side are shelving. From the inner edges of these reefs, shoals extend 0.35 mile SW. Within the W horn of the detached reef there is a rock, just awash at HW.

The E channel, which lies 0.5 mile from the other, has a depth of 11.1m, but the E part of Romilly Bank, which has not yet been closely examined, stretches partly across its S end. The tidal currents in the channels run at the rate of 3 to 5 knots.

Directions.—Bring the S extremity of Pana Tinani Island in range with the N extremity of Dadda hai Islet, bearing 252°, which leads to the entrance of the W channel of the passage. Having approached the entrance, bring the S extremity of Nimoa Island,the point of which will appear low and indistinct, just open NW of Pana Hoba Islet, bearing 229°; this will be in range with the center of the passage and exactly underneath a gap between two nipples in the skyline of the hills on Tagula Island.

Having entered Coral Haven and proceeding W, the best route is N of Middle Reef, thence out by Doga Siu Siu Passage S of Pana Tinani Island.

8.44 Yuma Passage (11°21'S., 153°23'E.), the E entrance lying 2.5 miles S of the W end of Yeina Island, is a narrow, deep, and intricate channel, winding for 4.5 miles between Rawa Reef and the reef E of it. It connects with Gold Rush Channel about 1.25 miles S of Osasai Islet. The reefs on either side are steep-to, with three sharp turns in the passage. The channel has depths of from 38 to 56m, but at the S end there is a charted depth of 7.4m. This passage is dangerous for vessels of any size to attempt, due to the strength of the tidal currents, which run at a rate of 3 to 5 knots. It is reported to be a good passage for vessels up to 300 grt.

Marx Reef (11°24'S., 153°27'E.) is a detached reef, steep-to on all sides, lying in the bight of the reef between Yeina Island and the N side of Tagula Island.

Tides—Currents.—In Coral Haven, the first quarter of the flood sets SW, gradually changing its direction to the S, and during the last quarter to the SE. The first quarter of the ebb sets NE, changing at the last quarter to NW. These changes are most marked during spring tides and are similar to those observed in the W part of the archipelago near the sunken barrier.

Gold Rush Channel (11°23'S., 153°20'E.) is the S entrance to Coral Haven; though deep, it is very intricate and suitable only for small boats. The channel is 8 miles in length and lies between the fringing reef of Tagula Island and the S side of Rawa Reef. Because of strong tidal currents and the many shoals, the channel is not recommended. It is only suitable for small craft.

Tagula Island—North Coast

8.45 The N coast from Muhua Bay trends ESE for 10 miles to a point below Mount Ima and forms the S side of Gold Rush Channel. The coast in this area is mostly wooded with a range of low hills, and the fringing reef closely follows the shore line.

The Feiori River is the largest on this coast and flows in the sea about 4.5 miles E of Nepenthes Point. The river can be used by small boats for nearly 1.5 miles from the entrance; many small villages are found in this area.

The channel across the bar, at the mouth of the river, is to the E of the mangrove islet, the outer edge of the bar is steep-to. There are a number of locks and reefs off the entrance to the river, which can best be seen on the chart.

Immediately E of the Feiori River, the coastal channel opens out to a basin, 2 miles in diameter, in which there are numerous patches awash. There is anchorage, 0.3 mile N of the entrance to the Feiori River, in a depth of 29.3m, mud.

Rabuso Creek (11°29'S., 153°33'E.) is an inlet located 7 miles E of the eastern entrance to Gold Rush Channel. It is entered through an opening about 64m wide in the fringing reef and extends in a S direction for about 0.7 mile.

Boboa Islet (11°29'S., 153°35'E.), a mangrove islet on the barrier reef, lies 1.5 miles E of the entrance to Rabuso Creek. A rock is located 73m within the edge of the reef and nearly covered at HW, lies on the E side and serves to indicate the approach to the inlet.

There is anchorage between the two entrance points of the inlet, in a depth of 20.2m, mud, with swinging room of 137m. The inner part of the inlet has depths of 14.7 to 18.4m. Small craft can anchor, in 16.5m, near the head of the creek, 0.15 mile E of the village, lying on the W side. There is a small wharf at the SW head of the creek, and another abreast of the village, both with depths of about 2.5m alongside.

The coast E of Rabuso Creek trends E for 8.5 miles and then in a SE direction for 7 miles to Cape Siri, presenting no remarkable features and being mostly low and lined with mangroves.

East of Rabuso Creek, the fringing reef assumes the character of a barrier, gradually widening its distance from the land and sweeping with a uniform curve around Cape Siriat a distance of from 8 to 12 miles. It encloses an extensive lagoon, the N and E portions of which have not been examined. At 10 miles bearing 052° from Cape Siri, there is a passage, about 0.15 mile wide and open on a 204° bearing, that leads into the lagoon, but it has not been examined or navigated. A reef is reported just inside the opening of this passage. There is an opening for small craft about 4 miles E of Rabuso Creek. There is anchorage inside for vessels up to 100 grt. The lagoon within the barrier reef is reported to be navigable by vessels up to 100 grt.

Tagula Island—South Coast

8.46 **Cape Siri** (11°37'S., 153°47'E.), the SE extremity of Tagula Island, is low, wooded, and rises towards the NW. A village is situated on the point. Between Cape Siri and Cape Baganowa, about 13 miles W, the coast is fringed by a reef which extends up to 1.5 miles offshore. The lagoon inside the barrier reef has only been partially examined, but appears fairly clear of dangers. There are some coral patches lying about 2 miles off the fringing reef between Cape Siri and Point Lamada, located 6 miles W.

Lawik Reef is the name given to the S part of the barrier reef. This reef sweeps around Cape Siri trends W and passes S of Cape Baganowa at a distance of about 3 miles.

Cape Baganowa (11°39'S., 153°33'E.) is the southernmost point of Tagula Island. The cape, which forms the heel of a peninsula of the same name, is dominated by a conical hill 149m high. There is a large village on the SW side of the peninsula. A sunken rock lies 3 miles ESE of Cape Baganowa.

There are two openings in the barrier reef S of Tagula Island, namely, Deijei Radi Pass and Smiths Pass.

Deijei Radi Pass (Johnston Pass) (11°41'S., 153°31'E.) is about 0.75 mile wide and deep. The summit of Mount Imau bearing 025°, just open NW of the W extremity of the Baganowa Peninsula, leads through the pass.

The tidal currents set through Deijei radi Pass with a velocity up to 3 knots. The flood current sets to the SW, the ebb to the NE, and both somewhat diagonally across the channel.

Dumaga Bay (11°37'S., 153°33'E.) is formed between the W part of the Baganowa Peninsula and the mainland. Anchorage may be taken in Dumaga Bay, in a depth of 25.6m, mud, about 0.5 mile offshore, with the 149m conical hill on the Baganowa Peninsula bearing 131° and the W extremity of the peninsula 221°.

Directions.—Dumaga Bay is somewhat difficult of access and the approaches have not been thoroughly sounded. Due to the strong tidal currents and the irregular bottom the passage between the peninsula and the Fairfax Reefs is only practicable during SW and with the reefs clearly visible.

The clearest approach appears to be from W, skirting the fringing reef at a distance of 0.2 to 0.3 mile and anchoring as directed above.

8.47 **Fairfax Reefs** (11°38'S., 153°31'E.) are a group of sunken rocks which lie from 1 to 2 miles W of the S entrance point of Dumaga Bay. There is a deep channel 0.4 mile wide between them and the reef fringing the peninsula.

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

A detached reef, awash, with a channel 0.3 mile wide between it and the coastal reef, lies 0.5 mile NE of Fairfax Reefs and 0.6 mile W of the peninsula. A 2.7m shoal lies about 0.2 mile NW of the detached reef and is connected to it by a ridge of shallow water. Another shoal, with a depth of 5.5m lies 0.4 mile NNE of the detached reef.

Liji liji Bay (11°35'S., 153°26'E.) lies 6 miles WNW of Dumaga Bay and provides anchorage, in 25.5m, sand, with Juru Point, the S entrance point, bearing 176°, distant 0.8 mile. A reef, the edge of which is steep-to, extends 0.5 mile W of Juru Point.

Baumum Bay, located close W of Liji liji Bay, does not appear to afford any anchorage. A reef and foul ground extend about 1 mile SSW and S from the E entrance point of the bay to a position about 1 mile SE of Heibura Point, the W entrance point.

Pantawi Point (11°33'S., 153°21'E.), a low point, is located about 4.5 miles W of Bauman Bay, behind which there is a series of rocky peaks on the ridge sloping down from Mount Riu,

the summit of Tagula Island. The coastal reef extends 1.75 miles offshore from a position 1 mile E of the point. Also 0.5 mile SE of the S extremity of the reef is a coral reef, awash.

Bada bada Bay, a deep bight in the coastal reef lies close W of Pantawi Point. The bay affords anchorage in the middle part, in depths from 14.6 to 18.3m, sand. This anchorage is protected from SE by the reef extending SW from Pantawi Point.

Maduwa Point (11°30'S., 153°16'E.) is the SW tip of a narrow peninsula which has two peaks 0.75 mile apart. The SW of the peaks is 184m high; the NE peak, named Mount Bousquet, is 235m high.

Hinai Bay is entered between Maduwa Point and a point about 5 miles SE. The bay appears to afford anchorage clear of a rocky patch in the middle; the inner part of the bay has not been closely examined. Both sides of the bay are fringed by reefs which extend in long tongues. The Hula River discharges into the head of the bay.

Caution.—Hinai Bay must be approached with caution as a long line of patches extends 1.5 miles SE from the S extremity of the reef extending from Maduwa Point. From this point there is a gap 0.75 mile wide; the reef continues for 1 mile further SE. The gap probably provides the best entrance into the bay as the shoals may be seen on either side. Also passage E of the patches appeared clear, but it has not been examined. Rocky patches located within the bay are 2.75 and 3.75 miles E of Maduwa Point.

8.48 The channel used for navigation between Maduwa Point and Cape Baganowa is narrowest S of Pantawi Point. At this position, a series of yellow patches near the inner edge of the barrier reef begins. The northernmost of these lies about 3 miles S of Pantawi Point. However, there are quite a few of these patches between the above and the barrier reef, and these may best be seen on the chart. The inner edge of the barrier reef between Smiths Pass and Deijei Pass has been traced 3 miles W.

Tidal currents between this part of the barrier reef and Tagula Island set to the SW on the flood and to the NNW on the ebb.

Smiths Pass (11°40'S., 153°14'E.), which is the second opening in the barrier reef S of Tagula Island, is located about 10 miles S of Maduwa Point. The pass is 0.75 mile wide, with a least depth of 9.1m, and is clear of dangers. Three coral patches lie within the pass on the W side. Close outside the barrier reef, about 3.5 miles W of the pass, is an extensive reef.

Bousquet Bay (11°29'S., 153°16'E.) is entered between Point Maduwa on the E and the mainland to the W. Both the bay and its approach are encumbered with reefs which are best shown on the chart.

Hui-Waditimo Islet, a mass of dead coral, lies in an approximate position 7 miles WSW of Maduwa Point. This islet covered with a few bushes lies on the E end of a reef which has not been examined.

Samumu Reefs (11°30'S., 153°09'E.) are located 4.5 miles W of Maduwa Point and is about 6 miles in width.

Shallow Bank (11°30'S., 153°14'E.) is a coral patch with several rocky heads, with depths less than 1.8m. This bank, which lies about 2 miles W of Maduwa Point, is 0.3 mile in length. About midway between the bank and the point is a reef which dries on its E side. West of Shallow Bank and between it and Samumu Reefs is a reef which always shows. The channel between Shallow Bank and the reef W of it is 0.75 mile wide. The W extremity of Iyin Islet bearing 004°, leads through this channel.

8.49 **Iyin Islet** (11°27'S., 153°14'E.), lying 3.75 miles NW of Maduwa Point, is about 0.5 mile offshore. The islet consists of a grassy ridge of hills, 52m high, surmounted by a clump of trees on its SW end.

There is a good, but confined anchorage, in 12.8m, sand and mud, off the W side of Iyin Islet, with the NW entrance point of the bay N of Iyin Islet bearing 049°. This anchorage is in smooth water and out of the influence of tidal currents.

Onagom Reef, which is steep-to, lies almost midway between Panaman Islet and Iyin Islet.

Panaman Islet, located 3.5 miles W of Iyin Islet, is 61m high, thickly wooded, and uninhabited. The islet lies on the S edge of a reef, under the name Bagana, which extends in patches for 2 miles, NW and over 1 mile N and NNE from the islet.

Bilobei Reef, fairly steep-to and located 1.5 miles N of Panaman Islet, is horseshoe shaped with an opening to the NW.

There is a clear channel, with a depth of 22m in mid-channel, between Bilobei Reef and the shore reef of Tagula Island.

Inskip Reefs, a series of reefs, awash, lie 2.75 to 5.5 miles NW of Panaman Islet.

Caution.—The area between Inskip and Samumu Reefs on the N and the barrier reef on the S is cluttered with many reefs and shoals.

8.50 A mangrove-covered coast trends NW 5.5 miles from the W entrance point of the bay N of Iyin Islet to Panawadai Point. The broad coastal reef fringes the coast, extending off it in places for a distance of up to 1 mile.

Hosiai Point (11°24'S., 153°11'E.) divides the two small bights that are located between Iyin Island and Panawadai Point. The two bights are encumbered with detached reefs and dangerous patches. The coastal reef extends only a short distance off the heads of these bights on either side of Hosiai Point, while extending about 1 mile off Hosiai Point.

Guide Reef (11°22'S., 153°09'E.), a rocky patch which usually shows well, has depths from 1.8 to 3.7m and lies about 2 miles W of Hosiai Point. A sunken rock lies about 0.75 mile SW of the reef.

Shark Reef (11°24'S., 153°08'E.), a coral patch which dries, is located 3.5 miles W of Hosiai Point. Two shoals, with depths from 2.7 to 9.1m and 3.7 to 4.6m, lie respectively, 1.5 miles SW and 0.5 mile W of Shark Reef. A shoal with a depth of 4m, and a shoal, with a depth of 5.5m, lie about 2.75 miles W and 2.5 miles WNW, respectively of Shark Reef.

An anchorage for small vessels with local knowledge is situated in the S part of the bight, on the NW side of Hosiai Point, sand and mud, in depths from 11 to 12.8m. This anchorage is sheltered from SE winds and tidal currents.

The above anchorage is approached with **Mount Madau** (11°22'S., 153°12'E.) bearing 055°, and leads between patches of reefs. When the SW hill over Maduwa Point comes in range with the summit of Iyin Islet bearing 139°, vessels may drop the anchor, in 11m. Also, small vessels with local knowledge may anchor in the bight on the SE side of Hosiai Point, in a depth of 14.6m. Vessels should keep Maduwa Point bearing about 142°, taking care not to shut out the point behind Iyin Is-

land.

Directions.—Vessels proceeding along this coast may pass NE of Bilobei Reef and SW of Guide Reef. The N shoulder of the 235m hill on Maduwa Point open SW of Ilyin Islet bearing astern about 127° leads NE of Bilobei Reef and SW of Guide Reef.

The coast of Taluga Island N from Panawadai Point for 1.25 miles to Hohunawei Point and then NE for 1.5 miles to Bobo-hai Point, is fringed by a reef nearly 1 mile wide.

8.51 **Bobo-hai Point** (11°20'S., 153°12'E.) is the NW extremity of Taluga Island. There are a few villages at this end of the island, but the inhabitants appear not to be numerous.

Vehi Reef (11°21'S., 153°09'E.), which dries, lies about 3 miles SW of Bobo-hai Point.

Reef Two is located about 6.5 miles WSW of Bobo-hai Point. The reef is steep-to and has a drying sand bank on its end.

Remora Reef, whose position is approximate, lies about 9 miles WSW of Bobo-hai Point.

Rossel Island

8.52 **Rossel Island** (Yela Island) (11°22'S., 154°10'E.) is the easternmost island of the Louisiade Archipelago. Rossel Island, which is known to the Tagula islanders as Rua, lies nearly 19 miles NE of Tagula Island.

Mount Rossel (11°21'S., 154°14'E.) lies near the E end of the island and is 838m high. This precipitous peak has steep ridges extending to the N and W, but descends in more gentle slopes SE to Cape Deliverance, the E extremity of the island. The SW ridge has two conspicuous peaks each 549m high. The E peak, Mount Mo, is flat-topped; the W peak is conical. At the W extremity of the island is a conspicuous conical peak 347m high.

Rossel Island is thickly wooded; nearly the whole S coast is a dense forest. The higher parts of the island are almost constantly cloud-capped during the Southeast Monsoon. Rossel Island was reported to give a good radar return from a distance of 28 miles.

Rossel Lagoon (11°18'S., 153°48'E.) is over 25 miles in length from the NW point of Rossel Island to Rossel Passage at the W end. The barrier reef encircling this lagoon is narrow and has four passages through it W of the island. The barrier reef on the S side of the island is unbroken E of Rossel Passage. General depths in the lagoon range from 37 to 64m, but numerous scattered shoals lie in it. Few of these shoals dry and the larger ones are usually awash. Since the water is so clear the shoals can usually be distinguished in good light.

Rossel Passage (11°21'S., 153°39'E.), at the W end of Rossel Lagoon, is the only safe passage for a vessel of any size. This passage is about 0.9 mile wide between the point of the barrier reef on the NW side, and the edge of a coral reef awash on the SE side. Between this coral reef and the W end of the S barrier there is another coral reef, awash, leaving a clear passage of about 0.2 mile on either side of it. The channels are clearly visible and the reefs are steep-to. The sea breaks heavily on both of these reefs and also on the barrier reef.

Tidal currents within Rossel Passage are fairly strong and set straight through; the flood sets to the SW while the ebb sets to the NE.

Just within Rossel Passage, anchorage has been taken in the lagoon, with the boulder on the N barrier reef bearing 303°, distant 2 miles.

Caution.—Vessels entering Rossel Lagoon must exercise caution because the area has not been adequately surveyed.

8.53 In the barrier on the N side of the Lagoon there are three passages or openings; Swinger Opening is the larger passage; the two smaller passages are called Boat Channel and Narrow Passage. Narrow Passage, which is the E of the two smaller passages, is narrow but apparently clear. However since neither of the two smaller passages have been examined, they are not recommended for use.

Swinger Opening (11°16'S., 153°58'E.), whose entrance lies about 6 miles W of the NW point of Rossel Island, is about 0.25 mile wide, and deep. West Point, in range 171° with Ngea Islet (Tree Islet), leads to the entrance of Swinger Opening. A narrow horn of reef on each side of the opening extends for more than 1 mile SSW.

Directions.—Vessels approach the W entrance to Rossel Passage steering 052° and pass the extremity of the reef on the W side of the channel at a distance of about 0.4 mile. A course of 063° should then be steered to pass between two coral reefs, about 0.65 mile apart and distinctly visible, about 4 miles NE of the entrance. When about 0.5 mile beyond the southernmost coral reef, alter course to 091° and pass about 0.3 mile S of a small reef lying about 4 miles from the last turning point and 0.2 mile S of a reef lying 3 miles further. When 1 mile beyond this reef, alter course to 098°, passing N of a reef with two sunken rocks near it and S of two reefs, nearly awash, with a submerged rock close S of the reef. This course passes 0.25 mile N of a reef lying 5.25 miles WNW of West Point. When abeam of this reef, alter course to 113° for the anchorage in Tryon Bay. This heading passes between Pawsey Reefs and a small reef lying 1.25 miles NNW.

Caution.—Navigation within Swinger Opening is intricate, and with a tidal current of 2 to 4 knots it cannot be taken without considerable risk. In addition, Swinger Opening has not been completely surveyed.

Rossel Island—West Coast

8.54 The W side of the island is deeply indented between Gwainyu Point and West Point. Mbeawe Bay, entered between Gwainyu Point and Mbeawe Point, about 1.5 miles S, is apparently deep.

Wola Island (High Island) (11°18'S., 154°02'E.), 91m high, is located 1.5 miles W of Gwainyu Point and is grass-covered, flat-topped, and steep-to.

Yonga Bay (11°20'S., 154°05'E.) is entered between Mbeawe Point and Mboibi Point, 3.5 miles WSW. The S shore, which is rocky, consists of alternate bays and coves, none of which affords a desirable anchorage, the water being deep, with a rocky and uneven bottom. The largest and westernmost of these coves is Dixon Bay (Kwaya Bay).

About 2 miles from the head of Yongga Bay and within the middle is a 5.5m patch with some rocky and foul ground about 0.5 mile SE of it. These dangers make access to the inner part of the bay somewhat difficult.

Tyron Bay (Chambine Bay) (11°21'S., 154°01'E.), which lies W of Dixon Bay, is entered between Mboibi Point and West Point. Tyron Bay is protected from all winds, except those between N and W. A reef, which nearly dries and may be difficult to see, lies 0.5 mile SW of the N entrance of the bay, with which it is connected by foul ground. Rocks with depths less than 1.8m extend 0.2 mile W of the reef. The S part of the bay is clear of dangers.

Pawsey Reefs, which nearly dry, lie about 1.5 miles NW of West Point. In the middle of these reefs is a rock a few feet high.

Anchorage.—Anchorage, in a depth of 22m, sand, can be taken 0.25 mile N of Wola Island. Anchorage may also be taken in Tyron Bay, in a depth of 25.6m, sand and mud, with the N entrance point bearing 348° and the S entrance point bearing 261°. This part of the bay is clear of dangers.

Rossel Island—South Coast

8.55 The S coast is rocky, steep and rugged between West Point and Southwest Point (Vamba Point), 4 miles SE.

Ngea Islet (Tree Islet) (11°24'S., 153°59'E.), which is 12.2m high, lies 1.25 miles S of West Point and on the barrier reef.

The reef E of Ngea Islet assumes a fringing character, extending from 0.5 to 1 mile offshore as far as Govia Bay. Govia Bay, which lies 5 miles E of Southwest Point, is filled with reefs, except in its outer part where there may be a boat entrance. Between this bay and the SE end of the island is Nyebe Bay and off the SE end the coastal reef extends nearly 2 miles offshore. The sea breaks heavily on the reef during the Southeast Monsoon.

Several unexamined passages, from 183m to 0.4 mile wide, indent the reef off the S side of Rossel Island. The principal passages, which are reported suitable for small vessels only, are called Ye Passage, Dowa Passage, and Gware Passage.

Gwe Passage (11°25'S., 154°01'E.) is 2 miles ESE of Ngea. The W side of the passage is marked by a beacon. The passage, 91 to 137m wide, is marked by stakes and leads N for about 0.45 mile and then opens into a lagoon extending WNW for 1 mile to a boat channel connecting to Rossel Lagoon. The village of Pambwa is on the E shore of the lagoon. It was reported that a 500 grt vessel entered Gwe Passage on a course of 135° with the District Officer's house ahead; this is a prominent building with a corrugated iron roof about 0.15 mile NW of a windsock at an airstrip. At about 0.15 mile beyond the entrance beacon course was altered to 000° and anchorage was obtained at the E end of the lagoon off the village, in 12 to 18m. Landing can be made at the NW end of the airstrip.

Gware Passage (11°25'S., 154°12'E.) is about 0.15 mile wide with reefs on both sides, which normally break heavily. Two reefs lie about 0.3 mile within the entrance, but passage between the reefs is clear. The W reef was marked by a beacon.

Gware Passage leads to an anchorage off Abeleti (Iwole), a plantation and trading post, situated 2 miles E of Nyebe Bay. There are two prominent white houses on a hill at Abeleti, but the W house was reported obscured by foliage. This anchorage was made with the W reef beacon in line with the E white house, bearing 010°; anchorage, in a depth of 15.2m, was taken 183m S of the beacon. Anchorage has also been taken, in a depth of 9.1m, about 183m NE of the beacon.

Rossel Spit (11°27'S., 154°23'E.), a triangular barrier reef which fronts the coast and contains many reefs, lies between the SE point of Rossel Island and Cape Deliverance, 3 miles NNE.

Cape Deliverance (11°23'S., 154°13'E.), a low rocky point, is dominated by a hill 244m high, which slopes gradually to the coast. Diama Islet lies on the coastal reef close E of the Cape.

Adele Islet (Loa Boloba) (11°27'S., 154°24'E.), 40m high, lies 8 miles ESE of the Cape and marks the E extremity of the spit. A light, from which a racon transmits, marks the islet.

The outer edges of Rossel Spit are apparently steep-to, although a bank with a depth of 100m was reported to lie about 0.8 mile E of Adele Islet. There is a light on this islet. A stranded wreck lies on the edge of the reef 2.75 miles WSW of Adele Islet.

A very strong WNW current has been experienced when rounding Adele Islet from N. There are eddies in these waters extending 3.5 miles E of Adele Islet. From Cape Deliverance E there is an opening into the N side of the reef 2 miles wide, which leads into the lagoon. However, this opening has not been surveyed and is reported to be encumbered with shoals. Two partially-submerged wrecks lie on the reef 2.75 miles E and 3.5 miles ESE of Cape Deliverance.

Rossel Island—Northeast Coast

8.56 The coast NW of Cape Deliverance, composed mostly of mangroves, is fronted by a coastal reef to a distance of about 1 mile.

Pwennegwa Harbor (11°22'S., 154°17'E.), the only opening in the fringing reef on the E coast which has been examined, is entered 1.5 miles N of Cape Deliverance. The opening is about 0.75 mile long and 0.13 mile in width at the entrance. Coral flats on either side dry at LW. A boulder, probably always uncovered, lies about 183m S of the S entrance point of the reef.

Anchorage may be taken, in depths from 16.5 to 18.3m, mud, near the head of the harbor, about 0.2 mile offshore.

Observation Rock, 3m high, lies 2 miles NNW of the entrance to Pwennegwa Harbor and 0.5 mile offshore. Close SE of the rock is an opening in the reef which widens toward its head, where anchorage might be taken by small vessels with local knowledge.

Warunga Passage is an opening in the coastal reef 1.5 miles NW of Observation Rock.

Heron Opening whose entrance lies about 3 miles NW of Observation Rock, is a lagoon-like opening in the reef. This reef encumbered opening provides anchorage for Jinya (Ginyo) mission station, the largest settlement on Rossel Island Heron Islet, 9.1m high, lies on the NW entrance point of the opening. A boulder lies on the SE entrance point. Foul ground exists 0.4 mile ENE of Heron Islet. It was reported that navigation through Heron opening was possible for small craft proceeding in favorable light conditions.

Rossel Island—North Coast

8.57 From **Te Point** (Ie Point) (11°18'S., 154°13'E.), the low N part of the island, the coast trends 9 miles W to

Gwainyu Point (11°18'S., 154°04'E.), the NW extremity of the island. Wu Bay is located 5 miles E of Gwainyu Point. This stretch of coast is fronted by a reef. Between the coast and the reef there is foul ground, which is very dangerous.

Relief Opening (11°17'S., 154°10'E.), about 0.2 mile wide, is the only opening in this reef and lies about 3.5 miles WNW of Te Point.

Pocklington Reef (10°48'S., 155°44'E.) lies about 83 miles ENE of Cape Deliverance. Several rocks with heights between 0.9 and 3m lie along its length. The wreck on the NE end of the reef provided a good radar response. There is no anchorage in the vicinity of the reef.

Manuga Reefs (Protectorate Reefs) (11°00'S., 153°21'E.) consist of two separate reefs awash at LW. The reefs are separated by a shallow passage about 0.5 mile wide.

The SE reef, which is apparently steep-to, has on its outer edges a few black boulders which dry about 1.5m.

On the NE edge of the NW reef is a sandy islet with some bushes on it, about 6.1m high. A cay, 0.6m high, with grass on it, lies 0.5 mile SE of the above islet.

8.58 The **Renard Islands** (10°52'S., 153°04'E.) are a group lying on separate reefs, the easternmost of which lies 11 miles NW of Manuga Reefs. On the N side, shallow water extends for a distance of 2 to 3 miles and the S side of the chain is steep-to. The islands are inhabited.

Kimuta Island (10°51'S., 152°59'E.), which is 84m high, is the largest and westernmost of the group. The coast is generally rocky with occasional sandy beaches. Ridges of hills extend through the island, grassy at the W end and wooded at the E end.

Bagaium Islet, 9.1m high, lies close S of the W end of the island and on the reef which fringes the island.

Niva Beno Islet, 26m high and wooded, lies 1.25 miles E of and on the same reef as Kimuta Island. There is a village at the W end of the islet. Several rocks and islets lie on the reef E of the islet. Topuna, an islet 20m high, being at the E extremity of the reef.

Baiw Isleta, Panawadai Islet, and Pana Roran Islet make up a small group of low bushy rocks and islets on a separate reef about 1.5 miles N of Kimata Island. The area from the N edge of the reef surrounding these islets curving around toward the E extremity of the reef surrounding Kimuta and Niva Beno Islet has not been examined.

Oreia Islet, 27m high and wooded, lies about 3.5 miles SE of Niva Beno islet. Oreia Islet is located near the W end of a reef on which is Nirut Islet. Between Oreia Islet and Topuna Islet, there is a passage about 2.25 miles wide with depths from 4.9 to 5.5m. However shoal patches and strong tide rips are found across this passage.

The easternmost islet of the Renard Group is Epoko Islet. This islet, which is about 6m high and covered with bushes, lies 3.75 miles E of Oreia Islet. Epoko Islet lies on the N edge of a reef whose SE side is steep-to, but shoal water projects 4 miles WNW from it.

Anchorage, in a depth of 7.3m, may be taken by small craft during the Southeast Monsoon at the head of a bight formed by the horn of a reef extending 0.6 mile offshore, on the N side of Kimuta Island, the largest of the Renard Islands.

Misima Island

8.59 Misima Island (Misimai Island) (St. Aigan Island) (10°41'S., 152°44'E.) is a mountainous and densely-wooded island located 10.5 miles NNW of Kimuta Island.

Mount Koia Tau, a rounded peak 1,036m high, is located 7 miles E of the W extremity of Misima and is the summit of the island. The higher peaks of this ridge are frequently cloud-capped during the Southeast Monsoon. A series of conspicuous hills from 305 to 437m high are located on the S part of the N extremity of the island. There are several villages, most of which are on the N side of the island.

Misima Island—South Coast

8.60 Cape Ebora (Cape Ebola) (10°38'S., 152°31'E.), the W extremity of the island, is a sharp rocky point. A rock lies awash close off the point, but otherwise it is steep-to. The land rises rapidly to an elevation of 762m E of the Cape.

From Cape Ebora, the rocky coast trends ESE for 7 miles to Bagga Bagga, a steep cliffy point. Close E of Bagga Bagga Point a bay indents the coast to a distance of about 0.25 mile. A cove and a large village lie 2.75 miles E of the same point. A promontory, which forms the S extremity of the island, lies 5.5 miles E of the cove. About 6 miles ENE of this promontory is the low cliffy point forming the W entrance point of Bwagadia Harbor.

It has been reported small craft may take anchorage in a bay about 1 mile ESE of Cape Ebora. Also there are several coves on either side of Bagga Bagga Point which might provide shelter to small craft.

Maika Harbor (10°42'S., 152°48'E.) is formed by a small inlet. The entrance, about 91m wide, is well defined and marked by lighted beacons.

The harbor is dredged to 8.5m and is suitable for vessels up to 90m in length and 6m in draft. Winds of 15 to 20 knots and waves of 1.5 to 2m occur throughout the year. The Southeast Trade Wind curls around the island and tends to blow from SW into the harbor.

Pilotage is not available. The port radio station operates on VHF channel 16 from 0600 to 1600.

Lighted range beacons, in line 336°, lead into the harbor. A dangerous rock lies about 50m SE of the lighted beacon W of the entrance.

No anchorage is available within 30 miles of the harbor. Depths up to 300m exist immediately outside the harbor. Anchoring is prohibited E of the E light at the harbor entrance as a pipe extends 0.15 mile to seaward.

There is one berth, 60m long, available. The axis of the wharf is 155°/335°. Vessels berth either port or starboard side-to, but the former is not recommended for vessels over 60m long due to difficulty of turning in the harbor.

If an anchor is required for berthing it is recommended that, during the approach, it be walked back until one shackle is on deck and when it touches the bottom it is paid out as required.

8.61 Bwagaoia Harbor (10°41'S., 152°51'E.) is well-defined and marked by a light on its W entrance point. The harbor is a narrow inlet formed between the coast, which is bordered by mangroves N of a cliffy point and by the W side of a reef extending about 1 mile S from the head of the inlet. Although

the entrance is less than 91m wide, it and the harbor are clear of dangers. The wharf has an alongside depth of 3.7m. Bwagaoia is the Sub-district headquarters for the Louisiades and has communication by air with Port Moresby.

It was reported that small craft with local knowledge anchor in the harbor with the stern made fast to the trees on the W side of the harbor, heading S. Swinging room is restricted.

A red cyclone mooring buoy is moored in the harbor; a white marker buoy indicates the position of the mooring buoy anchor.

Managun Islet (Managon Islet), 27m high and tree covered, lies on the SE extremity of the fringing reef forming the E side of the above inlet. Gigira Islet, 18.3m high, lies 0.5 mile W of Managun Islet and on the S edge of the same reef.

Misima Island—North Coast

8.62 **Cape Henry** (10°40'S., 152°53'E.) is the E extremity of the island. From the cape a line of cliffs, 30.5 to 61m high, trends 6.5 miles NW to Rokia Point.

Rokia Point (10°37'S., 152°47'E.), the N extremity of the island, is a low point. Between Rokia Point and Cape Ebora, about 16 miles W, the coast is rocky in places with stretches of sandy beaches.

The N coast has not been surveyed, but due to the great depths within 1 mile offshore, it is improbable that there is any anchorage, except in Rijak Bay (Treachery Bay), 1.25 miles SW of Rokia Point. This anchorage, off Sagara, is reportedly used by small vessels during the Southeast Monsoon. Anchorage may be had off Liag (Liak) village, in 14.6 to 18.3m, just W of a reef which extends about 0.15 mile offshore.

The Deboyne Islands

8.63 The **Deboyne Islands** (10°44'S., 152°22'E.), lying SW of Misima Island, are a group of islands and barrier reefs enclosing lagoons.

Panaete Island (Panniet Island) (10°41'S., 152°21'E.), located about 8.5 miles WSW of Misima Island, is the largest and northernmost of the group. The island, which is thickly wooded, is crescent shaped and has a single conical peak, 221m high, near its W side.

The N coast of the island is bold, steep-to, and about 30.5m high, gradually diminishing to about 6.1m high at the S extremities. The principal villages are on the S coast, which is shoal to approach and dries in sand flats for some distance offshore. Panaete Island has the largest population in the Louisiade Archipelago.

Small vessels can take anchorage off the E coast of Panaete Island 0.75 mile N of Pana-uya-wana Islet, in 33m, sand and coral. This anchorage, situated about 183m offshore, is suitable only when the wind is from NW to SW.

A thin ridge of coral reef extends SW for 6 miles from the SW extremity of Panaete Island to the N side of W passage. This ridge forms the NW barrier of Deboyne Lagoon.

From the SE extremity of Panaete Island, a reef, through which there are four openings, extends 9.5 miles SE to the N part of S passage. On this reef are some wooded islets and sand cays. Of the four openings in the reef, the two N openings are not navigable as they open into shallow water and foul ground.

From the W passage, the barrier reef projects about 12 miles E. At this point it is separated by S passage from the above reef extending SE from Panaete Island. There are three openings in this 12 mile section.

The three above sections of the barrier reef enclose Deboyne Lagoon.

Pana-uya-wana Island (10°44'S., 152°25'E.) lies on a reef which extends SE from the SE extremity of Panaete Island.

Passage Islet, 12m high, lies about 6 miles SE of Pana-uya-wana and on the N edge of a reef. There is a passage N of Passage Islet which is 0.2 mile wide with depths up to 10m. However, a 5.5m patch lies in mid-channel and tidal currents from 3 to 4 knots set through the passage.

Rara Island, 26m high and wooded, is located upon a reef 1.5 miles S of Passage Islet.

White beacons stand about 2.25 miles SE of Pana-uya-wana Island near Losai Island; on the N extremity of Passage Island, and on the NW extremity of Rara Island.

8.64 **Redlick Passage** (10°48'S., 152°30'E.), about 0.7 mile wide, lies between the NW tip of Rara Islet and the S end of Passage Islet reef. A rock with a depth less than 1.8m and a patch with a depth of 4.6m, lie within 0.4 mile NNW of the NW tip of Rara Island. In the N part of the channel there are depths of about 5.5m. The reef on the N side of the passage is plainly visible.

The tidal currents in the passage set through at a considerable rate, but the channel is easily navigated.

South Passage (10°51'S., 152°31'E.) lies between the E end of the reef forming the S side of Deboyne Lagoon and the NW side of the atoll where the Redlick Islands lie. The passage is wide and deep, except for an 11m patch which lies in the middle. A white beacon marks the W side of South Passage; a red beacon stands on the reef 1.25 miles farther WSW.

Tidal currents were observed moving at 4 knots setting along the axis of the channels of the passage.

Nibub Islet (10°51'S., 152°26'E.), 9.1m high and marked by a beacon, lies 3.5 miles SW of Rara Islet, on part of the S barrier reef.

There are three navigable channels through the S part of the barrier reef. Nibub Passage, which is the easternmost of the three, lies close W of Nibub Islet and is marked by a beacon. This channel is 0.2 mile wide with a least depth of 6.4m. The easternmost of the remaining two passages is 0.45 mile wide, but a spit, with a least depth of 2.7m, extends to the middle of the passage from the reef on the W side. Sunken rocks lie about 0.25 mile N of this spit. There is a red beacon on the W side of the reef extending 2.25 miles W from Nibub Passage.

8.65 **Nivani Passage** (10°49'S., 152°52'E.), which is the third channel, is also the westernmost of the three. This passage is about 0.4 mile wide and deep in the middle. Shoals and foul ground project 1.5 miles NW from the reef on the E side of the passage.

West Passage (10°48'S., 152°17'E.), about 9 miles W of Nibub Islet, is 1.25 miles wide and unobstructed with deep water close up to the reefs. A least depth of 16.5m has been reported in the passage.

Tides—Currents.—A strong tidal rip occasionally sets across West Passage at the seaward limits of the reef. These rips are easily seen and do not present a hazard due to the width

of the entrance. The rip was observed to set to the S during the ebb and to the N on the flood current.

8.66 **Deboyne Lagoon** (10°48'S., 152°24'E.), roughly triangular in shape, has a number of shoals in the N part, which are best shown on the chart.

Panapompom Island, 157m high and wooded, lies nearly in the middle of the lagoon, about 2 miles S of Panaete Island. There is a village on the NE side of the island. Panapompom Island, joined to Panaete Island by foul ground, is completely surrounded by reefs and shoals which are best seen on the chart.

Nivani Island, 95m high, small, grassy, and partly wooded, is located about 0.5 mile S of Panapompom Island and marked by beacons. The channel between the islands is shallow. Reefs and foul ground project off the S and W sides of the island. A depth of 8.2m lies about 0.5 mile S of the E extremity of the island. A depth of 2.7m marked by a beacon lies about 2 miles SE of Panapompom Island. A depth of 3.7m lies 0.5 mile N of this beacon.

Anchorage may be taken during the Southeast Monsoon off the W side of Nivani Island, in a depth of 5.5m.

Tidal currents in the vicinity of Panapompom Island and Nivani Island are negligible, but gradually increase to the E and to the W.

The **Redlick Islands** (10°50'S., 152°33'E.) comprise a chain of low bushy islets lying on the N edge of a reef located SE of Deboyne Lagoon and separated from it by South Passage, previously described in paragraph 8.64. This large reef, the edges of which are steep-to, has a deep lagoon within with no entrance. Upon the E edge of the same reef, and 3.5 miles SE of the Redlick Islets, is an islet 12m high.

Mabui Islet, 27m high to the tops of the trees, stands on the NE side of a reef, between the SE side of the atoll on which the Redlick Islets lie and the NW side of the barrier reef N of the Calvados Chain. There is a deep channel on either side of the reef.

8.67 The **Torlesse Islands** (10°49'S., 152°13'E.) are a group of low, wooded, inhabited islets which lie on a reef about 4 miles W of the Deboyne Lagoon. The three main islets of the group are Pana-niu, about 30.5m high; Bonna-bonna-wan; and Tinolan. There are several rocks on the E and SE sides of the reef. The center of a bank, with a least known depth of 101m, lies about 3.5 miles W of Pana-niu.

Tidal currents with a N set of 4 knots have been reported in the N approach between the Torlesse Islands and Deboyne Lagoon.

Directions.—Vessels may enter Deboyne Lagoon from the E or the W. Passage into the entrance, and then the lagoon, through either Redlick Passage or West Passage, presents no difficulties, subject to the usual precautions. Both of these passages are well defined, and Redlick Passage, though narrow, may be taken with care.

Caution.—An area about 70 miles in length and width within the W part of the Louisiade Archipelago has not been surveyed. Vessels regularly navigate this area on certain well known tracks, and the following islands and dangers are known to exist.

Islands and Dangers at the West End of the Louisiade Archipelago

8.68 The **Conflict Group** (10°46'S., 151°48'E.), located about 13.5 miles W of the Torlesse Islets, is an extensive atoll.

Nearly all of the islands are located on the N side of the atoll, there being but three on the S side. The largest islands are apparently at the extremities,with Irai (Ilai) and Panasesabeing at the W end and Aurioa (Aroroa) and Muniara at the E end. Panarakiim (Panarakuum), Ginara, Panaboal (Panibari), and Tabulagoal (Tubinagurm) are the largest on the N side. Itarmarina and Quesal (Kisa) are the two islands within the lagoon.

There are many passages, some of them deep, leading between the islands forming the atoll into the lagoon. This lagoon provides a possible anchorage, in depths of about 27.4m or less.

Emerald Reef (10°38'S., 151°34'E.) lies NW of the W end of the Conflict Group. A depth of 12.8m was obtained 6.75 miles NW of Panasesa Island, in what appeared to be the bight of a reef. From this position, a portion of the reef was found to extend 4 miles NW, and the other SE for probably a greater distance. Many tide rips prevented the limits of the reef from being clearly ascertained. However, W of the 12.8m patch, the reef appeared to be nearly awash.

Reefs extend NW from the W end of the Conflict Group apparently connecting with Emerald Reef. Two shoals, with depths of 13.1 and 8.2m, were reported to lie about 8 miles WNW of the W extremity of Irai Island.

A ridge with shallow water, extends 2 miles W from the NW tip of Emerald Reef and is probably part of the same reef. A coral patch with a depth of 12.8m, lies 9 miles N of the above NW tip. A group of three reefs and shoal waters are located about 4 miles NW of the NW tip of Emerald Reef.

8.69 **Lunn Island** (10°47'S., 152°00'E.) lies about 5 miles E of the Conflict Group. The island is 24m high and fringed by a reef. A light is shown from the E end of the island.

Bunora Islet is located about 15 miles NNW of Lunn Island. Sarupai Islet lies about 4.5 miles WNW of Bunora Islet.

A coral shoal, whose position is approximate, is charted 10 miles WNW of Sarupai Islet.

Directions.—Vessels usually enter the lagoon via Ship Pass, SE of Irai Island. Vessels steer 046° for Itamarina Island. Once inside the lagoon a course of 088° with Lunn Island ahead, takes a vessel through the lagoon to pass out by the passage just N of Muniara Island. A depth of 7.3m was reported on the Muniara Island side of this passage.

Another passage from W, reportedly used by a small vessel, is to enter between Panasesa Island and Gabuga butau Island. A depth of 5.5m was reported between these islands. Vessels then pass close to the fringing reef on the N side of Itamarina Island. Course should then be shaped to pass S of Quesal Island to the passage just N of Muniara Island.

There is deep clear water on the seaward side close up to the reef forming the S side of the lagoon. Also, deep clear water exists between the E end of the Conflict Group and Lunn Island.

Vessels should exercise caution when navigating within the lagoon due to the incomplete nature of the survey information. In the passage between Bunora Islet and Sarupai Islet, the bot-

tom suddenly shoals off to 60.4m, indicating the possible existence of undetected dangers in this vicinity.

Anchorage can be taken off the E side of Panasesa Island by small vessels, in 9.1m. Vessels have approached this anchorage through the passage between Panasesa Island and Gabugabutau Island.

8.70 The **Bonvouloir Islands** (10°23'S., 151°57'E.) and reefs extend in a curve about 20 miles in a NW and SE direction. These islands are inhabited.

East Island (10°24'S., 152°06'E.), 198m high and densely wooded, is the easternmost of the group. This island lies about 26 miles NE of the Conflict Group. There are great depths off the N side of the island at a distance of from 0.5 to 0.75 mile. It was reported that East Island lay 0.5 mile N of its charted position.

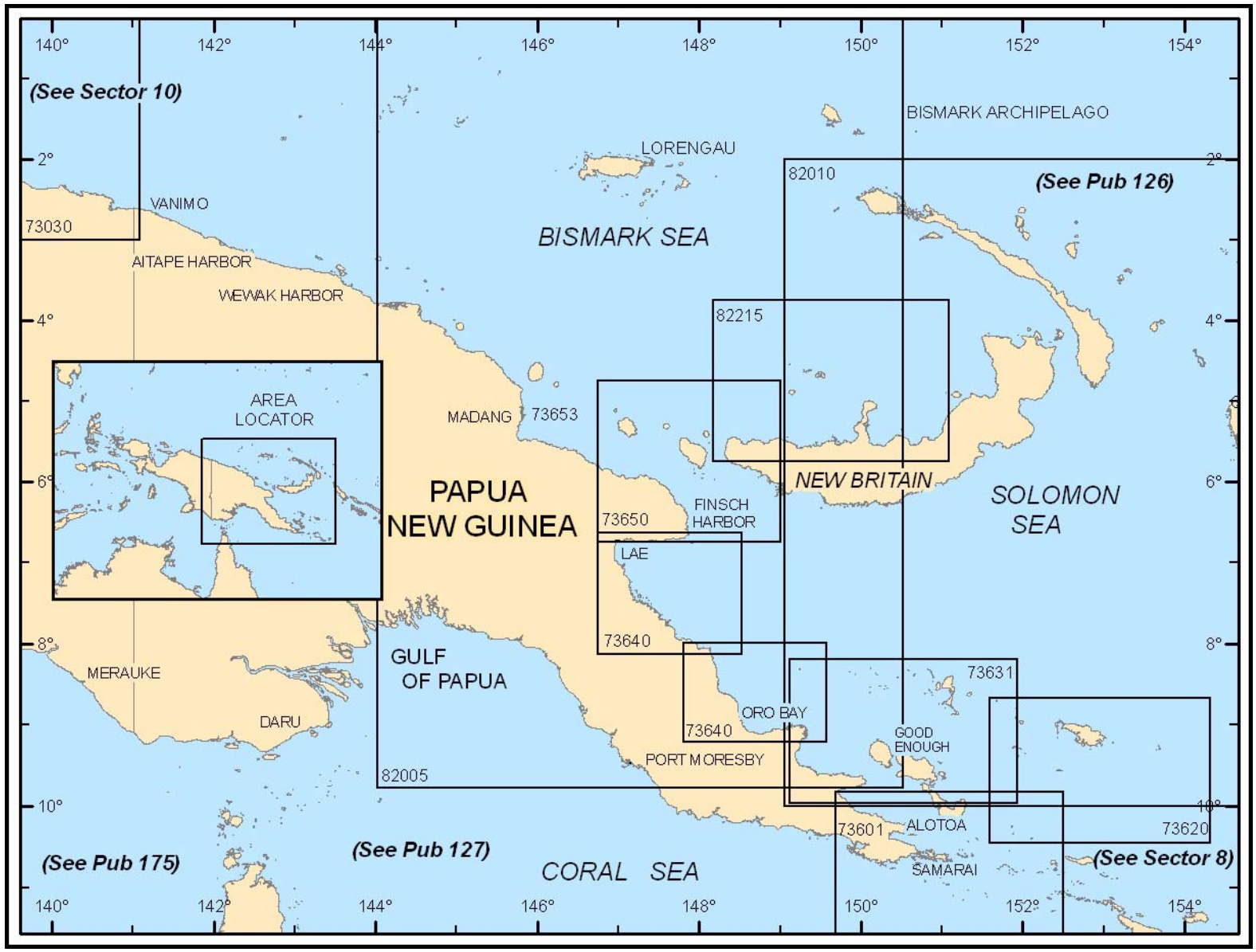
Discolored water, with probable depths of from 32.9 to 36.6m, extends off the E end of East Island.

A shoal, with a depth of 6.7m, lies about 1.75 miles W of East Island. A reef, on which the sea breaks, lies about 5 miles W of the island. A shoal, with a depth of 11m, lies 0.6 mile N of the reef. A 9.1m patch lies 6 miles W of the island.

Anchorage may be obtained, in a depth of 31m, broken coral and sand, about 0.3 mile from the NW side of East Island.

Hastings Island (10°20'S., 151°52'E.), 222m high, is bold and densely wooded. A bank, 0.75 mile in length, lies off its NW point; discolored water has been observed off its E end. A light marks the SW extremity of the island.

The **Strathord Islands** (10°15'S., 151°52'E.) are a group of low wooded islands connected by a reef. These islands are located about 4 miles N of Hastings Island. A light is shown from the N extremity of the Strathord Islands. The passage between the Hastings Island and the Strathord Islands appears to be clear of danger.



Additional chart coverage may be found in NGA/DLIS Catalog of Maps, Charts, and Related Products (Unlimited Distribution).

SECTOR **9** — CHART INFORMATION

SECTOR 9

ISLANDS NORTH AND NORTHEAST OF EAST CAPE—NORTH COAST OF PAPUA NEW GUINEA —EAST CAPE TO EAST BOUNDARY OF IRIAN JAYA

Plan.—This sector first describes the islands N of the Louisiade Archipelago, and N and NE of East Cape, the E extremity of Papua New Guinea. The islands, described from E to W, are the Laughlan Islands, Woodlark Island, the Trobriand Islands, the Lusancay Islands and Reefs, and the D'Entrecasteaux Islands. The N coast of Papua New Guinea, from East Cape to the E boundary of Irian Jaya, at the 141st meridian, is then described. The arrangement of the latter part is from E to W.

General Remarks

9.1 Tides—Currents.—A W current with a velocity of 2 knots has been observed between Rossel Island and the Laughlan Islands, and thence a NNW current with a velocity of 1.25 knots to a position about 170 miles NNW of the Laughlan Islands, decreasing in velocity to 0.25 knot, but setting in the same direction, thence W towards Finsch Harbor.

The current between Kiriwina Island and Kitava Island sets NNW with a maximum velocity of 2 knots during the Southeast Trade Winds.

In Huon Gulf, a strong current setting SE towards Burnung Point is apparently caused by the discharge of the Markham River.

From Vitiaz Strait to Isumrud Strait, the currents are variable. From May to September, W sets of the South Equatorial Current predominate, with rates up to about 2 knots in the open ocean, and up to 3 knots through Isumrud Strait. From November to February, the Northwest Monsoon reverses the trend.

From about March to November, the predominant direction of the current is WNW near the coast of Papua New Guinea, but is W farther seaward; average velocities vary from 1 knot to 1.75 knots. In the Northwest Monsoon, the flow near the coast is reversed and sets SE.

The Laughlan Islands

9.2 The **Laughlan Islands** (Nada Islands) (9°17'S., 153°40'E.) consist of eight low islets, lying on a horseshoe-shaped reef, open W. The greatest diameter of the lagoon is about 3 miles. The islets, none of which are more than 2.7m high, with coconut palms about 24m high, are composed of sand and coral. There are several villages, some of the inhabitants of which speak a little English and are very friendly.

The Laughlan Islands were reported to give a good radar return from a distance of 16 miles.

The best entrance is N of a small sand bank with some bushes on it. The water in the lagoon is clear, rendering the numerous coral patches easy to distinguish.

Anchorage.—Good anchorage has been taken by a 1,400 ton vessel, in 18.3 to 22m, in the S part of Wabomat Lagoon. Local knowledge is required. Small vessels can anchor, in 9.1m, about 0.2 mile off the village on Budelun Island.

Caution.—The Laughlan Islands should be given a wide berth at night due to the currents in their vicinity.

9.3 Cannac Islet (9°17'S., 153°28'E.), a bare rock, 35m high, lies about 9 miles W of the N islet of the Laughlan Islands. Foul ground extends about 4 miles S of Cannac Islet; a depth of 7.3m was reported about 4 miles ENE of the islet.

Cannac Islet was reported to give good radar returns from distances up to 25 miles.

An extensive coral bank, with depths of 18.3 to 37m, and a width of about 10 miles, extends about 15 miles W of Cannac Islet. There is a 11m shoal 18.5 miles W of Cannac Islet.

Anchorage may be obtained outside the lagoon, in a depth of about 7m, about 0.2 mile W of Cannac Islet.

Woodlark Island

9.4 Woodlark Island (Muyuwa Island) (9°07'S., 152°50'E.), about 29 miles W of Cannac Islet, is high in its W half, and low in its E half. The island is about 33 miles in length in an E-W direction, and about 16 miles in breadth. Suloga Point is the SW point of the island and the SW entrance point of Suloga Harbor. Suloga Peak, 410m high, lies about 1.5 miles N of Suloga Point, and is prominent from S. **Mount Kabati** (9°04'S., 152°49'E.) lies near the middle of the N side of the island.

The coast of the island is generally high and densely wooded to the water's edge, in some parts consisting of vertical limestone cliffs. The NE side of the island is relatively steep-to, while the S and SW sides are encumbered with islets and detached reefs to a distance of 17 miles.

Woodlark Island has been reported to be a good radar target at a distance of 23 miles.

Caution.—The N side of the island is unsurveyed and should not be approached within 2 miles. It has also been reported that the NE part of the island lies 2 miles SW of its charted position.

Woodlark Island—Islands and Dangers

9.5 Ginetu Island (9°27'S., 152°38'E.), about 16 miles SSW of Suloga Point, is wooded, about 18.3m high to the tops of the trees, and bordered by extensive reefs. An islet, 13.7m high to the tops of the trees, lies near the extremity of a reef extending about 1 mile E of Ginetu Island. Detached reefs and shoal patches lie about 2 miles W and 6.5 miles NW of Ginetu Island.

From a position about 8 miles NW of Ginetu Island, a broken barrier reef, on which there are several islands, extends about 8 miles NW, then about 15 miles N to the S extremity of Madau Island.

Madau Island (9°00'S., 152°28'E.), with a width not exceeding 1.5 miles, extends about 7 miles N, then 3 miles NE, then 5 miles ESE, and is almost connected at its SE end to the

NW corner of Woodlark Island. A very shallow lagoon, full of reefs and shoals, occupies the NW part of this area bordered by the barrier reef, Madau Island, and the W end of Woodlark Island. Farther SE, many reefs and coral heads lie in an unsurveyed area W of a line between Ginetu Island and Suloga Point; there is an entrance through the barrier reef in the latter part, but it is only accessible to vessels with local knowledge.

Madau Island was reported to lie 2 miles W of its charted position.

Kwaiapon Bay (Kwarapan Bay) (9°05'S., 152°43'E.), with its entrance about 9 miles NW of Suloga Point, should not be approached by vessels with a draft of more than 3.7m; local knowledge is necessary. Kalumadau, the only settlement on Woodlark Island, lies about 2 miles inland from the head of Kwaiapon Bay, and is unhealthy.

Beacons, with radar conspicuous metal framework towers surmounted by conical topmarks, are situated on the SW side, 17.5 miles W and 9.25 miles NW of Suloga Point.

9.6 The **Alcester Islands** (9°28'S., 152°28'E.), about 12 miles WSW of Ginetu Island, consist of a flat-topped densely-wooded island, 55m high, to the tops of the trees, at its E end; an islet of the same character, 30.5m high, lies close E. The island is steep-to on its NW side, where the cliffs rise perpendicularly from the water. A cove and a village lie on the N side of the island.

The island has no fringing reef on its S side, and is generally steep-to, but a reef fringes its N side in places, and there is reef extending 0.35 mile SW from the W end of the island. The Alcester Island were reported to lie approximately 4 miles E of their charted position.

Anchorage may be taken off the village in a cove on the N side of the island near the middle during the Southeast Trade Wind.

Suloga Harbor (9°13'S., 152°46'E.)

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9.7 Suloga Harbor, at the entrance of a spacious inlet, is entered between Suloga Point, the SW point of Woodlark Island, and Whasela Point, about 2.25 miles NE. Mapas Island, close NE of Suloga Point, to which it is connected by coral reef, shelters the harbor. There are general depths of 12.8 to 20m in the harbor.

A depth of 11m lies about 7 miles SE of Suloga Point, in the approach to the harbor.

The approach to the harbor lies between Mapas Island and the reef fringing Woodlark Island, which is partly awash, 0.8 mile E; the channel is 0.65 mile wide, with fairway depths of 24m. The passage into the harbor lies between Whasela Point and a detached reef which extends 0.5 mile E of Oquana Point, the N extremity of Mapas Island; this passage is 0.25 mile wide.

Mapas Island (9°12'S., 152°48'E.), about 61m high, has most of its shores fringed with mangroves, and a salt water lagoon extends nearly its whole length. There is a village on the sandy beach on the SW side of the island. Reefs extend 0.25 mile N of Picnic Point, the NW end of the island; there are two detached patches between the extremity of the reefs and Oquana Point.

Whasela Point is formed by two wooded islets with foul ground between them and the coast. Steep Point, close W, has some huts on it. Shoute Point, about 1.25 miles WNW of Whasela Point, is the E entrance point of the N part of the inlet.

A detached reef lies in the center of Suloga Harbor, about 0.5 mile N of Picnic Point.

An area of discolored water, presumably shallow, was reported to lie 0.35 mile S of Mapas Island.

Directions.—From S, Suloga Peak is conspicuous, and on approaching the harbor, Mapas Island can be made out. Vessels approaching Suloga Harbor should steer a course of 021° through the middle of the channel between the reefs extending from the E side of Mapas Island and the reef E. The edges of the reefs are clearly defined, but the detached reef E of Oquana Point is not easily made out.

When Oquana Point, the N point of Mapas Island, bears 280°, alter course gradually W and anchor, in about 20m, when Shoute Point bears 333°, distant about 0.5 mile. The anchorage lies about 0.2 mile E of the detached reef in the center of the harbor. Small vessels may obtain anchorage SE of the reef, with Oquana Point bearing 100°, distant 0.3 mile.

9.8 **Guasopa Harbor** (9°14'S., 152°56'E.) lies in a bight between Main Point, the SE extremity of Woodlark Island, and a point on the coast about 4 miles W. A barrier reef, extending about 9 miles WSW from Main Point, protects the harbor. Reu, Vaviai, and Aiun, 39.6m, 36.6m, and 37m high, respectively, to the tops of the trees, are thickly wooded islets, which lie on the barrier reef, about 1.25 and 3.5 miles W, and 8 miles WSW, respectively, of Main Point.

A 7.3m unexamined patch (9°19'S., 152°57'E.) lies about 4.5 miles SSW of Main Point.

The main entrance to the harbor rounds the W extremity of Vaviai Reef, between the reef extending about 0.5 mile SW of Vaviai and an unexamined depth of 5.5m, about 1 mile SSW of Vaviai, on which the sea breaks. This patch is the E of a series of patches on the barrier reef to the W. There are depths of 20 to 26m in the passage, and from 14.6 to 22m in the fairway inside, with not less than 9.1m nearly to Guasopa, a village about 3.5 miles NE of Vaviai. A 3m shoal lies in the fairway about 1 mile NE of Vaviai, and an 8.5m patch lies about 0.5 mile farther NE. Iris Patch, in a depth of 4.6m, lies on the W side of the fairway of Guasopa Harbor, 0.85 mile WNW of the W end of Vaviai. There are depths of 3m extending 0.5 mile off the N coast of Vaviai.

The E entrance lies E of the reef between Vaviai and Reu islets, and is reported to be intricate and patchy.

There is a landing stage, available for small craft, in the NE part of the harbor.

There are some reefs off Aiun and E of it. A vessel steering a course of 098° from abreast Aiun to Nubara, an islet about 17 miles ENE, crossed some sunken patches of reef, over one of which there was a depth of 6.4m, about 3 miles off the coastal reef.

Anchorage.—Anchorage has been taken, in 16.5 to 18.3m, in Guasopa Harbor, with the E extremity of Vaviai bearing 189°, distant about 0.4 mile.

Directions.—The E peak of the continuous high land of Woodlark Island, bearing 314°, is reported to lead up to the W

entrance. When the W entrance has been identified, a vessel should steer to pass between the spit extending from the SW end of the reef on which Vaviai lies, and an unexamined shoal, in a depth 5.5m, about 0.6 mile SSW of it, passing about 0.1 mile from the reef and rounding the NW angle at the same distance, avoiding Iris Patch.

Caution is necessary in entering the harbor, and only vessels with local knowledge should attempt it.

9.9 **Kamarau Bay** (9°10'S., 152°58'E.) is entered between a rounded point about 1.25 miles NNE of Main Point and a point about 2.5 miles farther NNE. The bay extends about 3.5 miles NW and rivers discharge into the bay at its head. The bay has not been surveyed, but appears to be shoal for a considerable distance from its head.

It is reported that small craft can anchor near the S shore of the bay but it is open to swell in strong SE winds.

Direction Point (9°09'S., 153°03'E.), the E extremity of Woodlark Island, lies about 3.75 miles NE of the N entrance point of Kumarau Bay. The unsurveyed coast between is fronted by a reef which appears to extend more than a mile offshore.

Nubara Islet (9°13'S., 153°07'E.) lies about 1 mile W of the end of a reef extending about 7 miles ESE of Direction Point. The islet was reported to be about 30.5m high to the tops of the trees and to give a good radar echo at 23 miles. Two small islets lie on the reef, about 2.5 miles S of Direction Point. A reef extends about 3 miles SW of Nubara Islet; the area about 5 miles farther SW is unsurveyed.

An above-water reef lies about 5 miles NE of Nubara Islet; a reef extends about 3 miles S of the above-water reef, and the area in the vicinity is unsurveyed.

An 11m shoal lies about 6 miles ESE of Nubara Islet.

Buyuasi Bay (Richards Bay) (9°06'S., 152°58'E.) lies on the NE side of Woodlark Island, about 4.5 miles NW of Direction Point; a village lies in the W corner of the bay. The bay affords anchorage for small vessels with local knowledge, in 18.3m, coral, about 55m offshore, but it is exposed and unsafe in the Northwest Monsoon. Perpendicular cliffs, about 18m high, border the bay and there is no landing place.

At the N extremity of Woodlark Island a shoal, in a depth of 1.8m, extends from 0.75 mile to 1.25 miles offshore; the sea seldom breaks on it, but it is usually marked by heavy tide rips.

Egum Atoll

9.10 **Egum Atoll** (9°25'S., 151°57'E.), nearly circular and about 16 miles in diameter, lies about 22 miles WNW of the Alcester Islands. A large part of the reef is in depths of 7.3 to 13m, but it rises about a meter above-water on the N side, where some 14 islands and islets are located.

Yanaba Island, the largest of the islands and islets, lies at the NW end of the reef. It is 65m high, to the tops of the trees, in its N part, and 47m high at its E end. There are some villages in a sandy bay on the S side of Yanaba Island. Tabunagora Island, 22m high, to the tops of the trees, lies about 6 miles SE of Yanaba Island.

Yanaba Island is reported to be a good radar target at a distance of 15 miles.

A small islet, 31m high to the tops of the trees, lies about 4 miles N of Yanaba Island.

Egum Islet and Nasakori Islet, about 3 miles SE, lie in the middle of the lagoon. There are many isolated reefs and coral heads in the atoll.

The NW and NE entrances into the lagoon appear to be the best. The NW entrance, SW of Yanaba Island, has a depth of approximately 5.5m. The NE entrance is about 0.4 mile wide, but appears shoal, and its use is not recommended.

Anchorage.—There is reported to be anchorage, exposed to SE winds, in 11m, off the villages on the S side of Yanaba Island. There is reported to be sheltered anchorage in the vicinity of Egum Islet.

Caution.—A dangerous submerged rock has been reported (1993) to lie in position 9°26.6'S, 151°50.3'E about 6 miles SW of Egum Islet.

The Marshall Bennett Islands

9.11 **Gawa Island** (8°58'S., 151°59'E.), the E island of the Marshall Bennett Islands, is a former atoll elevated above the sea. The coral wall rises to an elevation of 173m to the tops of the trees. The plateau is 30.5m below the circumferential rim. Coconut palms mark each village. Gawa Island was reported to lie at least 2 miles E of its charted position.

Anchorage can be obtained practically anywhere about 0.1 mile or so offshore around Gawa Island. The water is clear and any uncharted dangers should be seen. Anchorage has been taken, in 57m, with the N extremity of the island bearing 093° and the NW extremity bearing 204°.

Kwaiawata Island (8°55'S., 151°55'E.), about 3 miles NW of Gawa Island, is an elevated atoll 181m high to the tops of the trees. A reef extends from the SE and NW sides of the island, but in other places it is steep-to. The cliffs at the E and W extremities of the island are perpendicular, with numerous caves all along these parts of the coast.

The center of the raised lagoon lies at an altitude of 99m; villages and extensive gardens border the lagoon.

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

9.12 Dugumenu Island, about 6 miles N of Kwaiawata Island, is 59m high to the tops of the trees. It is composed of coral, and is covered with coconut palms. Anchorage by large vessels can be obtained outside the coastal reef of the island.

Iwa Island (8°42'S., 151°41'E.), about 18 miles NW of Kwaiawata Island, is the NW of the Marshall Bennett Islands. It is 142m high, thickly wooded, and consists of a series of irregular coral terraces and precipices. The coast is bordered by steep cliffs. There is a village at the W point of a small sandy beach, but no anchorage.

Iwa Island has been reported to be a good radar target at a distance of 24 miles. Iwa Island was reported to lie 2 miles WNW of its charted position.

The Trobriand Islands

9.13 **Kiriwina Island** (8°35'S., 151°08'E.), the largest island of the Trobriand Islands, is densely wooded, and of almost uniform height, with an elevation of 46m to the tops of the trees. The other islands of the group are of a similar character. **Bomatu Point** (8°24'S., 151°07'E.), the NE extremity of Kiri-

wina Island, is marked by a light.

The N and E sides of the island are fringed by a reef, which extends from 0.1 to 0.3 mile offshore, in places, and there is practically no anchorage off these two sides. An extensive bay, on the W side of the island, is entered between Boli Point, about 2 miles SE of **Kadalawa Point** (8°32'S., 150°59'E.), the W extremity of the island, and Kabanikau Point, about 11 miles S. This bay is encumbered by a reef and coral heads which extend nearly to the line joining the entrance points.

Omarakana, a village in which there is a church, lies about 4 miles S of Bomatu Point, and 1.5 miles inland.

Muiau Bay, on the E side of the island, is fringed by a nearby drying reef extending about 73m offshore at its N end.

Vakuta Island (8°51'S., 151°11'E.) is separated from the S extremity of Kiriwina Island by a pass that is available only for boats. Vakuta Island has been reported to give a good radar return at a distance of 14 miles.

Kitava Island (8°37'S., 151°20'E.), about 10 miles E of Kiriwina Island, is 142m high, and appears to be an elevated knoll. From E, it appears as a densely-wooded ridge, slightly lower at each end, falling steeply into the sea. The central plateau of the island is surrounded by a wooded coral wall, the top of which is from 15.2 to 30.5m above the level of the plateau; several villages are in the depressed plateau. The E coast of the island is steep-to, and fringed by sand. Uratu Islet lies on a reef fringing the W side of the island and extending about 0.5 mile offshore.

A rock, over which the depth is unknown, has been reported to lie about 1.25 miles SW of Uratu Islet.

A light is shown from the SE side of Kitava Island.

Kaileuna Island (8°31'S., 150°57'E.), 46m high to the tops of the trees, lies about 1.25 miles W of the W extremity of Kiriwina Island.

Anchorage.—Good, sheltered anchorage can be obtained off the W side of Kiriwina Island, in about 9.1 to 13m, about 1 mile SW of Boli Point, avoiding the detached coral patches which are reported to exist there. Anchorage can also be taken in the lee of Mu-ua Island, about 10 miles farther S, when SE weather renders the anchorage off Boli Point untenable. There is a green beacon over depths of 3.7m about 1.25 miles W of Mu-ua Island.

A boat channel, marked by poles and beacons, leads from the anchorage of Boli Point to a jetty at Losuia, about 3 miles E of Boli Point; a least depth of 0.9m was reported over the bar S of Boli Point.

Sheltered anchorage, in SE weather, can be obtained, in 39 to 55m, SW of Sia Islet, 9.1m high, close off the NW side of Kiriwina Island, about 2.5 miles W of Bomatu Point.

Anchorage can be obtained anywhere off Kitava Island. The berth during the Southeast Trade Wind is in a depth of 18.3m, 0.15 mile N of Uratu Islet.

9.14 Dangers S of the Trobriand Islands.—The area between the S end of Kiriwina Island, and Fergusson Island and Goodenough Island, located about 42 miles SSW and 55 miles WSW, respectively, is studded with reefs. The eye is the only guide for navigation among the reefs, but the water is so clear that there is no difficulty in seeing them from aloft. The reefs are not steep-to as is usual off the coast of Papua New Guinea and anchorage can be obtained anywhere in their vicinity. It should be noted, as stated on the charts, shallower water than charted may exist in these areas due to incomplete information.

Recommended tracks.—A channel leads from a position 2 miles NNE of MacGee Patch (9°10'S., 150°50'E.), then separates about 6.5 miles NNE into two channels passing about 1.5 and 6 miles E, respectively, of **Wadana Islet** (8°56'S., 150°50'E.), then unites again nearly 2 miles S of **Iaga Islet** (8°44'S., 150°58'E.). The channel then extends NNE, then N through the deep channel W of Kiriwina Island.

The W channel is the recommended channel as the buoys which previously marked the channels have been removed. The channels are very narrow in places, and should only be used with local knowledge, using local charts.

The Lusancay Islands and Reefs

9.15 Thr Lusancay Islands and Reefs extend from about 12 to 60 miles W of the N end of Kiriwina Island; between them and Cape Ward Hunt, about 115 miles W, many reefs are charted. This area should be avoided. The tops of the trees on the islands attain an elevation of 30.5 to 61m.

Nauria Island (8°34'S., 150°17'E.), 61m high and bare, is the S island of the group. Rothwell Bank, a sand bank with low trees on it, lies about 20 miles SW of Nauria Island.

It was reported that radar echoes were obtained of the Lusancay Islands at a distance of 21 miles.

Passages in the vicinity should not be attempted except in the finest weather and with the sun in a favorable position. Many of the reefs are very long and narrow, running in a NW-SE direction, and it is difficult to find a passage through them.

Deep water exists on the N side of the Lusancay Islands, close N of the fringing reefs, which afford protection for small craft during the SE season.

The D'Entrecasteaux Islands

9.16 The D'Entrecasteaux Islands, S of the Lusancay Islands and Reefs and the Trobriand Islands, lie in close proximity to the E end of Papua New Guinea. It consists of Normanby Island, Fergusson Island, Goodenough Island, and numerous other islets.

Normanby Island (10°00'S., 151°00'E.), the SE island of the group, is wooded, except for a mountain near the middle which is bare, high, and rocky. The island has a narrow mountain range, attaining an altitude of 1,027m at the NW end of the island, with deeply-furrowed sides and wide valleys. The island has very little fringing reef.

The S coast of Normanby Island, which forms the N side of Goschen Strait, has been described in paragraph 7.41.

Normanby Island—Southwest Coast

9.17 Lebudowa Bay is entered about 3 miles N of **Cape Prevost** (10°06'S., 150°57'E.), the SW extremity of Normanby Island. This bay has not been fully examined,and is much encumbered by coral patches. The coastal range of hills dips considerably near the center of the bay, rising again towards Double Peak, 823m high, about 12 miles N. **Bwaeiona Point** (10°02'S., 150°57'E.), the N entrance point of the bay, lies about 4.5 miles N of Cape Prevost; a shoal, with a least depth

of 2.7m, lies about 0.3 mile S of the point.

Outer Rocks, about 1 mile WSW of Bwaeiona Point, consists of two rocks, 1.2 and 0.6m high, lying on a reef of submerged rocks. The reef extends about 180m NW and 135m SE of the highest rock, and is steep-to. A 2.1m shoal, with a 9.7m patch close SW, lies about 0.75 mile WNW of Outer Rocks.

Cape Chesterfield (10°00'S., 150°54'E.) lies about 7 miles NNW of Cape Prevost. Two tree-covered islets lie on a drying reef about 0.75 mile S of the cape and reefs, terminating in a 3.7m shoal, extend about 2.5 miles S of the cape.

Entrance Islet, 26m high, lies in the approach to Sewa Bay, nearly 0.5 mile N of Bwaeiona Point, on a submerged reef extending about 92m N and SSW of it.

Sewa Bay

9.18 The entrance to Sewa Bay, about 5 miles N of Cape Prevost, is almost closed by **Pwasiai Island** (10°01'S., 150°57'E.). The island is 96m high, and fringed on its S and E sides by foul ground extending up to 92m offshore. The passage N of Pwasiai Island is a boat entrance over a reef of sunken rocks. The S passage, about 90m wide, with depths of 50m in the fairway, lies between the W point of Pwasiai Island and the peninsula E, which terminates NW in **Buiueta Point** (10°01'S., 150°57'E.).

The bay is a landlocked harbor, backed, except at its NW end, by densely-wooded hills. **Adelaide Peak** (9°59'S., 150°57'E.) attains an elevation of 271m about 1.25 miles N of Buiueta Point. The bay has three arms; the entrance opens into the short W arm. Bwaguda Bay occupies the S arm while the N and largest arm terminates in Martin Treacy Harbor.

A bank, with depths of less than 5.5m, extends about 135m N of Buiueta Point; West Islet, 11.6m high, lies on this bank. A reef extends about 0.3 mile S from the N shore of the W arm. A deep channel, 0.15 mile wide, leads into the bay, between the above bank and reef.

On the S side of the W arm, Ellen Isle lies 0.35 mile E of Buiueta Point. Una Rock, which dries 1.2m, and Henby Shoal, with depths of less than 5.5m, extend about 0.2 mile offshore, nearly 0.75 mile and 1 mile respectively, ENE of the same point.

9.19 **Geboia Point** (10°01'S., 150°59'E.), about 1.25 miles E of Buiueta Point, is the NE extremity of a hilly peninsula which separates W arm from Bwaguda Bay. Galogalo Islet, 10.4m high, lies near the outer end of a reef of sunken rocks extending about 0.2 mile NE of Geboia Point.

Whittle Reefs lies with its SE end about 0.4 mile N of Galogalo Islet; foul ground, with drying patches, extend about 0.35 mile WNW of its SE end.

There are general depths of 37 to 50m in the central part of Sewa Bay, W of Whittle Reefs.

Bwaguda Bay, entered between Galogalo Islet and the shore E, has general depths of 33m in the entrance, shoaling gradually to 20m near its head, with comparatively steep-to shores. Powles Rock, in a depth of 3.7m, lies in the entrance to the bay, 0.13 mile E of Galogalo Islet; Nusa Rock, in a depth of 3.7m, and sunken rocks on its NW side, lies 0.25 mile ESE of the same islet. Patrick Patch, in a depth of 9.1m, and a 5.5m patch lie 0.35 mile and 0.5 mile, respectively, SSE of Galogalo Islet; the latter patch lies about 135m offshore.

The N arm has no known dangers more than 0.2 mile offshore W of the meridian of Whipple Reefs. It shoals gradually to about 9.1m 0.25 mile from the head of Martin Treacy Harbor. About 0.3 mile E of Powles Rock, near the N entrance to Bwaguda Bay, there is a small wharf with a depth of 5.5m alongside. It was reported to be in a poor state of repair.

Anchorage can be taken in Sewa Bay as convenient, in depths of 11 to 47.5m, mostly mud.

The coast between Cape Chesterfield and the entrance to Maiobari Bay, about 4 miles NNW, is indented by several small coves, and the coastal range is densely wooded.

Maiobari Bay (9°56'S., 150°53'E.) affords anchorage for small vessels with local knowledge, in 40m, mud; the anchorage is restricted by shoals extending from its shores. The shores of the bay are densely wooded and bordered by mangroves. It is advisable to anchor farther out during the strong NW winds.

9.20 **Duchess Islet** (9°57'S., 150°51'E.), about 2 miles W of the S entrance point of Maiobari Bay, is about 61m high, with a saddle-shaped summit, and thickly wooded. Julian Reefs, on the S of which the sea breaks, extend about 2.5 miles SSW and 4 miles S of the islet. A rock, awash and dangerous to navigation, is located 3.5 miles S of Duchess Island.

Perry Bay lies between the N entrance point of Maiobari Bay and **Perry Islet** (9°49'S., 150°49'E.), about 8.5 miles NNW; the latter is a low flat islet lying on a reef extending about 1 mile WSW from the coast.

The main ridge of Normanby Island, after dipping considerably and becoming somewhat level in Lebudowa Bay, rises again abreast the middle of Perry Bay to conspicuous **Double Peak** (9°51'S., 150°53'E.), 823m high.

Sunken coral patches extend from 2 to 5 miles offshore between Duchess Islet and Cape Deedes (9°48'S., 150°45'E.), a dark densely-wooded point, about 10.5 miles NNW. The charted positions of these patches must be considered as approximate only, and it is probable that other dangers are farther W.

Caution.—It is therefore recommended not to approach the SW coast of Normanby Island within 8 miles.

9.21 Between Cape Deedes and **Paipainina Point** (9°43'S., 150°44'E.), about 4.5 miles N, densely-wooded hills descend steeply to the sea. Observation Islet, close NW of Paipainina Point, is 30.5m high, steep, rocky and densely wooded. Foul ground extends about 0.5 mile S of the islet. A reef, which breaks in a moderate sea at LW, position approximate, lies about 1.5 miles SW of the islet, with another reef midway between. Another reef was reported to lie 3 miles SW of Observation Island.

Cape Dawson (9°42'S., 150°45'E.), the NW extremity of Normanby Island, is a well-marked bluff with considerable depths within 1 mile of the shore. It is also the S entrance point of Dawson Strait, which separates Normanby Island from Fergusson Island. Two reefs lie 0.75 and 1.25 miles WSW of Cape Dawson. A shoal patch is charted about 2.75 miles WNW of Cape Dawson.

Solomania (9°45'S., 150°48'E.), the N mountain of Normanby Island, lies about 3.5 miles SSE of Cape Dawson, rising as a blunt cone, with a small double-notched summit, 1,027m high;

it is similar to Double Peak, about 8 miles SE, both rising from the main ridge of the island, with a considerable dip between them.

Fergusson Island

9.22 **Fergusson Island** (9°30'S., 150°40'E.), the largest of the D'Entrecasteaux Islands, has three great mountain masses rising from it. Mount Kilkerran is a sharp cone, 2,072m high, on the NE side of the island. Mount Maybole, 1,272m high, and the Kubioia Range, from 914 to 1219m high, about 5.5 miles farther S, are on the W side of the island. The Edagwaba Range, 1,219 to 1,821m high, on the S side, extends E from Cape Mourilyan, the SW extremity of the island. The SE part of the island is of irregular outline, with several low hills and deep bays.

Seymour Bay, on the W coast, has saline lakes and several small hills emitting sulphur fumes at its head; there are also several boiling springs.

The island is well populated. The lower slopes of the hills are cultivated, while the upper parts are thickly wooded.

Cape Mourilyan (9°38'S., 150°26'E.), the SW extremity of Fergusson Island, is bold, well defined, and fringed by a narrow strip of coral; a village lies on its S side. The coast between Cape Mourilyan and **Amplett Point** (9°39'S., 150°37'E.), about 11 miles E, forms a bight, thickly wooded, with a sandy beach and villages in places.

Dawson Strait

9.23 **Dawson Strait** (9°41'S., 150°48'E.) has not been closely examined; it was reported that navigation through the strait would be dangerous and intricate from the appearance of the reefs seen off Dobu and other islets near its SE end.

Saramo Point (9°40'S., 150°47'E.), steep and rocky, about 10 miles E of Amplett Point, is the SE termination of the slopes of the Edagwaba Range; there are many villages between the points.

Ebeoa Point (9°43'S., 150°50'E.), about 4.5 miles SE of Saramo Point, is reef-fringed and the S extremity of a peninsula. A double-topped hill, about 366m high, lies about 5.5 miles NNE of Ebeoa Point, and rises to a height of 539m, about 2 miles farther N, on the edge of a crater.

Dobu Island (9°45'S., 150°52'E.), on which there are some boiling springs, is of volcanic origin and lies in the E entrance of Dawson Strait; an extinct crater, at an elevation of 274m, lies in the center of the island. The flat land and low hills on the S side of the island are densely populated and covered with coconut palms.

Nekumara Island and Kwaiope Island lie on the same reef within 2.5 miles NE of Dobu Island; the former islet is thickly populated.

9.24 **Kawai Point** (9°41'S., 150°54'E.) lies about 1.5 miles N of Kwaiope Islet, on the SE end of Fergusson Island. A drying reef and a 5.5m spit extend about 0.75 mile S of the point. There is a 7.3m patch 1 mile S of Kawai Point.

Sanaroa Island (Welle Island) (9°36'S., 151°00'E.) lies about 3 miles NE of Cape Kwaia (Cape Doubtful), the E extremity of Fergusson Island; the channel between them is about 155m wide, with a least depth of 22m, and is marked by a red buoy on either side. In the absence of the buoys, a vessel should steer with Mebuli-buli Point ahead, bearing 335°, which leads through, but very close to the reefs.

Sanaroa Island is 212m high and probably of volcanic origin. Extensive reefs lie SE of the island. A shoal, on which the sea breaks, lies about 2.25 miles SW of the S extremity of the island and a 5.5m patch was reported to lie 3.75 miles WSW of this point on the island.

Directions.—Vessels entering Dawson Strait from W should approach with Saramo Point, in range 062°, with the S edge of the double-topped hill about 6 miles ENE, until the summit of Dobu Island bears 117° and vessels should steer for it on that bearing. When the N extremity of Kwaiope Islet bears 070°, it should be steered for on that bearing. On approaching Nekumara Islet alter course slightly N until the S extremity of Sanaroa Island bears 070°, when it should be steered for on that bearing, passing between a 7.3m patch and the reef fringing the N side of Kwaiope Island.

A good passage into Dawson Strait lies between Dobu Island and Nekumara Island. The passage may be approached from E with the S point of Dobu Island bearing 270°. A vessel should keep to the Nekumara Island side, steering with the S base of the mountain, about 2 miles N of Ebeoa Point, bearing 322° ahead. See the Amphlett Group in paragraph 9.26 for a continuation of the directions N.

Normanby Island—Northeast and East Coasts

9.25 Little is known about the NE and E coasts of Normanby Island.

There is a government station at Esa-ala, about 4 miles SE of Cape Dawson. There is a small wharf, with a depth of 2.7m alongside. Anchorage can be taken by coastal vessels, in 33m, 0.15 mile NE of the wharf. There is considerable volcanic activity in the area; a seismological station is situated on a hill about 1 mile W of the wharf.

Awaiara Bay, entered between **Granawe Point** (9°57'S., 151°04'E.) and Bwaruada Point, about 8 miles E, provides shelter for small vessels about 183m offshore. Local knowledge is required.

The E coast of Normanby Island, between Cape Pierson and Cape Ventenat, about 17 miles S, is indented by a number of small bays, and backed by a range of mountains.

The Amphlett Group

9.26 The **Amphlett Group** (9°15'S., 150°50'E.) consists of many islands and islets, lying N of **Cape Vinall** (9°24'S., 150°46'E.), the NE extremity of Fergusson Island.

Wamea Island (9°14'S., 150°54'E.), 415m high, lies about 11 miles NE of the cape, and is the E of the group. Pigeon Rock, 48m high, lies about 0.75 mile W of the W side of the island; two shoal patches lie between the rock and the island. The village of Dromo Dromo stands on a narrow rocky saddle on Wamea Island, at an elevation of 152 to 183m. Urasi Island, 311m high, lies about 1.5 miles NW of Wamea Island.

Wamea Island was reported to be a good radar target at a distance of 29 miles.

Wright Patch (9°11'S., 150°54'E.) and **Crook Patch**

(9°07'S., 150°54'E.), each with a depth of less than 1.8m, lie about 2.25 and 6.5 miles, respectively N of the N extremity of Wamea Island. A patch, which breaks, and **MacGee Patch** (9°10'S., 150°50'E.), with less than 1.8m, lie about 3 miles NE, and 4.25 miles NW, respectively of the same extremity. A shoal of about 5.5m was reported to lie 3.5 miles S from the E tip of Yabwaia Island; the same shoal extends to about 1 mile NNE from the NW tip of Urasi island.

Watota Island (9°18'S., 150°42'E.), 184m high, lies about 10 miles WSW of Urasi Island. A shoal, with a depth of 1.8m, was reported about 3.25 miles NNW of Watota Island.

It was reported that small craft can anchor, in a depth of 7.6m, sand and coral, between Yabwaia Island and Wawiwa Island. Although sheltered from SE seas, it is frequented by gusts of wind from the surrounding high land.

Directions—After passing through Dawson Strait, a vessel should steer for Sanaroa Hill, the summit of Sanaroa Island, bearing 023°. When Scrub Islet, the SW of a group off the SW extremity of Sanaroa Island, bears 131°, and the leading marks on **Benalla Point** (9°35'S., 150°53'E.) are in range bearing 311°, alter course left, keeping the leading marks in range ahead, passing through a narrow channel through the scattered reefs extending from Fergusson Island to Sanaroa Island. An alternative range is with Mebuli-buli Point, bearing 335°, in line with the W hummock of Yabwaia Island, passing very close to the reefs. When the NW end of Sanaroa Island bears 035°, alter course to 353°, and pass about 0.4 mile W of the reef, which is easily distinguished, extending NW of Urewala Island, which is located about 8.5 miles N of the NW end of Sanaroa Island. Then steer for the E extremity of Urasi Island, bearing 353°, just open E of Pigeon Rock, which leads E of the reef extending E from Wata Island, located about 8.5 miles NNW of Urewala Island. On nearing Pigeon Rock, alter course to pass W of it, and then steer to pass between Urasi Island and Wamea Island. When the E extremity of Wamea Island bears 145°, alter course left, keeping it on that bearing astern, passing SW of Wright Patch and NE of MacGee Patch.

See paragraph 9.14 for recommended tracks N of MacGee Patch.

Fergussan Island—West and North Coasts

9.27 Seymour Bay (9°32'S., 150°29'E.), N of Cape Mourilyan, is encumbered with coral patches. Tumagabuna Islet lies close S of the N entrance point.

Waluwea Point (9°25'S., 150°26'E.) lies about 4.5 miles NNW of the N entrance point of Seymour Bay. **Cape Labilardiere** (9°20'S., 150°29'E.), the N extremity of Fergusson Island lies about 6 miles farther NE.

The N coast between Cape Labilardiere and the entrance to Hughes Bay, about 10 miles ESE, appears steep, bold, bare, and without anchorages.

Sunday Islet (9°16'S., 150°30'E.) lies about 3.5 miles NNE of Cape Labilardiere; a sand cay, about 1 mile E, lies on a reef with sunken rocks.

A 2.7m patch lies about 2 miles ENE of Cape Labilardiere, with a 3.7m patch and some reefs close W of it. A chain of shoals extends N of these patches and N of Sunday Islet. Little is known of the area.

Sunday Islet was reported to be a good radar target at a distance of 25 miles.

Tides—Currents.—A strong NW current has been experienced along the N coast of Fergusson Island during the month of November.

Anchorage.—Sheltered anchorage for small vessels can be obtained at the head of Seymour Bay. There are numerous coral patches in the approach, especially from S; the best approach is along the N shore.

Good anchorage may be obtained by vessels up to 45m in length, sheltered during the SE weather, in a small bay on the E side of Waluwea Point. The bay is reported to be free of dangers, with general depths of 37m in the anchorage. There is a small jetty at the head of the bay, with a village and plantation nearby.

Goodenough Island

9.28 Goodenough Island (9°20'S., 150°15'E.), the NW of the D'Entrecasteaux Islands, has a mountain range traversing its whole length. Vineuo, 2,545m high, the W of three peaks, is located towards the N edge of the range.

A cultivated plain, with a maximum width of about 3 miles, lies between the mountain range and the NE coast. The slopes and contiguous plains are cultivated in flats and terraces; some of the projecting points are purely volcanic. There is a small crater, probably not long extinct, on Cape Watts, the SE extremity of the island. The island is well populated.

Two wharves are situated about 1 mile NW of **Watutu Point** (9°23'S., 150°23'E.), the E extremity of Goodenough Island; the SE wharf is 91m long, with a depth of 9.1m alongside, while the NW wharf is 85m long, with a depth of 8.8m alongside. White buoys are moored NW and SE of the wharves. Vessels berthing at the SE wharf should approach on a course of 240° and berth port side-to, taking care to avoid coral patches lying SSE of the head of this wharf. Talafatama Jetty, suitable only for boats, is situated about 0.6 mile NW of the NW wharf.

Malauna Bay (9°14'S., 150°18'E.), entered between Malauna Point, about 10 miles NNW of Watutu Point, and Knight Point, about 2 miles farther NW, is encumbered with reefs, but affords good anchorage to vessels with local knowledge, in depths of 12.8 to 20m, mud. It is sheltered from SE winds; the off-lying reefs afford some protection from N and NW winds. The shores of the bay are low and fringed with reefs and mud flats. Sheltered anchorage can be taken, in 18.3m, mud, with Malauna Point bearing 096°, distant about 0.25 mile. Anchorage may also be obtained, in a depth of 16m, with Malauna Point bearing 100° and Knight Point bearing 315°.

Cape Lahaye (9°11'S., 150°12'E.), the N extremity of the island, is low and wooded; a low coastal ridge and off-lying reefs lie between it and Watutu Point. Between Cape Lahaye and Cape Rawlinson, the W extremity of the island, the spurs from the main ridge approach the coast which has a bold aspect, and is generally rocky and cliffy.

Nuama Islet, covered with grass and scrub, with a double summit, 61m high, and Siata Islet, wooded and 24.4m high, lie about 1 mile and 3 miles, respectively, NW of Cape Layahe.

An extensive and intricate mass of reefs fronts the NW coast of Goodenough Island.

The SW coast of Goodenough Island is described with Ward Hunt Strait in paragraph 9.35.

Moresby Strait

9.29 Moresby Strait (9°30'S., 150°25'E.), separating Fergusson Island and Goodenough Island, has not been thoroughly examined. There are considerable depths in the strait, but there are several steep-to coral patches.

The S entrance, between Cape Mourilyan and Cape Watts, is about 8.5 miles wide, but is reduced in width considerably by the reefs extending N of Cape Mourilyan. Waqipa Island, with its SW extremity about 1.5 miles NE of Cape Watts, is an extinct volcano, 165m high and grass covered; small detached reefs lie about 0.5 mile SE of its SE end. The island is inhabited; its NW side is connected with Goodenough Island by a reef with some islets on it.

An unexamined patch, with a depth of 12.8m, was reported to lie about 1.25 miles NE of Waqipa Island.

The N entrance, about 2.5 miles wide, is obstructed by the Barrier Islands, with a narrow channel on either side of them. The E channel is dangerous, but Warrego Passage, the W channel, has been swept and is believed clear of dangers.

Anchorage.—Mud Bay, entered between **Coconut Point** (9°28'S., 150°22'E.) and the coast 1.5 miles NW, provides sheltered anchorage in the bights on either side of Wailagi Point, in the S side of the bay. Large vessels find the most suitable anchorage, in 46m, at the head of the bay, about 0.4 mile, 322° from Wailagi Point and about 0.25 mile offshore.

Anchorage for deep draft vessels can be obtained, in about 51m, about 2 miles NW of Watutu Point; small vessels can anchor in less depth closer inshore.

Directions.—Vessels proceeding to the anchorage in Mud Bay from S should round Cape Mourilyan at a distance of about 0.75 mile, and then steer for the E extremity of Ilamu Island, the W of the Barrier Islands, bearing 354°. When **Tumagabuna Islet** (9°29'S., 150°28'E.) bears 113°, in range with Bray Hill, about 1 mile inland, alter course left keeping the islet astern on that bearing. When the summit of Waqipa Island bears 176°, alter course to 245° and steer this course until the E extremity of Coconut Point bears 130°, when course can be steered for the anchorage.

Vessels proceeding through Moresby Strait to the anchorage NW of Watutu Point after rounding Cape Mourilyan should steer for the E extremity of Ilamu Island, bearing 354°, until the center of Warrego Passage bears 307°, when a mid-channel course should be steered through the passage. The passage is about 0.2 mile wide, and was reported to have a depth of 51m.

Vessels proceeding from Moresby Strait to the Amphlett Group require local knowledge and should use the swept channel which passes NW of the group. After passing through Warrego Passage bring Talafamata Jetty bearing 242° astern, and keep it on that bearing until Cape Labilardiere bears 180°, distant about 1.25 miles, when a course of 100° should be steered, passing S of the 3.7m and 2.7m patches N of the cape. A distinctive green patch, about 2 miles E of Cape Labilardiere, is located on the lower slope of the hill behind the cape. When this green patch bears 244.5° alter course to keep it astern on that bearing. When **Tuboa Island** (9°12'S., 150°49'E.) bears 209° course should be altered to keep it in line with the E end of Wawiwa Island astern on that bearing, and Gumatabu Islet ahead, bearing 029°; this course leads close W of McGee Patch.

See paragraph 9.14 for recommended tracks N of McGee Patch.

North Coast of Papua New Guinea—East Cape to Germania Hook

9.30 This part of the sector describes the N coast of Papua New Guinea, from East Cape to Germania Hook. **East Cape** (10°13'S., 150°53'E.) was previously described in paragraph 7.30.

The N coast of the peninsula which forms the extreme E end of Papua New Guinea, from East Cape to Basilisk Point, about 10.5 miles W, is rocky and steep; it comprises several small bays, which are deep, but afford no anchorage. Mount Killerton rises to 491m about 1.25 miles S of Basilisk Point.

Bentley Bay, entered between Basilisk Point, and Cape Ducie, about 6.5 miles WNW, affords indifferent anchorage. The land rises steeply in a series of densely-wooded hills, separated from each other by deep gorges and narrow valleys, opening out into small plains here and there as they approach the coast.

Cape Ducie, low, rocky, and thickly wooded, has the appearance of an island from E. It is steep-to on its N side, but a sunken reef extends nearly 1 mile E, with a small cay, which dries 1.2m, on it. The reef also extends S, joining Catherine Island to the cape. The latter island is low, covered with mangroves, and appears bordered with mangrove swamps. Annie Inlet, entered close S of Catherine Island, was not examined, but numerous reefs and discolored water were observed; it is only suitable for boats.

Anchorage.—The shores of Bentley Bay are steep-to, but anchorage can be taken, in 28m, sand, about 1 mile offshore, near the coral reef fronting the W shore; this anchorage is insecure with N winds.

9.31 Excellent Point (10°13'S., 150°33'E.) lies about 3 miles W of Cape Ducie, which it resembles. The bay between the points has shores lined with mangroves.

Awaiama Bay is entered between Excellent Point and Puni Puni Point, a prominent cliff, about 5 miles W. Two finger peaks of the Stirling Range, 741m high, about 2 miles S of Puni Puni Point, are conspicuous from E. There are several villages on the shore of the bay; the E shore is fringed by a reef in places. There is good anchorage at the head of the bay during the Southeast Trade Wind.

The coast between Excellent Point and Cape Frere, about 23 miles WNW, appears to be free of dangers. The aspect changes W of Excellent Point; the slopes facing the sea are covered with grass, the summits are thickly wooded, and at the base a broad belt of cultivated land extends to the coast. The Stirling Range, backing the coast, continues to increase in altitude W, and attains an altitude of 1,149m in a round summit, about 2.75 miles inland at Cape Frere.

9.32 Cape Frere (10°05'S., 150°11'E.) is a bold, steep bluff, which is steep-to, with no fringing coral reef. The sides of the headland are covered with grass, and intersected with numerous ravines running nearly parallel with each other. As the cape is approached, numerous cascades and watercourses may be seen on the mountain sides.

Goodenough Bay entered between Cape Frere and **Sibiribiri Point** (9°43'S., 150°03'E.), about 22 miles NNW, is generally deep and affords no anchorage except in Rawdon Bay and Menapi Bay. The SW shore of the bay, and most of the N shore are steep-to. The water at the head of the bay is discolored.

Five peculiar pinnacle peaks, about 26 miles WNW of Cape Frere, lie grouped together, near the coast, and are prominent from E. At the head of the bay the lofty grass land ceases and the ridge of high mountains continues NW. The coastal range on the N side of the bay consists of densely wooded hills, 91.4 to 122m high.

Many small villages are scattered on the shores of the bay, on the belt of alluvial land which extends along the foot of the mountains.

Bartle Bay (10°06'S., 150°08'E.), entered between Cape Frere and Daru Point, about 5 miles W, is backed by a succession of table lands, from 61 to 457m high, rising in terraces, covered with long rich grass. There is no anchorage in the bay except for small craft very close inshore. Dogura, a large settlement, about 5 miles W of Cape Frere, is prominent from seaward. A jetty, which can accommodate vessels up to 37m in length and 3.4m draft, is situated at the village of Wedau, close W of Daru Point.

9.33 Rawdon Bay (9°46'S., 149°53'E.) lies about 10 miles WSW of Sibiribiri Point. The Mosquito Islands, two low, flat, and wooded islands of coral formation, lie in the entrance of the bay. The village of Abuara stands on the shore of the bay.

On Baniara Island, the NW and larger island, there is a government station and jetty; vessels up to 100 tons and 3.7m draft can berth alongside the jetty.

A wide passage on the W side of Baniara Island lies between the reefs extending from the mainland abreast the island, and those extending from the W end of the island. Entrance can be made E of Baniara Island, but it is less direct.

Anchorage.—Good anchorage can be taken, in 29m, stiff mud, about 0.5 mile S of Baniara Island. Sheltered anchorage can be obtained, in 22m, between the NW side of Baniara Island and the mainland.

A small shoal was reported to lie about 0.5 mile offshore, about 5 miles W of Baniara Island.

9.34 Menapi Bay (9°46'S., 149°56'E.), about 3 miles E of Baniara Island, and where there is a mission station, affords anchorage for one vessel of up to 300 tons, in 9.1m. A detached reef, in a depth of 1.8m, lies in the middle of the entrance to the bay, but there is a passage on either side of it; the E passage is recommended. The anchorage is sheltered from NW, and moderately sheltered from SE weather; there is a beach at the head of the bay.

Glen Islet (9°44'S., 150°03'E.), 10.7m high, with a few trees, lies on the S end of a coral reef fringing Sibiribiri Point, the SE extremity of the Cape Vogel Peninsula, to a distance of about 0.4 mile. A drying sand bank lies on the outer edge of the fringing reef, and a detached patch lies about 0.5 mile S of the islet.

Ward Hunt Strait

9.35 Ward Hunt Strait is about 16 miles wide between **Cape Vogel** (9°41'S., 150°03'E.) and Goodenough Island to the NE.

Dart Reefs (9°34'S., 150°13'E.), detached patches, with a depth of 1.8m, extend about 14 miles WSW from the SE extremity of Goodenough Island. A clear and deep channel, 1.5 miles wide, lies between the NE patch and Goodenough Island.

Keast Reef, about 4.5 miles NE of **Kibirisi Point** (9°38'S., 150°01'E.), in a depth of 1.8m, and breaks in a moderate swell. A clear and deep channel, about 3.5 miles wide lies between the reef and Ipoteto Islet.

Aspect.—The shores of the strait present a great contrast. Goodenough Island, on the N side, rises to an elevation of 2,545m; its thickly-wooded mountainsides are visible at a great distance, although the summit is usually covered with clouds. The coast on the S side is grassy and undulating, and of greater variety. The hills do not exceed 183 or 213m in height; the coast is generally low, indented, and fronted by small sand islets fringed by coral.

Approaching the strait from SE, a conical hill N of the Mosquito Islands is first seen appearing as an island; not until a vessel is within a distance of about 18 miles does the land on the S side of the strait appear to be continuous.

Caution.—Vessels proceeding through Ward Hunt Strait and across the entrance to Collingwood Bay should follow the track indicated on the chart, passing about 1 mile NE of Ipoteto Islet. The area away from the track should be used with extreme caution due to the incomplete nature of the information in the area. It was reported that vessels are always set N when passing through the strait.

9.36 Sibiribiri Islet (9°41'S., 150°03'E.), 12.2m high and covered with mangrove, lies on the coastal reef, about 3 miles N of Glen Islet, and about 0.1 mile offshore. A shoal patch lies about 1 mile NW of the islet, 0.35 mile offshore. There is a conspicuous wreck on the reef off of Cape Vogel, about 2.25 miles N of Glen Islet.

Anchorage.—A bay lies between Sibiribiri Islet and Kibirisi Point, about 3.5 miles NW; Tara Kwaruru, a salt water creek, lies at the head of the bay, at the W end of the anchorage. The anchorage is sheltered from the prevailing SE winds by Karaiga Islet and the reef on which it stands. The latter islet, about 4.7m high, with bushes on it, usually shows distinctly from E. The village of Irowowono lies on the mainland S of Karaiga Islet. The village of Inageta lies about 0.4 mile farther W; a creek, fringed by mangroves, lies close W of the latter village.

Target Patch, coral, in a depth of 1.8m, lies about 0.6 mile WNW of Karaiga Islet, with a passage, about 0.4 mile wide and clear of dangers, between them.

Anchorage may be obtained, in 33m, mud, with the N extremity of Karaiga Islet bearing 085°, and the village of Inageta bearing 209°, open SE of the mangrove promontory NE of it. This position gives less than 0.1 mile swinging room, but the SE wind being steady, a vessel would seldom swing towards either reef. A vessel approaching from E, after rounding the N end of Karaiga Islet reef, may steer for the anchorage.

Kibirisi Point (9°38'S., 150°01'E.) is a black rocky point, 6.1m high. Ipoteto Islet, close E of the point, is 18.3m to the tops of the trees. The islet is fringed by a narrow ridge, and connected to the point by a shallow ridge. A light is shown

from the islet.

Dog's Hill, 67m high, lies about 1.5 miles W of Kibirisi Point. The coast from Dog's Hill for about 3.5 miles WSW, consists of cliffs about 30.5m high. Then a coastal range of hills extends to Dark Hill 107m high, close S of **Dark Hill Point** (9°36'S., 149°39'E.), about 20 miles W of Dog's Hill. Saddle Hill, 334m high, and Cone Peak, 337m high, lie on the coastal range, about 8 miles WSW and 12 miles W, respectively, of Dog's Hill.

The coastal range near Dark Hill gives place to a thickly-wooded plain, extending 4 to 10 miles inland, with here and there a small dark hill rising from the surrounding level.

The coast is fringed with mangrove and fronted by reefs in places; in many of the mangrove bights are coral islets that cannot be distinguished at a distance of 2 or 3 miles.

9.37 Cape Watts (9°31'S., 150°21'E.), the SE extremity of Goodenough Island, is rocky and fringed with coral reef. The wooded land rises to an elevation of 674m about 2 miles N of the cape. A somewhat remarkable square-topped summit, 555m high, lies about 1.5 miles WNW of the cape.

There are numerous uncharted shoals between Cape Watts and **Taleba Bay** (9°28'S., 150°14'E.), about 7 miles WNW. This area should only be navigated in favorable light and with a good masthead lookout.

Cape Varieta (9°24'S., 150°08'E.), 14 miles NW of Cape Watts, is a cliff, 49m high, rising about 1.25 miles N to a peak, 536m high. Anchorage can be taken, in 47m, sand and coral, 0.35 mile SSE of Cape Varieta and about 0.25 mile offshore.

Cape Womobu (9°22'S., 150°06'E.), about 2.75 miles NW of Cape Varieta, is a 46m high promontory; foul ground extends 1 mile W and SW of it. A shoal lies 2.25 miles NNW of the cape and about 1.25 miles offshore. There are possibly other off-lying patches, as the vicinity has not been closely examined.

Collingwood Bay

9.38 Collingwood Bay (9°25'S., 149°30'E.) is entered between the N side of Cape Vogel and **Hardy Point** (9°09'S., 149°19'E.), about 50 miles NW. The bay is encumbered with many shoal patches, the positions of which are approximate, and consequently little reliance can be placed on the chart.

Caution.—The bay should be navigated only in the most favorable weather, with a lookout aloft.

The S shore of the bay W of Dark Hill and the S part of the W shore are low and flat, but the N part of the W shore is bold, rocky, and steep. **Mount Trafalgar** (9°10'S., 152°46'E.), 1,725m high, and **Mount Victory** (9°12'S., 149°04'E.), an active volcano, 1,884m high, located about 11 miles SSW and 16 miles SW, respectively, of **Cape Nelson** (9°00'S., 149°15'E.), each have the appearance of a large island from a distance.

The **Jabbering Islands** (9°37'S., 149°54'E.), about 6 miles W of Kibirisi Point, consisted of islets over 9.1m high and covered with bush. They were reported to be washed away, leaving only reefs, some of which dry at LW, in the area. Caution should be exercised in approaching the area as the surrounding reefs are very steep-to.

The **Sidney Islets** (9°35'S., 149°49'E.), about 5.5 miles WNW of the Jabbering Islands, have been reduced to sand and coral reefs, awash or below water. An area of shoal water lies between 0.75 mile NE and 0.5 mile N of the Sidney Islets.

Black Rocks (9°35'S., 149°34'E.), which dry 0.6m and can usually be identified, lie about 5 miles W of Dark Hill Point, and extend to about 1.5 miles offshore. Button Island stands on a drying reef, about 1.5 miles WSW of the outer end of Black Rocks.

9.39 Jarrad Island (9°35'S., 149°29'E.) lies about 5 miles W of Black Rocks. The village of Baiawa, about 2 miles S of the island, is backed by a dark hill, with a flat summit, 76.2m high.

Fir Tree Point (9°33'S., 149°24'E.) is a low and sandy point, with the Rakua River discharging close SE; a spit, in a depth of 3m, extends 0.35 mile NE of the point. Anchorage can be obtained, in 18.3m, mud, about 0.5 mile SE of Fir Tree Point, and also in a least depth of 9.1m, N of the point. Local knowledge is required for both these anchorages.

Foul ground extends up to 1 mile offshore NW of Fir Tree Point, between 0.5 mile and 2.5 miles westward of the point. Virau, a reef, lies about 0.25 offshore, about 3 miles NW of the point.

A point, about 4 miles WNW of Fir Tree Point, forms the S entrance point of the bight forming the head of Collingwood Bay. The inner part of the bight is relatively free from dangers to within 3.5 miles of Keppel Point, about 15 miles farther NW. However, isolated drying reefs lie about 4.75 and 7 miles WNW of the S entrance point, and two 1.5m patches lie 4 miles WNW and 7 miles NW of the same point.

Anchorage.—Anchorage can be taken, in about 18.3m, about 0.5 mile NW of the S entrance point of the above-mentioned bight.

Vessels up to 2,000 tons can anchor 0.5 mile off the black sandy beach at **Wanigela** (9°21'S., 149°10'E.). The anchorage is sheltered from NW, but small vessels would find it exposed in SE weather. A good all-weather anchorage is reported inside the large offshore reef NE of Wanigela. A channel through the reefs from **Hardy Point** (9°09'S., 149°19'E.) to Wanigela is marked by beacons. The general direction of the buoyage is from NE to SW, with even numbers on the SE and odd numbers on the NW side of the channel. This channel is reported to be very tortuous.

Directions.—The following recommended route for the passage from Ipoteto Island to Wanigela involves navigation through poorly charted waters which contain many shoals. Some of the reefs close to the recommended track may be marked by beacons or drum buoys, but these are unreliable, and not to be relied upon, and the directions should be adhered to closely.

From a position about 0.5 mile N of Ipoteto Island, steer a course of 279°, which leads 0.5 mile N of the N reef of the Jabbering Islands. This reef dries at LW and is usually easy to distinguish. Alter course to 290° about 0.75 mile past the latter reef to pass about 0.5 mile N of the reef in the Sidney Islets, which lies about 2 miles ENE of **Posa Posa Harbor** entrance (9°36'S., 149°47'E.); this reef also dries at LW and can be distinguished. In the vicinity of the Sidney Islets the vessel passes between dangerous reefs, distant from 0.25 to 0.5 mile on either side. When the latter reef is abeam alter course to 270° and

steer that course until Dark Hill Point bears 244°, when it should be steered for on that bearing for about 1 mile. When the point at the entrance to Posa Posa Harbor bears 101°, alter course to 281° to keep the point astern on that bearing. The latter course leads 0.5 mile N of Virau, and 0.45 mile off the nearest point of land, the S entrance point of the bight at the head of Collingwood Bay. When 2.5 miles past Virau, alter course to 319°, which leads to Wanigela Reef, a fairly large breaking reef, which can be passed on either side to an anchorage off the beach fronting Wanigela; that part of the track,W of Black Rocks has a least depth of 20.1m.

9.40 **Keppel Point** (9°19'S., 149°13'E.), a low point, has foul ground extending 4 miles E from it to join the numerous reefs and shoals, many of which are unexamined, which occupy the central part of the bay between Black Headed Rocks and **Veale Reef** (9°12'S., 149°28'E.).

The coast between Keppel Point and Hardy Point, about 12 miles N, is fronted by numerous detached dangers.

Sinipara, an islet which dries 0.9m, lies about 1 mile S of Hardy Point.

Tufi Harbor and Approaches

9.41 **Tufi Harbor** (9°05'S., 149°18'E.), entered about 3.5 miles N of Hardy Point, is a government station, with a resident magistrates house and other buildings, situated on the N side of the harbor. A wharf with a depth of about 2.7m alongside is situated on the N side of the harbor in the village of Tufi. There are depths of over 55m in the harbor.

Lights, in range 308.5°, lead through the dangers in the SE approach to the harbor; the front range light is shown from the S entrance point of the harbor.

Veale Reef (9°12'S., 149°28'E.), marked by a light, lies on the NE side of the range line, about 9.75 miles ESE of Hardy Point. Greaves Reef, marked by a light, lies about 2 miles farther NW.

Black Headed Rocks (9°14'S., 149°25'E.), which dry 0.9m, lie on the SW side of the range line, about 8 miles SE of Hardy Point.

Ham Reef (9°12'S., 149°26'E.), marked by a light and with a sunken rock about 1 mile SW of it, lies on the SW side of the range line, about 1.75 mile W of Veale Reef. Sunken rocks lie about 2 and 3 miles, respectively, WNW of Ham Reef.

Stewart Reefs (9°08'S., 149°23'E.), marked by a light, lie on the NE side of the range line, about 4.25 miles ENE of Hardy Point.

A shoal, in a depth of 3.4m, lies about 1 mile ESE of the S entrance point of Tufi Harbor. A rock, 2.7m high, lies on the reef extending about 0.45 mile from the N entrance point.

Directions.—Approaching from SE, a vessel should bring the approach range in line, bearing 308.5°, from a position about 4 miles SE of Veale Reefs, and keep on this range until past Stewart Reefs when the recommended track indicated on the chart should be followed. If proceeding to Tufi Harbor, continue on the 308.5° range line until the 2.7m high rock bears 325°. Then steer for it on that bearing until two small range marks, with triangular topmarks, situated fairly high up on a steep, grassy bluff at the W end of the harbor, are in range, bearing 270°, which leads through the harbor entrance. The marks are small and may be difficult to identify in the afternoon light.

Collingwood Bay to Cape Nelson

9.42 Drying reefs extend up to 0.6 mile off Hardy Point and Cape Nelson, about 10 miles NNW, and from most of the points between.

Maclaren Harbor (9°04'S., 149°18'E.), entered about 2 miles N of Tufi Harbor, has depth of about 64m throughout, except for the narrow W arm at its head.

Cape Nelson (9°00'S., 149°15'E.) is the N extremity of a peninsula topped by Mount Victory. The land within the cape consists of grassy slopes rising to the spurs of the mountains from 122 to 152m high. The coast in the vicinity of the cape is broken by narrow inlets resembling fjords. Cape Nelson is steep-to outside the narrow fringing reef, but there are numerous off-lying reefs.

A light is shown from **Hall Point** (9°03'S., 149°18'E.), about 4.5 miles SE of Cape Nelson.

Caution.—Navigation off the coast of Papua New Guinea between Cape Nelson and Cape Ward Hunt, about 87 miles NW, appears to be of the most dangerous character, due to the unsurveyed areas and the numerous coral patches and shoals. The coral patches are steep-to and the sea seldom breaks on them. The weather is often thick with passing squalls of rain, and anchorages are rare close to land. Between coral patches only a few miles apart, a sounding of several hundred meters may be obtained.

Vessels should proceed with utmost caution and follow the recommended track indicated on the chart. Vessels should be careful not to get E or N of the line indicated on the chart off Cape Nelson.

Dyke Acland Bay

9.43 Dyke Acland Bay is entered between Cape Nelson and **Cape Endaiadere** (8°41'S., 148°26'E.), about 52 miles WNW. The low thickly-wooded shores of the bay are backed by a plain extending many miles inland. The whole coast has no marked features, and the trees with which the plain is covered appear in the distance to be of the same height and color.

The foothills of the Hydrographer's Range back the head of **Ketakerua Bay** (9°05'S., 148°37'E.), which lies about 38 miles W of Cape Nelson. The range rises to an elevation of 1,646m about 17 miles WNW of the head of Ketakerua Bay.

There are several deep inlets between Cape Nelson and the W entrance point of Anasari Harbor, about 6.5 miles W. The spurs of Mount Trafalgar to this part of the coast have a gradual slope, and are covered with grass and scattered trees. A reef fringes the coast and extends up to 0.5 mile offshore.

A shoal, with a depth of 7.6m, lies about 4.5 miles NE of Cape Nelson.

Anasari Harbor (9°01'S., 149°09'E.) provides anchorage, in about 29m, about 0.6 mile from its head.

Port Hennessy, close E of Anasari Harbor, is reported to afford good anchorage.

Spear Island (8°59'S., 149°08'E.) lies about 0.2 mile N of the NW entrance point of Anasari Harbor. Spear Island Light is shown from the NW entrance point of the harbor.

Kanimeno Point (9°01'S., 149°06'E.), about 2.25 miles WSW of Spear Island, has a drying reef extending about 0.5 mile offshore; a rock, with 1.8m, lies about 1 mile NNW of the point. A shoal with 12.8m, lies about 1.5 N of Kanimeno Point.

An unexamined shoal, in a depth of 12.8m, lies about 5.5 miles NW of Spear Island. Tancred Reef, in a depth less than 1.8m, lies about 10.5 miles WNW of the same island.

9.44 **Porlock Bay** (9°02'S., 149°00'E.) is entered between Kanimeno Point and Musa Point, about 12 miles WSW. The greater part of the shore is a network of lagoons, and the head of the bay is fringed by reef extending more than 0.5 mile offshore.

Curtis Reef (9°02'S., 149°01'E.), awash at LW, lies about 5 miles WSW of Kanimeno Point, and about 1.75 miles offshore.

Porlock Harbor (9°03'S., 149°04'E.) is entered between Okeia Point, about 2 miles SE of Kanimeno Point, and Tamina Point, about 1.5 miles farther SE. The shores of the harbor are fringed with mangroves backed by hills, which rise to 229m on the E side and 204m on the W side. Drying coral reefs extend a short distance off the E shore and up to 135m off the W shore.

Jones Reef, which dries, lies in the fairway of the entrance, nearly 1 mile N of Tamina Point; foul ground extends about 90m N of the reef.

Stella Islet, about 1 mile S of Okeia Point, lies on a coral reef, 0.15 mile offshore.

The inner harbor is entered between Stella Islet and Polaris Point, about 0.6 mile SW. Its E side is steep-to until about 92m offshore, and the W side to about 135m offshore. A 2.7m shoal lies off the W shore, about 0.2 mile SE of Polaris Point. Shoal water extends about 0.4 mile from the head of the inner harbor where a small river discharges. There is a jetty on the E side nearly 1 mile SE of Polaris Point.

A cove, between Tamina Point and Polaris Point, 0.67 mile ESE, has steep-to shores up to the edge of the fringing coral reef. Foul ground extends about 0.1 mile N of Polaris Point, and depths of 5.5m or less, extend up to 0.1 mile offshore for a distance of about 0.5 mile SE of the point.

Anchorage can be taken, in depths of 16 to 22m, in Porlock Harbor.

The **Musa River** (9°05'S., 148°54'E.) flows out by two mouths at Musa Point. The delta is low swampy land, as is also the coast for some distance E. The E mouth is less than 95m wide, with a depth of 4.3m, and the W mouth is 0.15 mile wide, with a depth of 0.9m on the bar; both of these depths are possibly subject to change during freshets. At times the water is discolored for some distance off the mouths. The river has been ascended many miles by boat. Anchorage can be taken, in depths of 12.8 to 18.3m, off the mouths of the Musa River.

Port Harvey (8°54'S., 148°31'E.), on the W side of Dyke Acland Bay, affords anchorage, in 18.3m, in the middle of the port. Rocky Point, at the head of the port, extends NE, forming a creek on either side of it; the point is fringed by a reef extending about 135m NE of it, with a 1.5m shoal close outside of it.

A drying reef extends 0.17 mile NE of the SE entrance point of the port. Two reefs which dry, on the N of which there are two mangrove islets, extend about 0.3 mile and 0.2 mile offshore, respectively, about 0.5 and 0.8 mile N of Rocky Point.

A shoal lies about 0.5 mile E of Cape Sinclair, close N of Port Harvey.

9.45 **Oro Bay** (8°53'S., 148°29'E.) (World Port Index No. 53206) is entered between Cape Sinclair and a point about 1.25 miles NW; the village of Beamu stands at its head. Drying reefs extend about 90m from the shore of the bay, except at its head which is sandy.

Aspect.—On the S side of the bay there is an T-headed pier; the head is 60m long, width 12.1m, with a depth of 11.4m alongside. The pier is steel and concrete structure, in good condition, and fendered adequately. The inner side of the T-head has depths of 10.5m is are used by coastal vessels. A ramp projecting from the shore W of the pier is used by barges. Three mooring dolphins are situated in the vicinity of the main wharf. Containers can be handled at the main wharf; ro-ro vessels are frequent callers at the port.

Berthing may be delayed from December to March during NW winds. Berthing is best carried out in the early morning when there is usually no wind.

A new dolphin and extended mooring and a new extension berth in the E end is now underway. The overall length of the berth will then be 95m.

A directional light leads into the bay.

Pilotage.—Pilotage is not compulsory. Pilots are available from Port Moresby with 48 hours notice. The pilot boards 1 mile NE of the pier. Vessels contact "Oro Bay Port Control" on VHF channels 16, 12, and 6.

Anchorage.—Anchorage can be taken, in 12.8 to 16.5m, in the middle of the bay, but is restricted in the approaches to the pier and in the turning basin.

9.46 A shoal, with a depth of less than 1.8m, lies nearly 3 miles N of Cape Sinclair. Between this shoal and **Cape Sudest** (8°44'S., 148°28'E.), several shoals, with depths of 2.1 to 5.5m, lie within 4.5 miles of the coast. A rock, with a depth of less than 1.8m, lies 7.5 miles SE of Cape Sudest. Rocks, with depths of less than 1.8m over them, extend up to 3 miles E of Cape Sudest.

Between Cape Sudest and **Cape Endaiadere** (8°41'S., 148°26'E.), on which there is a coconut plantation, several detached shoals, with depths of 3 to 12m, lie within 4.5 miles of the coast.

Dyke Acland Bay to Cape Ward Hunt

9.47 **Buna** (8°40'S., 148°24'E.) lies about 2.5 miles WNW of Cape Endaiadere. Buna Roads, NE of Buna, is encumbered with shoals. There is a government station at Buna, with two disused wharves close W of it.

There are numerous dangers in the approach to Buna. The outermost danger is a shoal, with a depth of 2.1m, about 3 miles NNE of Cape Endaiadere, with a 10m shoal about 0.5 mile farther NNW. Shoals, with depths of 4 to 4.6m extend about 2 miles S and SW of the 2.1m shoal. Shoals extend about 2 miles NE of Cape Endaiadere.

Holnicote Bay is entered between **Cape Killerton** (8°37'S., 148°20'E.), about 6.5 miles NW of Cape Endaiadere, and **Kumusi Point** (8°28'S., 148°12'E.), about 11.5 miles farther NW. Cape Killerton is low, wooded, and fringed by a reef. Kumusi Point has large casuarinas growing on it. The Mangrove Islands, three in number, lie about 1 mile WNW of Cape Killerton.

A 5.2m patch, a 1.8m patch, and a 7.6m patch, lie about 3.5 miles N, 3.25 miles NNE, and 4 miles NE, respectively, of Cape Killerton, at the seaward limit of an area fouled by reefs and rocks. At the W end of the area, a shoal, in a depth of 0.6m, lies about 2.25 miles NW of Cape Killerton. A dangerous wreck lies close SW of the above shoal.

Range beacons, in range 168.5°, and consisting of tubular metal tripods surmounted by white triangular daymarks, stand on Cape Killerton.

A beacon stands on the fringing reef, about 0.1 mile E of the cape; another beacon stands on a reef about 0.15 mile farther E.

Cape Killerton may be closed, clear of dangers, to a distance of 1.5 miles, but caution is necessary. Shoal water is difficult to see in the area.

Anchorage.—Vessels may anchor as convenient off Cape Killerton or, in about 16.5m, about 2 miles NNW of the cape.

Vessels may also go alongside a wharf, about 0.25 mile SSE of the cape, with 4.6m alongside. To reach the wharf, round the cape at a distance of about 0.25 mile, then pass between the two beacons E of the cape before shaping course for the wharf. The swell can make the alongside berth uncomfortable. The wharf was reported to be in ruins.

Cape Killerton is the closest anchorage to Popondetta, about 11 miles inland.

A 2.4m patch lies about 4.25 miles NW of Cape Killerton, and nearly 2.5 miles offshore.

The Kumusi River, discharging at the NW entrance point of Holnicote Bay, has an islet in its mouth. The approach to the river is unsurveyed and the water is discolored. An unexamined shoal lies about 4.5 miles ESE of Kumusi Point.

9.48 Gumboro Hill (8°19'S., 148°11'E.), 207m high, is conspicuous nearly 9 miles NNW of the Kumusi River.

The Opi River, with its entrance about 1 mile ENE of Gumboro Hill, is sluggish, about 47m wide, with a depth of 3.7m.

Caution Point (8°16'S., 148°12'E.), about 3 miles N of Gumboro Hill, is bold, with some coconut palms on it, and terminates in a bluff on its S side. Anchorage may be obtained, in 27m, sand, 0.75 mile SE of Caution Point.

The coast between Caution Point and Black Rocky Point (Black Rock Point), about 6 miles NNW, is foul. Black Rocks extend about 0.5 mile NNE of Black Rocky Point.

Robinson Bay (8°09'S., 148°08'E.), entered about 2 miles NNW of Black Rocky Point, has depths of 18.3 to 24m, mud. Foul ground extends from the S entrance point of the bay. The coast in this vicinity is backed by a range of hills, 396m high.

Douglas Harbor (8°05'S., 148°08'E.), entered about 4 miles N of Robinson Bay, is about 0.35 mile wide at its entrance, where there is a depth of 24m , shoaling to 5.5m at its head. The harbor provides good shelter in all weathers, but is not recommended in the SE season.

9.49 Cape Ward Hunt (8°03'S., 148°08'E.), about 0.75 mile NNE of Douglas Harbor, is a well-wooded, bold, and prominent point, about 46m high, rising to an elevation of 180m inland. A disued metal framework lighttower, 62m in elevation, stands on the point. Craigs Pillar is a conspicuous rock at the E extremity of the cape.

Mitre Rock, 12.2m high, which lies about 0.67 mile N of Cape Ward Hunt, appears composed of gray stone, and is probably steep-to; it was reported difficult to identify from a distance.

Caution.—There are numerous shoals off-lying the coast between Cape Endaiadere and Cape Ward Hunt; only those in the vicinity of the recommended track are described.

9.50 Eve Shoal (8°31'S., 148°25'E.), in a depth of 6.4m, lies on the SW side of the track, nearly 8 miles NE of Cape Killerton. Margaret Shoal, with a depth of 4.6m, lies about 0.75 mile S of Eve Shoal. An unexamined shoal, with a depth of 12m, lies about 1 mile farther S. A lighted beacon is situated about 1 mile NE of Eve Shoal. This light is sectored.

Claire Shoal (8°26'S., 148°23'E.), with a depth of 6.4m, lies on the E side of the track, about 11.75 miles NNE of Cape Killerton. Shoals, and many rocks, with depths of less than 1.8m, lie between 1.25 and 4 miles E of Claire Shoal.

A shoal, with a least depth of 11m, lies on the W side of the track, about 5 miles W of Claire Shoal. A shoal, with a depth of 5.5m, lies about 1.25 miles farther NNW, and Eleanor Shoal, with a least depth of 4.9m, lies about 1.5 miles N of the latter shoal. A 7.6m shoal patch lies about 5.5 miles NNE of Eleanor Shoal.

Raymonde Shoal (8°14'S., 148°16'E.), with a depth of 8.2m, lies on the E side of the track, about 5 miles ENE of Caution Point. Raymonde Shoal is marked by a lighted buoy; a lighted beacon marks a shoal lying 1.5 miles NE. Raymonde Shoal and the lighted beacon were reported to lie 0.6 mile E of their charted position.

A shoal, in a depth of 3.7m, was reported about 7.75 miles ESE of Cape Ward Hunt.

Cape Ward Hunt to Huon Gulf

9.51 Ambush Point (8°03'S., 148°03'E.), at the E branch of the Mambare River, lies about 5 miles W of Cape Ward Hunt. A spit, with a depth of 4m over its outer end, extends about 1 mile N of the point. The water is discolored in the vicinity.

Mambare Bay (8°02'S., 148°00'E.) is entered between Ambush Point and Warsong Point, about 6 miles NW. The delta of the Mambare River forms the E side of the bay, which is low and flat. A shoal, with a depth of 5.5m, lies 1 mile W of Dead Mangrove Point, located 2 miles W of Ambush Point. Between this shoal and the coast S, there are several patches, with depths of 2.4 to 3.7m. Farther NW, a bank, with depths of 3 to 8.8m, extends nearly 1 mile from the W shore of the bay. Anchorage may be taken, in 9.1m, about 1 mile SW of Dead Mangrove Point clear of the shoals lying in the SW part of the bay.

The **Gira River** (8°00'S., 147°57'E.) discharges close to Warsong Point, where it is nearly 73m wide. The bar fronting the river can only be crossed during a SE wind by shallow draft vessels.

The coast between Warsong Point and **Alligator Point** (7°56'S., 147°51'E.), about 7 miles WNW, is low and wooded.

Caution.—Lila Rose Shoal (7°58'S., 148°09'E.), with a depth of 7.3m, lies about 4.75 miles NNE of Mitre Rock.

9.52 Mambare Patches (7°56'S., 148°03'E.), with depths of 4 to 7m, extend about 4 miles in a NW-SE direction, and are centered about 6.75 miles NE of Warsong Point.

An obstruction was reported about 5 miles NNE of Warsong

Point.

A depth of 6.4m lies about 3.25 miles NNE of Warsong Point, at the outer end of Song Shoals.

Starkey Patches (7°56'S., 147°56'E.), with a least depth of 4.9m, lie about 4.5 miles ENE of Alligator Point. A shoal, with a depth of 7.3m, lies nearly 1 mile W of the NW extremity of Starkey Patches.

Hercules Bay is entered between Alligator Point (7°56'S., 147°51'E.) and Cape Waria, about 14 miles NW.

A shoal, with a least depth of 5.8m, lies about 6.75 miles NNW of Alligator Point. A 7.6m shoal lies about 2 miles farther NW.

Waria Patches (7°44'S., 147°48'E.), with a least depth of 4m at their N end, lie about 8.5 miles ENE of Cape Waria. A depth of 10.6m lies about 10 miles E of the cape.

Bau Islet (7°53'S., 147°43'E.), 22m high, and Tauwara Islet, 12.2m high, both wooded, lie about 6 and 9 miles, respectively, SSE of Cape Waria.

A shoal, with a depth of 11m, lies about 3.5 miles E of Bau Islet. A depth of 3m, and a reef which dries 1.8m, lie about 1.5 miles ENE and 1 mile SE, respectively, of Tauwara Islet.

9.53 The **Waria River** (7°50'S., 147°41'E.), discharging about 2 miles SSE of Cape Waria, has depths of 4.6m and 10.6m, about 0.5 mile and 1.5 miles, respectively, E of its mouth.

Anchorage can be taken, in 31 to 37m, mud, nearly 2 miles E of Tauwara Islet. Anchorage may also be obtained, in 11 to 14.6m, about 2.75 miles N of Bau Islet, 1.25 miles offshore.

Morobe Harbor is entered between **Stations Point** (7°45'S., 147°36'E.), about 4.5 miles WNW of Cape Waria and Moa Point, about 0.75 mile SW. Stations Point is the N extremity of the peninsula forming the E side of the harbor, which is sheltered from all except N winds. Morobe Point lies about 0.75 mile NW of Stations Point, N of the harbor entrance. The harbor has general depths of 20 to 26m. The settlement of Morobe lies on the E side of the harbor, close S of Stations Point; a small timber wharf, at the settlement, has a depth of 4.6m alongside, providing good shelter at all times.

The Luard Islands, in the NE approach to Morobe Harbor, are a group of reef-fringed wooded islands about 30 to 76m high. Mindrugutu Island is the NE island of the group. Una Reef, with a least depth of 3m, lies with its outer edge about 0.75 mile SE of the E end of Mindrugutu Island; a patch, in a depth of 10m, lies about 0.2 mile farther S.

9.54 **Matebinagutu Islet** (7°44'S., 147°38'E.) 34m high and surrounded by a reef to a distance of about 0.15 mile, lies about 2 miles ENE of Stations Point. A shoal with a least depth of 5.8m, lies 0.5 mile SE. Manila Reef, with a least depth of 2.4m, lies about 1.25 miles ESE of Stations Point.

The principal landmarks in the approach to Morobe Harbor are Mount Adolf, 344m high and cone-shaped, about 2.5 miles W of Stations Point, and Grasberg, 145m high, with two white houses on its summit, about 0.65 mile S of Stations Point.

Anchorage.—Anchorage can be taken, in 27.4m, with Stations Point bearing 109°, and Morobe Point bearing 010°. Anchorage can also be taken, in 22m, in Morobe Harbor, in midchannel, on a line joining Grasberg and Moa Point, or farther S.

Directions.—Vessels approaching Morobe Harbor from SE should steer for Stations Point, bearing 274°, which leads about 0.3 mile S of a 5.8m shoal SE of Matebinagutu Island. When the E extremities of Matebinagutu Islet and Mindrugutu Island are in range, bearing 023°, steer for the S extremity of Morobe Point, bearing 286°, which leads 0.35 mile N of Manila Reef. When Mount Adolph bears 260°, steer for it on that bearing until Morobe Harbor opens, when course may be steered for the anchorage.

Approaching from N the only conspicuous mark near the coast is Jabi Hill, described in paragraph 9.55, about 12 miles NW. The Hosken Islands are also useful. Vessels from N, after passing NE of Mindrugutu and the reefs extending E and SE of it, should steer for **Cormorant Point** (7°47'S., 147°38'E.), about 2 miles WNW of Cape Waria, bearing about 210° until Stations Point bears 274°, when the directions given above should be followed.

Caution.—A shoal extends about 0.2 mile offshore close S of the settlement of Morobe.

9.55 Royle Channel is the inside route from Morobe to Burnung Point, about 54 miles NW, and lies between the Straggling Islands, the Fly Islands, and the Longuerue Islands, and the mainland.

The **Hosken Islands** (7°38'S., 147°32'E.), about 7 miles NW of Mindrugutu Island, consists of four islands connected by a reef. Kayamagudu, the largest is 91m high and wooded; foul ground and a shoal, with a depth of 4.6m, extends about 0.5 mile N of the island. A submerged rock, position approximate, lies about 1.5 miles SSE of Kayamagudu Island.

The Jusabegud Islets, about 3 miles NW of Kayamagudu Island, consist of two low islets on the same reef. A drying reef extends to about 0.3 mile W of the W and larger islet. A patch, in a depth of 5.2m, lies about 0.15 mile ESE of the smaller islet.

Mageri Point (7°36'S., 147°28'E.) is the S entrance point of a bay W of the Jusabegud Islets. Jabi Hill, 323m high, about 1.25 miles NNW of Mageri Point, lies close within the N entrance point; from E and NE, it appears as an isolated peak, rising steeply from the sea. A shoal, with a depth of 7.3m, lies about 0.65 mile N of Mageri Point. The bay has general depths of 36 to 64m.

At the SW end of the bay, a channel, about 0.1 mile wide, leads into Mort Harbor. The harbor, backed by steep, wooded hills, is sheltered from all winds; it has general depths of 26 to 40m and is clear of dangers, except for a narrow fringing reef in places. A narrow inlet extends about 1.25 miles N from its W end.

The N entrance point of Mort Harbor is steep-to and easily distinguished from seaward; a reef, on which the sea breaks, lies about 0.15 mile N of the N entrance point, and extends about 0.15 mile E, with a depth of 5.5m at its outer end. The S entrance point of the harbor is a wooded sandspit.

The N entrance point of Mort Harbor, bearing 256°, leads into the bay, between the reef W of the Jusabegud Islets and the 7.3m shoal N of Mageri Point.

Anchorage can be taken anywhere in Mort Harbor. The best berth is in 40m, mud, about 0.2 mile SSW of the S entrance point. Small vessels may obtain good anchorage, in 11 to 16.5m, S of the sand spit.

9.56 The **Bienen Islets** (7°34'S., 147°26'E.) about 52m and

55m high, lie about 2.25 miles NW of Jabi Hill, on a reef close offshore. A shoal, with less than 1.8m, lies about 1.25 miles NE of the N islet.

Weibu Islet (7°33'S., 147°24'E.), 76m high, lies close offshore, about 2 miles NW of the Bienen Islets. Shoal water extends nearly 0.5 mile NW of the islet.

Natter Bay (7°31'S., 147°22'E.) is entered between a point about 2.5 miles NW of Weibu Island and Cape Kubumi, about 1 mile farther NW. The bay is clear of dangers and has depths of 22 to 88m.

The S entrance of the bay is low, sandy, and wooded; the S shore of the bay is flat and wooded, except for a hill, 104m high, close S of which is a lagoon. The lagoon discharges into the bay and causes the water to be discolored during the rainy season. The W shore is low and swampy, and the N shore is bordered by several cliffs, 15.2 to 18.3m high. A reef extends about 0.12 mile E of Cape Kubumi.

Anchorage can be obtained, in 45m, about 0.2 mile offshore, in the SW part of the bay.

The **Straggling Islands** (7°31'S., 147°24'E.) are a group of rocky and wooded islands, with Kakare Island, 88m high, the highest and largest, lying about 2.5 miles E of Cape Kubumi. Utbe Island, 76m high, and Abaru Island, 58m high, lie about 1.5 miles E and 1 mile N, respectively, of Kakare Island. Foul ground and depths of less than 5.5m extend nearly 1 mile N of Aburu Island.

Huon Gulf

9.57 Huon Gulf is entered between **Cape Kubumi** (7°30'S., 147°22'E.) and Cape Cretin, about 58 miles NW. The SW side of the bay has several bays and sheltered harbors, and is backed by the Kuper Range and the Herzog Mountains, separated from each other by the valley of the Francisco River. On the N side of the bay is the S part of the Rawlinson Range, 890 to 1,707m high.

The land at the head of the gulf, and for nearly 2 miles inland, is low, and near Burnung Point, about 35 miles NW of Cape Kubumi, the coastal range is broken by a deep valley. South of the valley, bold, stony and wooded ranges border the coast, descending steeply to the water's edge.

The depths near the shores of the bay are great, and the gulf in general appears to be clear of dangers, but there are a number of shoals in the vicinity of the islands off the SW side of the gulf. Between Cape Kubumi and Cape Dinga, about 18 miles NW, regular depths of about 110m, ooze, have been obtained at a distance of about 1 mile offshore, and somewhat nearer to the projecting points.

The rivers at the head of the gulf are shallow, with a rapid current, and only navigable by boats.

The rise and fall of the tide has been reported to be small.

Huon Gulf—Southwest Shore

9.58 The Fly Islands consist of three islands, fringed by extensive reefs; the SE island (7°28'S., 147°22'E.), 115m high, and the W island, 58m high, lie about 2 miles N, and 4.5 miles NNW, respectively, of Cape Kubumi. Several shoals, with depths of 3.7 to 10m, lie within 3 miles NNW of the N and largest of the Fly Islands. A patch, in a depth of 5.5m, lies nearly 1 mile S of the same island. Depths of 2.7m extend 1 mile SE of the largest of the Fly Islands.

Gorue Islet (7°31'S., 147°20'E.) lies close offshore, about 1.25 miles W of Cape Kubumi; an islet, 127m high, lies about 1 mile farther WNW.

A sand cay, 0.6m high, lies on the N end of a shoal, about 2.25 miles NNW of the 127m islet; foul ground and a shoal, with less than 1.8m, extends about 1 mile S of the sand cay. A reef, which dries 0.3m, lies about 1.5 miles WNW of the sand cay.

Brunswick Harbor (7°29'S., 147°16'E.), entered about 4.5 miles WNW of Cape Kubumi, is sheltered by hills and has depths of 24 to 42m, mud. Reefs extend N from both entrance points. Anchorage can be taken by vessels with local knowledge, in about 36m, mud, off the village of Seiama at the SW end of the harbor.

Small craft can anchor close to the shore, in depths of from 11 to 13m.

Bnoto Point, about 2 miles NW of the N entrance point of Brunswick Harbor, is steep backed by a hill, 232m high, and fringed by a reef.

Lasanga Island (7°25'S., 147°15'E.), the largest island of the Longuerue Islands, lies about 7.5 miles NW of Cape Kubumi. It has a saddle-shaped summit, with the peaks in an E-W direction, and attaining an elevation of 488m in the W part. A bay, on the S side of the island, provides sheltered anchorage to vessels with local knowledge. An islet, with a reef about 0.15 mile S of it, lies on the E side of the entrance to the bay.

The remaining islands of the group are small, high, wooded and rocky, and similar in appearance. Surgurd Islet lies about 1.75 miles ESE of the SE end of Lasanga Island; a shoal with 3.7m, lies about 0.67 mile NW of the islet.

Batteru Islet, 166m high, and Jawani Islet, 143m high, both densely wooded, lie at the NW end of the Longuerue Islands; the latter islet lies about 3.75 miles NNW of Lasanga Island. Shoals, with depths of 5.5m, lie within 1.25 miles N of Jawani Islet. An 8.2m shoal lies about 1 mile E of Batteru Islet, and a 2.4m depth lies about 1.25 miles SW of the same islet.

Wurttemberg Bay is entered between **Cape Goeben** (7°28'S., 147°13'E.) and Bnoto Point, about 2.5 miles E. Boyen Islet lies about 0.5 mile E of Cape Goeben, with a reef between. A reef, in a depth of 2.1m, lies about 0.5 mile NE of the islet. A depth of 48m was obtained about 90m from the head of the bay.

9.59 **Baden Bay** (7°28'S., 147°11'E.), entered about 1.5 miles W of Cape Goeben, is sheltered by Lasanga Island. A reef extends about 1 mile NNE of Sumboa Point, the NW entrance point. The village of Kia lies at the head of the bay. Good anchorage can be taken in Baden Bay, in 27m, by vessels with local knowledge.

Hessen Bay (7°23'S., 147°09'E.) is entered between Bamaba Point, about 2.75 miles NW of Sumboa Point, and **Cape Room** (7°21'S., 147°09'E.), about 2.75 miles farther NNW. The bay is divided into two parts by a flat point, near which the Sela River discharges. A reef, with a 3.7m depth near its outer end, extends about 0.5 mile E of Bamaba Point. Cape Room is fringed by a reef extending about 0.2 mile off its SE side; a 3.7m patch lies about 0.5 mile ESE of the cape, and a 4.9m patch lies about 0.2 mile farther ESE.

Anchorage has been taken, in a depth of 31m, about 0.1 mile offshore, on the S side of the mouth of the Sela River, with Bamaba Point bearing 129° and Cape Room bearing 016°.

Sachsen Bay (7°20'S., 147°08'E.) is entered between Cape Room and Cape Dinga, about 2 miles N. There is a sandy beach in the N part of the bay, and trees grow close to the water's edge in the S part of the bay. A 5.5m shoal and a 6.7m shoal lie nearly 1 mile ENE and about 0.75 mile ESE, respectively, of Cape Dinga. In the S part of the bay, no bottom was obtained at a depth of 20m. Anchorage can be obtained in the N part of the bay, about 0.15 mile from the head by vessels with local knowledge.

Nassau Bay (7°18'S., 147°08'E.) is entered between Cape Dinga and Gossler Point, about 3.5 miles N. It was reported that anchorage can be obtained, in 7.3m, about 0.4 mile off the N shore of the bay, but it is exposed; an alternative for small craft is in 13 to 18m, in the SW corner of the bay.

Simolala Islet (7°15'S., 147°09'E.), 88m high, is conical and wooded; it lies 1 mile E of Gossler Point. The islet is apparently connected to the point by a submerged reef, on which is a rock which almost dries.

A bank, with depths of 4.6 to 18.3m, extends about 3 miles N of Simolala Islet, and up to 1.5 miles from the coast. A rock, with a depth of 0.3m, lies on the bank, about 0.5 mile N of the islet.

A scar on the coast is conspicuous about 4.5 miles NNW of Gossler Point.

9.60 **Dot Islet** (7°07'S., 147°05'E.), 31m high and wooded, lies about 4 miles farther NNW and is connected to Tusin Point, about 0.5 mile NNW, by a reef. Two bare rocks lie close off the SW end of the islet. A 4.6m shoal lies about 1.5 miles E of Dot Islet, and a reef, in a depth of 3.7m, was reported about 2 miles SE of the islet.

Dot Inlet, entered W of Dot Islet, provides sheltered anchorage for small vessels, in 46m, about 91m offshore. The shore reef varies in width from 10 to 360m, being widest off the village of Kelkel, in the SW corner of the bay.

Laupui Point (7°05'S., 147°04'E.), about 2.5 miles N of Dot Islet, is the N spur of the Kuper Range. The Francisco River discharges into the SE side of Bayern Bay, about 1.5 miles WSW of the point, through a picturesque valley. The mountain ranges in this district S of Laupui Point have a different character to those tothe N; S they consist of short ridges running nearly parallel to the coast, while N the spurs are directed towards the coast.

Shepparton Shoal (7°05'S., 147°07'E.), with a depth of 4.6m, lies about 2.5 miles E of Laupui Point.

The Salamaua Peninsula, with **Burnung Point** (7°01'S., 147°04'E.) at its NW extremity, rises to an elevation of 249m and is joined to the mainland at its SW end by a low isthmus. Reefs extend about 0.2 mile N and NW of the N end of the peninsula. A rock, in a depth of 1.5m, and a shoal, with a depth of 6.4m, lie about 0.5 mile NE and 0.75 mile ESE, respectively, of Burnung Point.

Benalla Banks (9°35'S., 150°53'E.) lies with its least depth of 16.5m about 4.5 miles NE of Burnung Point.

Rotherys Reef (6°58'S., 147°00'E.), with a least depth of 1.5m, lies about 4.5 miles NW of Burnung Point. O'Deas Reef, with a depth of 4.3m, lies about 0.5 mile farther S.

9.61 **Salamaua Harbor** (7°02'S., 147°03'E.), on the W side of the Salamaua Peninsula, offers good and sheltered anchorage in any depth required. Centre Reef, marked at its outer end by a beacon, extends about 0.2 mile offshore from the W side of the peninsula, about 1.75 miles SW of Burnung Point. Kela Point, about 1 mile farther SW, has a reef extending about 0.2 mile NE of it.

A shoal, with a depth of 1.5m, lies about 3.5 miles W of Burnung Point. A reef, with less than 1.8m, and which breaks at LW, lies between the shoal and the coast SW. There is a wreck, dangerous to navigation, 0.5 mile N of Kela Point.

The S part of Salamaua Harbor is shoal, with depths of less than 5.5m, and large vessels should not proceed SW of a line extending ESE of Kela Point to the peninsula. North of the shoal area, the depths deepen rapidly to 37m, increasing to depths of about 92m W of Centre Reef.

9.62 **Sugarloaf** (6°51'S., 146°56'E.), a hill, 387m high, and 0.5 mile inland, is conspicuous about 13 miles NW of Burnung Point; it is the N spur of the Herzog Mountains to approach the coast. Between Sugarloaf and the entrance to the Markham River, nearly 7 miles N, the country between the foothills and the coast is low and swampy. Herzog Lakes form an extensive shallow lagoon S of the entrance to the Markham River. Mount Herzog, 1,880m high, is located about 10 miles SW of the entrance to the Markham River.

The coast for about 8 miles S of Sugarloaf is fronted by a shore bank, with depths of less than 5.5m, extending up to 0.5 mile offshore in places.

An extensive mud bank, centered about 3 miles NNE of Sugarloaf, provides anchorage for vessels with local knowledge, in depths of 16.5 to 37m, exposed to winds from E to SE, but the holding ground is good. This is also the quarantine anchorage for the port of Lae.

Labu Point (6°45'S., 146°58'E.) lies about 0.5 mile SW of the S entrance point of the Markham River. Shoal water, with depths of less than 5.5m extends about 0.4 mile E of Labu Point, then for about 1 mile farther SE. A pinnacle, with a depth of 9.8m, lies about 2 miles SSE of Labu Point.

Labu Bay, close N of Labu Point, affords anchorage, in 24 to 37m, for small vessels with local knowledge.

Huon Gulf—North Shore

9.63 The **Markham River** (6°45'S., 146°58'E.) is closed at times by a bar; there are considerable depths outside its entrance, but inside, the river is shallow and the depths are continually changing. Numerous island and shoals, constantly changing in shape, size and position, render navigation impracticable; a rapid current adds to the difficulties. The water is discolored for several miles seaward, when the river is in flood.

Lae (6°44'S., 147°00'E.)

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9.64 The settlement of Lae lies about 2 miles E of the mouth of the Markham River. It is a first point of entry for foreign vessels. An airfied lies close W of the settlement, and Voco Point lies about 1.65 miles E of the settlement.

Lae—Main Wharf

Winds—Weather.—There is a swell in strong SE winds. The SE breeze usually comes up in the afternoon and dies away in the evening. Rain showers are frequent, usually during night and early morning.

Depths—Limitations.—The main wharf (Overseas), which consists of three berths, lies about 1.5 miles W of Voco Point. Berth 1 and Berth 2, on the W side of the wharf, are each 123m long, with an alongside depth of 11m. Berth 3, on the E end of the wharf, is the tanker berth; it is 184m long, with an alongside depth of 13.2m, although it has been reported (1994) that a depth of only 11m alongside was available.

To the E of Berth 3 is a T-headed tanker jetty; the head of the jetty is 580m long, with a depth alongside of 14.2m. Further E is another T-headed jetty; the head of the jetty is 400m long and serves the cement works and storage silos.

Close W of the main wharf are two coastal wharves. Berth 4 is 54m long, with a width of 14m and an alongside depth of 4.9m. Berth 5 is 35m long, with an alongside depth of 2.7m.

Coastal vessels up to 40m long, with a draft of 3m, can also berth at one of two privately-owned wharves close N of Voco Point.

Aspect.—Mount Lunamen, 96m high, with a radio tower, marked by red fixed obstruction lights, on its summit, is very prominent 0.35 mile N of Voco Point.

In 1990, 349 vessels, with a total of 3.9 million dwt, used the port.

Proposals have been put forth to create a new oil berth, with a dolphin-type mooring arrangement, off Berth 3. A container terminal will add to the redevelopment of the old section of the main wharf.

Pilotage.—Pilotage is compulsory and is available 24 hours. Vessels contact "Lae Port Control" on VHF channels 16, 12, 8, and 6. The pilot boards about 1 mile SW of Voco Point.

The vessel's ETA should be sent 12 hours in advance, with confirmation not more than 5 hours and not less than 4 hours before arrival.

Anchorage.—The anchorage off Lae is an open roadstead. A quarantine anchorage lies about 4.5 miles SW of Lae has. In good weather, in the season of SE winds, anchorage with limited swinging room can be obtained in Milford Haven, about 0.2 mile W of the W end of the main wharf, in 61m, silt.

Large vessels may obtain anchorage, in 82m, with Mount

Lae—Tanker Berth

Lunaman bearing 018°, and the first and second points E of Voco Point in range. Vessels should not anchor outside this position as many anchors have been lost here.

Small vessels may obtain anchorage, in 16.5 to 28m, W of the wrecks which are marked by a green can buoy about 0.5 mile WSW of Voco Point. There is limited swinging room in this anchorage.

Frequent squalls rise from seaward and the holding ground is bad. These anchorages are not recommended.

Caution.—Vessels with a masthead height exceeding 18.3m are prohibited from entering an area about 0.1 mile wide, extending about 0.5 mile SE from the seaward end of the airfield.

9.65 The coast between Lae and Cape Arkona, about 22 miles E, consists of a densely populated plain, several miles wide, with lagoons, lying below spurs of the Rawlinson Range. The vegetation, with the exception of a few stretches, consists of mangroves, and many of the water courses in the plain have the appearance of small creeks.

Along this coast, about 0.5 mile W of the entrance to the Busu River, a shoal, with a depth of 9.1m, extends over 0.5 mile offshore.

Cape Arkona (6°44'S., 147°22'E.) is a conspicuous bluff,; within the cape are the houses of Hopoi Mission Station, standing on a conspicuous hill, the first hill on the coast E of Lae. A conspicuous hill, 282m high, lies near the coast about 8 miles E of Cape Arkona. Eastward of the cape, the spurs of the mountains approach close to the coast.

A shoal bank extends about 0.5 mile offshore for a distance of about 2.25 miles W of Cape Arkona; a shoal, in a depth of 4.9m, lies about 0.75 mile S of the cape.

Anchorage can be taken on this shoal, in 5.5m, about 0.3 mile offshore, 0.5 mile W of Cape Arkona.

A rock, position doubtful, and which almost dries, lies about 5 miles ESE of Cape Arkona, and about 1.5 miles offshore.

9.66 Cape Gerhards (6°45'S., 147°34'E.), marked by a light, lies about 12 miles E of Cape Arkona; the cape is fringed by reef extending 0.15 mile seaward.

Hanisch Harbor (6°44'S., 147°36'E.), entered between Cape Gerhards and Tigedu Point, about 4.5 miles ENE, is apparently free from dangers. The shores of the harbor are thickly populated; a river and several rivulets discharge into the harbor. A mission station lies 1.25 miles NW of Cape Gerhards. Anchorage can be taken, in 44m, in the NE part of the harbor by vessels with local knowledge. A better anchorage for small vessels is in 4m, in the SW part of the harbor, about 1 mile NNW of Cape Gerhards.

Schollenbruch Point (6°43'S., 147°45'E.) lies about 6 miles E of Tigedu Point. **Kaingana Islet** (6°43'S., 147°47'E.), low

and wooded, lies on a reef close offshore, about 3 miles farther E. A point, about 1 mile ENE of the islet, is distinctive from W due to the crested appearance of the trees on it.

The coast between Schollenbruch Point and Cape Cretin, about 7.5 miles ENE, should be approached with caution as unknown reefs may exist and there is usually a heavy sea. An extensive bank extends from 0.5 mile to 1.5 miles offshore between the points. Between Cape Cretin and Megim Islet, 9.1m high, about 1.25 miles SW, there is a group of coral reefs in which there are narrow boat passages.

Cape Cretin (6°40'S., 147°51'E.) is a bold headland; **Mount Lugaueng** (6°37'S., 147°50'E.), a flat wooded ridge from 350 to 396m high, with grassy slopes on its S side, lies about 3.5 miles NNW of the cape.

Nussing Islet, 21m high and marked on its E side by a light, lies about 0.75 mile E of Cape Cretin.

The **Tami Islands** (6°45'S., 147°54'E.), about 6.5 miles SSE of Cape Cretin, are a group of four wooded islets, 37m high, and two rocks, surrounded by extensive reefs. A shoal, nearly awash, lies in a NE-SW direction, with its S end about 1.5 miles N of Kalal Islet, the NW and largest of the Tami Islands. There are rocks, dangerous to navigation, 1 mile N and 1.75 miles NNW of Kalal Islet. A reef, with a depth of 3.7m, not easily discerned except in a good light, was reported to lie about 1.75 miles SE of Wonam Islet, the SE islet of the group.

It was reported that the Tami Islands make a good radar target at 19 miles.

Dreger Harbor and Schneider Harbor

9.67 The **Gingala Islands** (6°39'S., 147°52'E.), low and wooded, front the coast N of Cape Cretin for a distance of about 2.25 miles. Reefs and foul ground extend between them and join the N island to the mainland. Nababangdu Point, about 1.5 miles NNE of Cape Cretin, divides the area between the mainland and the islands into two harbors.

Dreger Harbor (6°38'S., 147°52'E.), the S harbor, lies inshore of Matura Island. It is entered between the promontory, about 0.5 mile NE of Cape Cretin, and Nussing Island, about 0.3 mile SSE. There is a light on Nussing Island. A 3m coral patch lies about 135m W of the SW end of Nussing Island; a 4.6m patch lies about 92m SE of the W entrance point. A deep channel leads NNE through two passages, each about 0.1 mile wide; one leads between Kumbam Island, 0.35 mile NNE of Nussing Island, and Simboa Island, 0.15 mile W, while the other leads between the S end of Matura Island and a drying reef, about 0.1 mile W, which extends about 0.1 mile from the mainland. The NE end of the reef is normally marked by a beacon.

The land near the harbor is low, of coral formation, and rises gradually to the Lugaueng Plateau. Wharves in ruins lie on the W side of the harbor. There is a 4.6m patch about 0.2 mile SSW of Nababangdu Point; a shoal, with a depth of 9.1m, lies 0.15 mile farther S, near the middle of the harbor.

Anchorage.—Dreger Harbor is sheltered and affords good anchorage, in depths of 24 to 40m. The usual anchorage is in the middle of the harbor.

9.68 Schneider Harbor (6°38'S., 147°52'E.), the N harbor, sheltered E by the Sagiang Islands (Sagiang Saun and Sagiang Kapuing), is well protected and secure, with depths of 12.8 to 20.1m, but as the entrance is narrow, it is only available for small craft. The entrance, which joins the harbor to Dreger Harbor, is bordered E by reefs, which break heavily in strong SE weather, making entry difficult even for small craft.

Langemak Bay (6°35'S., 147°51'E.), entered between Gagidu Point, about 4 miles N of Cape Cretin, and a point about 1 mile N, is open E and deep throughout. The bay is not easily identified due to the uniformly wooded appearance of its coasts, and the absence of any break in the mountains. The Mape River flows into the head of the bay, and after heavy rain discolors the water for several miles seaward. Wharves and jetties, all in ruins, lie on both sides of Langemak Bay.

Anchorage may be obtained, in 46 to 64m, in the SW corner of the bay, S of the mouth of the Mape River, and about 0.2 mile offshore. The anchorage is sheltered from all winds except those between E and NE. An anchorage suitable for vessels up to 30m long is available, in depths from 11 to 16.5m, off the S shore, SW of Kalinguang Point, 1 mile W of Gadigu Point.

9.69 Finsch Harbor (6°33'S., 147°51'E.) is formed by thr Nugidu Peninsula, which extends about 1.75 miles N of the N entrance point of Langemak Bay. The harbor is entered W of Cape Bredow (Cape Bredbow) (6°33'S., 147°51'E.), the N extremity of the peninsula. The harbor is divided into three basins separated by narrow shallow channels. The roadstead inside the entrance is suitable for only one large vessel. The Bumi River discharges on the W side of the entrance to the harbor. Wharves stand on either side of the channel, about 0.5 mile SSW of Cape Bredow; those on the E side are in ruins. The shores of the harbor are densely wooded.

The Nugidu Peninsula, which is low, merges into the mainland when seen from seaward, making the harbor difficult to identify from more than 4 miles offshore. Sattleberg, 975m high, lies about 6.5 miles NW of Cape Bredow; another landmark is afforded by a saddled-shaped indentation in the mountain range on the NE side of Sattleberg extending to the coast.

Madan Islet (6°34'S., 147°51'E.), 0.35 mile SSW of Cape Bredow, forms the E side of the N basin, which is suitable only for small vessels. A reef, in a depth of 1.8m, lies about 0.1 mile E of the N end of Madan Islet; it can be passed on either side in a least depth of 10m on its E side, and 16.5m on the W side. It should be passed on the E side; the bank extending from the W side of the Nugidu Peninsula abreast the reef is steep-to.

The **Flaggen Peninsula** (6°34'S., 147°51'E.) is a projection of land on the E side of the harbor, with its N end about 0.1 mile SSE of Madan Islet. The middle basin has depths of 3 to 6.7m, with a depth of 4.6m in the channel leading to it. The S basin is only suitable for boats.

Anchorage may be obtained, in 29 to 40m, sand and mud, with Cape Bredow bearing 051°, distant about 0.2 mile, and with the N extremity of the Flaggen Peninsula bearing 186°. A vessel in the roadstead, where a swell is felt, is exposed to winds from NNW, through N, to ENE, but they do not blow with sufficient strength to endanger a vessel with good ground tackle. The holding ground is bad.

Approaching Finsch Harbor from N the coast may be followed at a distance of 2.5 miles until the entrance to the harbor has been identified. Local knowledge is necessary to enter the basins.

Finsch Harbor to Vitiaz Strait

9.70 The coast from Finsch Harbor to Cape King William, about 33 miles NW, is backed by mountain ranges, which gradually become higher as Kitimula Point, about 13 miles N of Cape Bredow, is reached, and then become steeper, and attain their greatest elevation at Cape King William. As far as Kitimula Point, the coast and mountain ranges are wooded, but the hills in the foreground and others in the vicinity are covered with grass, and vessels coming from E can discern these grassy slopes from a considerable distance. A terrace formation is also a peculiar feature of this stretch of coast. There are a number of villages along the coast and many more in the hills.

Arndt Point (6°30'S., 147°51'E.) lies about 3.5 miles N of Cape Bredow. The Song River, closed by a bar, discharges N of the point, at the N end of Scarlet Beach, a small bay. Anchorage, sheltered from SE, can be taken by small vessels at the S end of Scarlet Beach.

Station Point (6°26'S., 147°51'E.), a round, coral, chalk cape, and Kamlagidu Point, 7.6m high and wooded, lie about 3.5 and 5 miles, respectively, N of Arndt Point. A coastal lagoon, with an entrance for small boats, lies close S of Kamlagidu Point.

9.71 **Kitimula Point** (6°20'S., 147°49'E.) rises steeply from the sea, and is dominated by a hill with terraces appearing like fortifications. It should not be mistaken for a similar projection some miles farther NW. The white patches on the S slopes of the hills at Kitimula Point are distinctive, and it may also be distinguished by wide grassy flats with some trees, while the cape NW is of brown color. A light is shown from Kitimula Point.

No bottom at a depth of 110m could be obtained 3 miles SE of Kitimula Point, and the coast appeared to be steep-to. The coast between Kitimula Point and Cape King William appears bold.

Between Kitimula Point and **Blucher Point** (6°14'S., 147°42'E.), about 10 miles NW, steep, rugged and bare spurs descend from the mountains, but at Blucher Point the land is partly wooded and partly covered with grass. A drying reef extends about 0.5 mile E of a point located about 2.5 miles SSE of Blucher Point; there is a detached reef about 0.5 mile SE of it.

Hardenburg Point (6°07'S., 147°37'E.) lies about 7 miles NW of Blucher Point. Kesseroa Lagoon, between Hardenburg Point and Cape King William, is formed by the fringing reef and numerous islets and rocks lying offshore. There is an entrance to it, with a depth of 4.9m, SE of Sialum Island, the large island at the N end. Two of the larger islands are inhabited. The lagoon has not been surveyed, but there is sheltered anchorage for small craft of up to 60 tons between Sialum Island and the mainland.

Cape King William (6°04'S., 147°35'E.) is not a well-defined headland, the coast rounding and preserving its steepness. A village lies close NW of the cape. At the E end of the Cromwell Mountains, and about 16.5 miles SW of Cape King William, stands the highest summit, about 2,935m high.

Vitiaz Strait

9.72 **Vitiaz Strait** (5°50'S., 146°45'E.) is the fairway off the coast between Cape King William and Cape Tiwalib, the S entrance point of Astrolabe Bay, about 100 miles WNW. **Umboi Island** (5°40'S., 147°57'E.) and the other islands NW form the N side of the strait, which is, in effect, more or less open sea. The least width of the strait is about 20 miles between Cape King William and the islands and reef S of Umboi Island.

Winds—Weather.—During the period from July to September, the Southeast Trade Winds sometimes blow with a force from 6 to 7, raising a short choppy sea between Papua New Guinea and Umboi Island. As the Papua New Guinea coast is approached, the squalls increase in violence.

Abnormal atmospheric conditions, rain, and poor visibility are likely in all seasons in Vitiaz Strait, E of **Teliata Point** (5°56'S., 147°20'E.).

Some shelter can be obtained off the W coast of Umboi Island. A few miles from Cape King, the NW point of the island, it may be blowing hard and raising a choppy sea, but as the island is approached the wind will be less violent.

Tides—Currents.—The currents in Vitiaz Strait are variable and greatly influenced by the wind. From May to September, the W set of the South Equatorial Current predominates, with velocities up to 1.5 knots through the strait. However, from November through February, the Northwest Monsoon reverses these trends and creates a SE set of up to 2 knots. The tidal currents are weak in April and May.

It was reported that a vessel in transit through the strait experienced a NW set of 1.5 knots. The normal direction of the current during January is SE at 2 knots.

Caution.—During abnormally strong SE conditions, currents between Umboi Island and Cape King William may run at about 6 knots. During the Northwest Monsoon, there is a SE set of up to 4 knots.

Vitiaz Strait can be unpleasant for small vessels during the SE season, and it is inadvisable to plan on ever making a good speed if proceeding S through this strait in the months from March to November. If proceeding from Manus S during these months, small vessels are recommended to proceed S from **Tolokiwa Island** (5°19'S., 147°37'E.) to the Papua New Guinea coast, and then follow the coast at a distance of about 0.5 mile, or less if prudent, off the coastal reefs. Following the coastline into bays can be advantageous if the NW set is strong. South of Kitimula Point both the sea and set generally abate.

Vitiaz Strait—South Side

9.73 The Finisterre Range, S of the coastal hills, extends nearly parallel to the coast, on the S side of Vitiaz Strait. The peaks of the range are usually obscured by clouds, but in the early morning, before sunrise, they are sometimes visible. Toward the W end of the strait, Mount Disraeli, a sharp cone, 3,719m high, and Mount Gladstone, 4,115m high, also conical but not as pointed, lie about 20 miles SSE and 23 miles SSW, respectively, of **Helmholtz Point** (5°36'S., 146°27'E.).

Kelanoa Harbor (6°02'S., 147°31'E.) is protected from E and N by a coral reef, with Chissi Islet, 1.5m high, at its N end. The entrance, between the islet and the coast W, is about 47m wide, with depths of 6.4 to 7.6m. A river discharges at the entrance.

Anchorage can be obtained by vessels with local knowledge, in 8.5 to 10m, S of Chissi Islet. The harbor is narrowed here by a reef extending about 0.1 mile offshore, and a vessel should secure a hawser to one of the trees to prevent it from swinging.

Scharnhorst Point (5°58'S., 147°27'E.), about 4.5 miles NW of Chissi Islet, is 73m high. A narrow strip covered with bushes borders the steep coast.

Teliata Point (5°56'S., 147°20'E.), about 7 miles WNW of Scharnhorst Point, is bordered by a fringing reef extending 0.75 mile seaward. Sio Island lies on the fringing reef. There is a Lutheran mission station and a grove of coconut palms at the village of Sio on the mainland. Anchorage can be taken, in 35m, sheltered from S and E winds, N of the small bay close W of Teliata Point.

Vincke Point (5°55'S., 147°16'E.), about 4.5 miles W of Teliata Point, is low and covered with grass. A large river enters the sea close E of the point, and the yellow water from the river flows E, leading to the supposition that an E counter current is in the vicinity.

The coast extending about 3.5 miles SW of Vincke Point has depths of 14.6 to 20.1m about 0.25 mile offshore. Several rivulets enter the sea here; a high waterfall is visible in the range behind.

Wasu Anchorage (5°58'S., 147°13'E.) and its adjacent village lie about 4 miles SW of Vincke Point. Beacons, in range 222° lead to the SE side of wharf, with 3m alongside and a length of 60m. Small vessels can anchor on the range line, in 18.3m, about 0.1 mile from the shore reefs; the reefs are not steep-to and caution should be exercised in the approach.

The wharf is exposed to winds from WNW to ENE, through N, and should not be used during the Northwest Monsoon.

9.74 Schlangen Harbor (5°58'S., 147°10'E.), formed between a reef and the coast, is entered about 7.5 miles WSW of Vincke Point. The entrance, between a small bush-covered islet and **Peschel Point** (5°57'S., 147°09'E.), about 8 miles WSW of Vincke Point, is very narrow, deep, and not easily recognized; the course for entering is close to the reef, on which the sea breaks, and the islet on the E side must not be approached too closely due to a projecting reef.

There are other openings with depths of 4.9 to 5.8m. There are other islets, covered with bush, on the E and W extremities of the reef. Abreast the E islet, there is a village on the coast, and between them an entrance suitable for small vessels appears to lead into Schlangen Harbor.

Anchorage may be obtained by vessels with local knowledge, in depths of 29 to 39m, just inside the entrance to Schlangen Harbor, with Peschel Point bearing 278°, distant from 0.25 to 0.5 mile.

Reiss Point (5°55'S., 147°03'E.), about 6 miles WNW of Peschel Point, is fringed by a reef extending about 0.1 mile offshore; on each side of the point is a village. A massive grassy hill, 400m high, descends steeply to the sea about 5 miles W of Reiss Point. Off the coast between the point and the hill, no bottom was obtained at a depth of 50m at a distance of 0.1 mile from the breakers.

Lepsius Point (5°51'S., 146°52'E.), about 12 miles WNW of Reiss Point, is the N extremity of an alluvial plain, covered with trees and grass, and is higher than other points in the vicinity.

An unexamined shoal, with a depth of 12.8m, over which there is discolored water, lies about 1.25 miles NW of Lepsius Point.

Sareuak Bay (5°51'S., 146°45'E.), a wide bight fringed with coral, lies with its head about 4 miles WSW of Lepsius Point.

9.75 Weber Point (5°46'S., 146°42'E.), about 10.5 miles WNW of Lepsius Point, has reefs in its vicinity extending about 0.5 mile offshore. Gauss Point lies about 1.5 miles farther WNW.

Bunsen Point (5°41'S., 146°35'E.) lies about 7.5 miles NW of Gauss Point; midway between the points is a river with a double mouth, one of which is filled with sand and gravel. A partly-drying reef extends about 1 mile offshore W of the point. Anchorage can be taken, in depths of 20 to 29m, by vessels with local knowledge, off the W edge of this reef.

Hemholtz Point (5°36'S., 147°27'E.) lies about 10 miles NW of Bunsen Point, and a large rive36r, with deep water off its mouth, flows out close to the point. A village lies on either side of the point; they become more numerous farther W. Dekays Bay is SE of Suri Point, which is about 2 miles ESE of Helmholtz Point. A reef extends from the latter point to nearly the E end of the bay. There is a signal station at the head of the bay, about 2 miles SSE of Suri Point.

Anchorage.—Dekays Bay provides anchorage, sheltered from all winds except those between N and E, to vessels with local knowledge. Sheltered anchorage may be obtained off the village on the W side of Helmholtz Point, in 20 to 26m, about 135m offshore, to vessels with local knowledge.

9.76 Cape Iris (5°34'S., 146°21'E.), about 7 miles W of Helmholtz Point, is wooded and fringed by a reef, which dries in places, and extends about 1 mile offshore. The large village of Massai and two small rivers, which form small lagoons at the mouth, lie at the inner end of the bay SW of Cape Iris. Anchorage for vessels with local knowledge can be obtained off the small rivers, in 35m, about 0.2 mile offshore, well protected from the Southeast Trade Wind. West of this anchorage is a reef, on the other side of which anchorage, in 40m, may be obtained near a small rivulet.

Kepler Point (5°34'S., 146°16'E.) lies about 4.5 miles W of Cape Iris; a river discharges at the point, and discolors the sea for a considerable distance offshore. Anchorage, in 44 to 81m, may be obtained by vessels with local knowledge, near Kepler Point, off a large village, from 0.1 to 0.2 mile offshore, between the reefs extending from the coast.

Herwarth Point (Hewarth Point)(5°32'S., 146°10'E.) lies about 7 miles WNW of Kepler Point. In the W part of the bay formed between them is a grassy hill, 100m high and thickly wooded, located close to the coast.

Pommern Bay (5°32'S., 146°09'E.), with wooded shores, lies about 1 mile SW of Herwarth Point. A wooded spur from the mountains, which are about 1,524m high, approaches close to the head of the bay, and near it is a wooded point extending E, with a rivulet at the point discoloring the sea for several

miles offshore. Another spur from the mountains descends in the direction of Cape Tiwalib, about 12 miles WNW of Herwarth Point; on the ridge is Mount Sirui, 710m high, conical and conspicuous, and a wedge-shaped ridge, both of which are partially wooded.

Vitiaz Strait—North Side

9.77 Umboi Island (5°38'S., 147°55'E.) lies on the N side of Vitiaz Strait, with its S extremity about 29 miles NE of Cape King William. The Siassi Islands form an extensive archipelago of low wooded islets S of Umboi Island.

Malai Island (5°53'S., 147°56'E.), 46m high, lies about 6 miles SW of the S end of Umboi Island, and Tuam Island, 61m high, the largest of the group, lies about 6 miles SE of Malai Islet.

Anchorage was reported available, in a depth of 9m, off a village on the NW side of Malai Island. The anchorage is approached from the W through a winding unmarked channel between the reefs.

See Pub. 126, Sailing Directions (Enroute) Pacific Islands, for the description of Umboi Island, the Siasi Islands, and Dampier Strait.

Long Island (5°20'S., 147°06'E.), about 34 miles W of Umboi Island, is of volcanic origin. Lake Wisdom, a large lake almost entirely surrounded by steep slopes, 305m high, occupies the center of the island; an active volcano is in the lake. Cerisy Peak, 1,136m high, lies near the S end of the island, and Reaumer, 1,304m high, lies near the N end of the island. Kiau Point, the N point of the island, is marked by a light and has a fringing reef for 2 miles on either side. The W and S coasts of the island are steep-to, except for a reef extending 2 miles offshore, about 7 miles WSW of Kiau Point, and a shoal, with a depth of 3.7m, reported about 1.5 miles offshore, about 9 miles WSW of the same point. A small reef extends about 0.5 mile from Cape Reaumur, the NE extremity of the island, and along the E coast of the island for a distance of about 6 miles, a reef extends 1 mile offshore. An islet, about 15.2m high, lies about 0.5 mile E of the SE end of the island.

There are rocks, dangerous to navigation, off the NW and W coasts of this island. These rocks are located 3.25, 4.5, 6.25 miles WSW, and 8 miles SW of Kiau Point. There is a shoal, about 0.75 mile long, 5.5 miles WSW of Kiau Point.

Long Island is reported to be a good radar target at a distance of 22 miles.

Crown Island (5°06'S., 146°57'E.), about 9 miles WNW of Kiau Point, has a fairly level summit, 566m high, and is fringed by a reef, which extends from 0.5 to 1 mile offshore, and through which there are numerous channels. Breakers have been reported off its NE side; several rocks, which break in a heavy sea, extend 1 mile offshore from the SW, S and SE coasts of the island.

An ATLAS (Autonomous Temperature Line Aquisition System) buoy is moored 6.5 miles NNE of Crown Island.

Hankow Reef (4°54'S., 146°45'E.), about 17 miles NW of Crown Island, has a least depth of 2.7m, and consists of four patches, extending in a NW-SE direction for a distance of 2 miles; the sea breaks heavily on the reef. A drying rock lies about 3 miles WSW of Hankow Reef.

Caution.—It was reported that Long Island and Crown Island lie 1.5 to 2.5 miles W of their charted positions.

ATLAS buoys are in the process of being laid down by the U.S. National Oceanic and Atmospheric Administration extending along the equatorial latitudes from the Galapagos Islands to Papua New Guinea (1992).

The buoys are toroidal with orange and white bands. Mariners are advised to keep 5 miles clear of these buoys.

Astrolabe Bay

9.78 Astrolabe Bay, entered between Cape Tiwalib and Cape Kusserow, about 18 miles NW, has considerable depths. The S shore of the bay is mountainous. **Mount Nasen** (5°30'S., 145°37'E.), 1,252m high, of the Ortzen Range, rises about 22 miles W of Cape Tiwalib. A vast plain, through which the Gogol River flows, backs the W shore. The water is deep close to the shore in most parts of the bay.

Astrolabe Bay—South Shore

9.79 Cape Tiwalib (5°28'S., 145°59'E.) is wooded and higher than the points of land E of it. A mission station stands on the cape, and a small bay lies E of it.

The **Kabenau River** (5°28'S., 145°55'E.), the mouth of which is closed at times, discharges into the bay about 7.75 miles W of Cape Tiwalib.

Konstantin Harbor (5°29'S., 145°50'E.) is entered between Garagassi Point, about 1.75 miles W of the mouth of the Kabenau River, and a point about 0.3 mile SSW. A factory chimney lies about 0.32 mile ESE of Garagassi Point; a flagstaff lies close E of the S entrance point of the harbor. There are general depths of 12.8 to 73m in the harbor. Good anchorage, sheltered from the prevailing winds, can be taken, in about 40m, with the factory chimney bearing about 071°, distant about 0.25 mile. Small vessels can anchor, in less than 37m, nearer to the shallows fringing the head of the harbor.

Astrolabe Bay—West Shore

9.80 The village of **Bogadyim** (5°27'S., 145°45'E.) lies about 5 miles WSW of Garagassi Point. Landing can usually be made at the jetty and also at the N end of the town in fine weather, but the breakers are sometimes so heavy that landing is impossible. Two yellow beacons, surmounted by triangular topmarks, in range, indicate the approach to the anchorage; they are difficult to distinguish.

Anchorage.—Good anchorage may be obtained, in 20m, with the beacons in range bearing 241° and the boat shed bearing 286°.

The **Gogol River** (5°19'S., 145°45'E.) discharges about 7.5 miles N of Bogadyim. A bank, with depths of less than 5.5m, extends from 0.3 to 0.5 mile offshore between the mouth of the river and Maraga Hook, nearly 3 miles S; there are several patches, with depths of 6.7m and 8.5m, which are steep-to on their seaward side, close outside the bank.

Bili Bili (5°18'S., 145°47'E.), an islet, 37m high, and steep-to, lies about 2 miles NE of the mouth of the Gogol River. A reef, with a depth of about 1.2m, lies about 0.6 mile WNW of the N end of the Bili Bili. Anchorage, in depths of 35 to 40m, may be obtained off the NW side of the islet.

Urembo, Jabob, and Jomba are wooded coral islets lying 2, 2.5 and 3 miles, respectively, N of Bili Bili, and from 0.6 to 0.15 mile offshore. The coastal bank extends to the two S islets. A radio tower is conspicuous, close inland, about 0.6 mile W of Jabob.

Submarine cables run ESE and SE from the shore W of Jabob.

Planet Rock, in a depth of 1.8m, lies nearly 2 miles E of Jabob and is difficult to distinguish.

Anchorage.—Sheltered anchorage for small craft may be obtained, in 14.6 to 16.5m, between Jomba and the mainland. The coast here is sandy beach with palm trees.

Madang Harbor (5°13'S., 145°49'E.)

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9.81 The harbor and city of Madang lie on the NW side of the Schering Peninsula, in the S part of a lagoon extending about 9 miles along the Papua New Guinea coast. It is a sheltered anchorage and port for large vessels. Beliau Island lies on the N side of the harbor. Binnen Harbor, W of Madang, extends about 0.7 mile S of Bode Point, the NW extremity of the Schering Peninsula.

Dallman Passage, the entrance to the harbor, lies between the NE side of the Schering Peninsula and the S end of Kranket Island, close NE. It is the S of several passages in the barrier reef which extends N and parallel with the coast for about 8.5 miles to abreast **Cape Barschtsch** (5°04'S., 145°49'E.). It is recommended for vessels approaching Madang from S.

The principal islands on the barrier reef N of Kranket Island, from S to N, are Paeowai Island, Tab Island, and Sek Island; the islands are densely wooded on their seaward side, but are cultivated on their inner side. There are several other islands and many shoal patches within the barrier reef.

Winds—Weather.—There is little wind in the port; during the rainy season the nearby marshes make the atmosphere unhealthy. Ships intending to remain for any period of time are advised to anchor between Kranket Island and Beliau Island.

Tides—Currents.—The tidal rise at Madang is 1.2m at mean higher HW. The tidal currents are scarcely perceptible. The flood sets SW and the ebb sets NE, but they are much affected by the prevailing winds; the maximum velocity is about 0.75 knot.

The current usually sets N along the coast and is reported to set continuously out of Dallman Pass; however, it was reported that the current was setting mainly into Dallman Pass.

Aspect.—Dallman Pass, about 0.2 mile wide, has depths 29 to 50m in the fairway; a 7.6m patch lies on the N side of the pass nearly 90m off the S end of Kranket Island.

Berth No. 1 (West Wharf) is on the N side of Bode Point; it is 137m long and 12.8m wide, with a depth of 10.1m alongside. Berth No. 2, used by coastal vessels, lies about 135m S of Berth No. 1; it is 52m long and 20m wide, with a depth of 5m alongside, although it has been reported (1994) to have a depth of only 2.3m alongside. Berth No. 3, for small craft, lies about 125m ESE of Berth No. 1; it is 30m long and 4.5m wide, with a 1.6m depth alongside.

There are no tugs or lighters available.

Dallman Pass has been reported difficult to identify until within a distance of from 3 to 4 miles, and the light structure on Kalibobo Point was reported visible about the same distance.

Mount Hansemann (5°10'S., 145°45'E.), 431m high, about 5 miles WNW of the entrance to Dallman Pass, is a good landmark.

Coast Watchers Light is shown from a steel framework tower on **Kalibobo Point** (5°12'S., 145°50'E.), the NE extremity of the Schering Peninsula.

An aviation light is shown about 1.67 miles W of Kalibobo Point.

Lights, in range bearing 300°, on the SE side of Beliau Island, lead through Dallman Pass.

Six beacons, each consisting of a white board, are situated on the S side of Kranket Island. Similar beacons are situated about 0.1 mile SW of the above-mentioned front range light and on the E side of Nui Island, located 0.25 mile N of Bodie Point.

Pilotage.—Pilotage is compulsory for anchoring, berthing, and unberthing. The pilot boards on the 300° range line about 1.5 miles from the entrance to Dallman Pass. Radio communication is possible with Madang Port Control on VHF channels 16, 12, 8, and 6.

The ETA at the pilot station should be sent not less than 12 hours before arrival via Port Madang, Port Moresby Radio or Rabaul Radio, and should be confirmed not more than 5 hours and not less than 4 hours prior to arrival.

Anchorage.—The best anchorage is in the quarantine anchorage, in a depth of about 44m, soft mud, good holding ground, between between Beliau Island and Kranket Island, with Babob Malon, a rock located 0.15 mile N of the N end of Beliau Island, bearing 321°, and the front structure of the 300° range on the SE side of Beliau Island, bearing 252°.

Vessels up to 91m in length can also anchor in Binnen Harbor, in depths of 12.8 to 16.5m.

An abandoned submarine cable crosses Madang Harbor between Bode Point and the S side of Beliau Island. Another submarine cable runs from Bode Point SW across the entrance to Binnen Harbor.

Anchoring is prohibited in an area extending across Madang Harbor, from the SE side of Beliau Island to the shore SSE.

Directions.—As Dallman Pass and Coast Watchers Light are difficult to distinguish, Mount Hansemann can be steered for bearing 302°, which leads to the harbor entrance. Then a vessel should steer a mid-channel course to the harbor. The pass and fairway boundaries are marked on the chart.

Kranket Island and Tab Island are more easily identified than Dallman Pass and the light structure. Bili Bili, about 5.5 miles SSW of the harbor entrance, forms a good landmark, being distinguishable at a distance of 10 miles.

Approaching from N, the houses of the settlement become visible soon after passing Sek Island.

Caution.—Many local fishing vessels may be encountered at night, from December to April, off the entrance to Dallman Pass.

Islands and Passes North of Madang

9.82 Tab Anchorage (5°10'S., 145°50'E.) provides anchorage in general depths of 20 to 40m. It extends from Panab

Madang

Island, about 1.5 miles N of Beliau Island, to Tab Island, nearly 2 miles E, and from the NW end of Kranket Island to **Rasch Pass** (5°09'S., 145°51'E.). It is bordered E by the barrier reef, Tab Island, Massas Island, and Paeowai Island and the reefs joining them; on its SW side by the rocks and reefs lying between Kranket Island and Panab Island; and on its NW side by the shoals and rocks extending from Panab Island to within 0.5 mile of the barrier reef close N of Rasch Pass.

Rasch Pass (5°09'S., 145°51'E.) is deep and steep-to. A white square beacon stands on Panab Island, and a 3.4m shoal, about 1 mile NE of the island, is marked on its SW side by a white triangular beacon with a red border. These beacons, in range 229.5°, lead through Rasch Pass.

A 4.6m shoal lies about 0.5 mile NE of Panab Island.

A reef, with rocks which break, lie about 0.5 mile NNW of the N end of Kranket Island.

A spit, with a least depth of 7.3m, extends about 0.17 mile SSW from the S side of Rasch Pass. A spit, with a least depth of 5.8m, extends 0.15 mile SW of the N side of the pass.

A channel leads from the S end of Tab Anchorage, passing E of Pana Tibun Islet and Beliau Island, to Madang Harbor, over patches with a least depth of 7.3m.

A deep channel leads NE of the 4.6m patch about 0.5 mile NE of Panab Island to Nagada Harbor (Friedrich Karl Harbor) (5°10'S., 145°48'E.). The latter harbor, close NW of Tab Anchorage, is a very narrow inlet, with depths of 14.6 to 28m.

9.83 **Malamal Anchorage** (5°07'S., 145°50'E.) provides anchorage in depths of 12.8 to 31m. The anchorage extends from **Wongat Island** (5°08'S., 145°51'E.) to the S end of Sek Island, about 1.75 miles N, and from the barrier reef to the entrance to Mililat Harbor. Islands and shoals separate Malamal Anchorage from Tab Anchorage. Wongat Island, about 1.25 miles NNW of Rasch Pass, is separated by a narrow channel from the barrier reef. A shoal, with a least depth of 4m, lies about 0.3 mile N of the N end of Wongat Island.

Tausch Island (5°06'S., 145°48'E.) lies on the N side of the entrance to Mililat Harbor, about 1.5 miles NW of Wongat Island. Patches, with a least depth of 2.7m extend about 0.4 mile E of Tausch Island. The area between Tausch Island, the S side of Sek Harbor, and Sek Island is encumbered with shoals; narrow and unmarked channels lead through the reefs E and NE of Tausch Island.

A narrow and deep break lies in the barrier reef, about 2 miles N of Rasch Pass.

9.84 **Sek Harbor** (5°05'S., 145°50'E.), with its main entrance, Ottilien Pass, about 8 miles N of Madang, affords excellent anchorage in all weather, being well protected by Sek Island and Admosin Island, situated about 0.75 mile W of the N end of Sek Island.

St. Michael's, the headquarters for the Roman Catholic mission, stands on the point about 0.5 mile SE of Admosin Island.

A jetty at Alexishafen, close SW of the mission, has a berthing face of 31.7m and mooring bollards on shore NE and SW of the jetty ends; there is a depth of 9.1m alongside and vessels of up to 12,000 tons have berthed at the jetty.

Ottilien Pass (5°05'S., 145°49'E.), between the N end of Sek Island and the mainland NW, is deep and clear of dangers in the fairway, but a reef extends about 0.1 mile off the mainland.

Anchorage, in depths of 22 to 29m, mud, may be obtained in the outer part of Sek Harbor, about 0.1 mile W of Sek Island.

Anchorage may also be obtained, in 26m, in the cove SE of Admosin Island.

Bostrem Bay (5°05'S., 145°47'E.), the continuation of the harbor W, affords good anchorage, but the approach is too tortuous for large vessels to make use of it.

Sek Harbor to Isumrud Strait

9.85 The coast N of Sek Harbor consists of flat land, with mountain ranges 6 to 8 miles inland. A reef, on which there are several islets, fronts the coast from Cape Maylum, about 2.75 miles N of **Cape Barschtsch** (5°04'S., 145°49'E.), nearly to Cape Juno, about 3 miles farther N. The Matuka River (Ama River) discharges about 4 miles N of Cape Juno, and is accessible only by boats when not obstructed by a bar.

Cape Croisilles (4°51'S., 145°48'E.), about 4 miles farther NNE, is prominent as the coast here changes to a NW direction. A light is shown from a steel tower, 15m high, with a white hut at its foot, on Cape Croisilles.

Off-lying Islands and Banks

9.86 **Bagabag Island** (4°48'S., 146°14'E.), 600m high, wooded, and volcanic, lies about 23 miles E of Cape Croisilles. The island, fringed with reefs, is also fringed by reefs lying from 1 mile to 1.75 miles offshore, with, apparently large gaps between them except on the N and NE sides. Bagabag Island was reported to lie 2 miles E or ENE of its charted position.

New Year Bay, on the SE side of the island, is about 0.75 mile wide, and extends in a NW direction. The bay has depths of 77m in the entrance and a shelving sandy beach at its head.

The drying reef, shown on some charts, about 2 miles SE of the bay entrance, is reported not to exist, but there is a patch, with a depth of 9.1m, about 1 mile SSE of the entrance. A reef, on which the sea breaks, lies about 2 miles ENE of the entrance; a reef extends 0.15 mile from the S entrance point.

Anchorage.—Good anchorage, in 28m, mud and sand, may be obtained near the head of New Year Bay, by vessels with local knowledge, sheltered from all winds except those between SE and E, near the head of the bay where there is a shelving sandy beach with offshore reefs.

9.87 **Karkar Island** (4°39'S., 145°58'E.) lies about 8 miles NE of Cape Croisilles, and about 10 miles NW of Bagabag Island. It is densely wooded, conical in shape, and volcanic. The peak, which is named Mount Uluman, is about 1,280m high and still active.

The W side of the island is fringed by a reef; another reef extends about 4 miles NE from the NE side of the island. Tuale Islet, about 1.5 miles E of the N extremity of Karkar Island, and Mangamarike Rock, about 5m high, about 1.75 miles farther ESE, lie on the latter reef. An islet, 18.3m high, lies about 2 miles SE of Mangamarike Rock.

Anchorage.—On the N side of Tuale Islet there is an opening in the reef through which vessels with local knowledge may enter and obtain anchorage, in about 35m, about 0.5 mile SE of the islet.

Kulili Harbor is entered on the opening in the reef W of Tuale Islet. Vessels with local knowledge can anchor, in a depth of about 35m, about 0.5 mile SE of the islet. From the anchorage a channel, marked by port and starboard beacons, leads to a jetty suitable for vessels drawing less than 3m, there is also a small boat jetty.

A shoal, position approximate, is charted 5 miles E of the S extremity of Karkar Island, and about 2 miles offshore.

Karkar Island is reported to be a good radar target at a distance of 19 miles.

Greig Bank (4°32'S., 146°14'E.), with a depth of 55m, lies about 12 miles E of Tuale Islet.

Isumrud Strait

9.88 **Isumrud Strait** (4°47'S., 145°51'E.), separating Bagabag Island and Karkar Island from the mainland, is free from dangers. Many floating logs and large trees were reported in the strait.

Tides—Currents.—A tidal current of about 2 knots in a NW direction to about 2 knots in a SE direction was reported in Isumrud Strait.

It was reported that a 1.5 knot current setting W was encountered between Bagabag Island and **Manam Island** (4°06'S., 145°03'E.) and that a 2.5 knot current setting NW was very apparent between Bagabag Island and Sek Harbor.

Isumrud Strait to Hatzfeldt Harbor

9.89 Mugil Harbor (4°50'S., 145°47'E.), about 2.5 miles NW of Cape Croisilles, is fronted by Vidari Islet, which is almost joined to the NW entrance point by a reef.

Anchorage.—The best shelter during the Northwest Monsoon is close E of the islet, in 24m. During the Southeast Monsoon, the SE corner of the bay is only suitable for small craft with local knowledge due to the very narrow channel leading to it.

Megiar Harbor, narrow and lying parallel to the coast, lies about 1.5 miles farther NW, and is available to small vessels with local knowledge. It is protected at its E end by a peninsula and its reef, and at its W end by an island and its reef.

Sarang Harbor (4°46'S., 145°42'E.), entered about 8 miles NW of Cape Croisilles, is formed between the mainland and a chain of islets and reefs extending for about 2 miles parallel to the coast; the W islet is connected by a reef to the NW entrance point of the harbor. Anchorage, in depths of 16.5 to 18.3m, can be obtained in the harbor by small vessels with local knowledge. There is a berth with more swinging room, sheltered during the Northwest Monsoon, off a plantation at the SE end of the chain of islets and reefs.

A bay, formed between the NW entrance point of Sarang Harbor and **Pallas Point** (4°44'S., 145°40'E.), about 2.5 miles NW, has a grassy plain, covered with trees, on its S side. Two rivers discharge into the bay; the N river discolors the sea for a considerable distance seaward. The coast NW of Pallas Point is mostly wooded and hilly. Anchorage may be obtained in fine weather close offshore.

A reef, on which the sea breaks heavily at times, lies about 1.5 miles N of Pallas Point, and 1 mile offshore; it is reported to have a depth of 1.2m, and is difficult to distinguish due to the discolored water.

A shoal, with a depth of 8.2m, lies about 2.5 miles NNW of Pallas Point. Another shoal, on which there are two rocks, lies about 4 miles NNW of Pallas Point and 1.5 miles offshore.

Dove Point (4°35'S., 145°33'E.), about 10 miles NW of Pallas Point, is flat and wooded, with a grassy hill close within. Bunabun Harbor, close W of the point, provides reasonably sheltered anchorage in SW weather for vessels up to 700 tons.

Neptune Point (4°30'S., 145°27'E.) lies about 7.5 miles NW of Dove Point. Ulingen Harbor, entered about 2 miles W of Neptune Point, is a narrow inlet, indenting the coast for about 0.5 mile; it is enclosed by wooded hills on the S and E sides, and partly on the W. A reef extends about 0.2 mile from the E entrance point of the harbor. Anchorage may be obtained, in 29 to 37m, N of the above reef, by vessels up to 1,000 tons, with local knowledge.

Ulingen Harbor was reported to give a good radar return at a distance of 10 miles.

Magnus Point (4°28'S., 145°24'E.), covered with pine trees, lies about 4 miles NW of Neptune Point.

9.90 Kronprinz Harbor (4°27'S., 145°22'E.), entered about 2 miles WNW of Magnus Point, has a coral reef extending from the N side of its entrance; inside the entrance there is a sandy beach with palm trees and several villages on both sides. Mount Prince Oscar, 1,250m high, about 10 miles W of Magnus Point, can be seen over the trees on the inner part of the harbor. A saddle-shaped mountain, half covered with trees, lies W of the harbor. Anchorage may be obtained by vessels with local knowledge, with the W entrance bearing 356° and the E entrance 106°. The depths decrease gradually from 35m towards the head of the harbor.

Cape Gourdon (4°23'S., 145°19'E.), about 9 miles NW of Magnus Point, is a gradually rising grassy hill; then to the entrance of Hatzfeldt Harbor, about 7 miles W, the coast is generally flat and bordered by a forest. A light is shown on Cape Gourdan.

Samoa Point (4°23'S., 145°16'E.) lies about 3 miles W of Cape Gourdon; a plain, through which two rivulets discharge, lies E of the point.

Caution.—Between Asuramba, about 1.5 miles SSE of Cape Gourdon, and **Dalua Bay** (4°21'S., 145°09'E.), 12 miles W, there are many shoals lying 2 to 3 miles offshore; vessels are cautioned to keep a good lookout when navigating in these waters.

Hatzfeldt Harbor

9.91 Hatzfeldt Harbor (4°23'S., 145°14'E.) lies W of Pataki Island, which lies about 5 miles W of Samoa Point. The inner part of the harbor lies between East Point and West Point, located about 1 mile SW and 1.67 miles WSW of Pataki Island. Both points are fringed by reef, with the reef off West Point extending 0.1 mile N.

Pataki Island (4°22'S., 145°15'E.), wooded and reef-fringed, lies about 0.25 mile N of Tombennam Point; the island was connected to the point by a sandy spit, 213m wide, covered with coconut trees and scrub. A bank, with depths of 3.7 to 5.5m, extends about 0.75 mile W of Pataki Island. A patch, with a depth of 6.7m, lies about 0.75 mile W of the same island; it was reported to lie farther S.

Schimo Reef, with a least depth of 2.1m, lies about 0.75 mile N of West Point.

These reefs are reported to be easily distinguished.

Chirimosh Island, midway between East Point and West Point, is fringed N by Hedwigs Reef, extending about 0.2 mile N. Harbour Reef, which dries, lies 0.12 mile SSE of the S end of Chirimosh Island. The reef may be passed on either side, but the channels are narrow, with depths of 5.8 to 8.5m.

The settlement lies on the E side of the harbor S of East Point.

Anchorage.—With NW winds the anchorage E of Chirimosh Island is recommended, but at other times the W part of the harbor is preferable. The anchorages are reported to be subject to the swell.

Anchorage can be taken, in a depth of about 20m, E and W of Chirimosh Island.

A German naval vessel obtained anchorage with Chirimosh Island bearing 192° and East Point bearing 147°.

Directions.—The approach E of Chirimosh Island is reported to be the best. A vessel approached the harbor with Chirimosh Island bearing 179° until the Nend of Pataki Island bore 089°, when a course of 230° was steered, passing between

Schimo Reef and the N end of Hedwigs Reef. Then a course of 162° was steered, keeping in mid-channel between West Point and Chirimosh Island.

Hatzfeldt Harbor to Cape Girgir

9.92 **Dugumur Bay** (Dogumur Bay) (4°23'S., 145°13'E.), on the W side of West Point, had depths of about 33m in the entrance. The E shore is comparatively steep-to, and depths of less than 11m extend about 0.25 mile off the SW shore.

West of Hatzfeldt Harbor, the coastal mountains become lower, forming a continuous chain of grassy hills; near the coast are numerous palm trees. Farther W, these hills fall to gently undulating land, after which they rise again, becoming steeper and more wooded. The coast forms several bays, the headlands of which are fronted by reefs.

Vessels are recommended not to approach this coast within 6 miles.

The **Legoarant Islands** (4°19'S., 145°01'E.), about 12 miles NW of Pataki Island, and about 2 miles offshore, are two reef-fringed islands, 0.5 mile apart in a NW-SE direction; there is apparently a clear passage between them. A reef extends 2 miles NW of the group, and there are several reefs in the bight SE of the islands, but they are generally visible from aloft.

Bogia Harbor (4°17'S., 144°59'E.), with its entrance about 1.25 miles W of the Legoarant Islands, is fronted by the Neilsen Islets, consisting of two coral islets, Kolakola and Reamuna. The channel leading into the harbor lies between the islets and the W shore, passing close W of a sunken reef lying W of Reamuna.

The S part of the bay consists of two bights, separated by a tongue of land, from which a reef extends. The settlement is situated on the W side of the W bight. A coral reef extends about 0.1 mile E from abreast the settlement, and a small jetty lies close S of the reef.

Anchorage may be obtained by vessels with local knowledge, in 46m, in the channel between the islets and the W shore or, in 14.6 to 18.3m, about 0.1 mile E of the jetty.

Podbielsky Point (4°15'S., 144°58'E.) lies about 1.5 miles N of Kolakola Islet. A coral reef, in a depth of 4.9m, lies about 1.5 miles NNW of the point, and 0.35 mile offshore, with a deep passage between it and the mainland.

Monumbo Harbor (4°14'S., 144°57'E.), entered about 2.5 miles NW of Podbielsky Point, is exposed to the swell and not a good anchorage. Malangin Islet lies in the middle of the harbor, 0.12 mile offshore; a reef extends about 0.1 mile N and 0.1 mile E of the islet.

9.93 **Hansa Bay** (4°10'S., 144°52'E.) lies between Hansa Point, about 5.5 miles NW of Podbielsky Point, and **Condor Point** (4°09'S., 144°52'E.), about 4.75 miles farther NW. A light is shown from Condor Point. Laing Islet, flat and densely wooded, lies 3 miles WNW of Hansa Point, and a spit extends from its S end to the shore.

A rock, with a depth of about 0.9m, lies about 0.6 mile NNE of Laing Islet. A patch, with a depth of 4.6m, lies 1 mile E of Condor Point.

Anchorage.—Good anchorage may be obtained, in about 18.3m, with Laing Islet bearing 089°, sheltered from nearly all winds, by vessels with local knowledge or, in 19.2m, mud, with Condor Point bearing 061° and the SW end of Laing Islet bearing 137°.

Manam Island (4°06'S., 145°03'E.), 1,300m high, lies with its SW extremity about 6.5 miles NE of Hansa Point, with Stephan Strait between. The island is conical, volcanic, and covered with vegetation, being wooded to an elevation of about 762m. In 1936, the volcano was in violent eruption. Several reports indicate that the island lies between 1.5 and 3 miles N to NE of its charted position. The island recently was reported to lie 2.2 miles E of its charted position.

Aris Island (3°59'S., 144°59'E.), about 3.5 miles N of the NW extremity of Manam Island, is 215m high, with a flat summit. The island has been reported to lie about 2 miles S and 1.5 miles SW, of its charted position.

A local magnetic anomaly has been reported E of Manam Island.

Venus Point (4°01'S., 144°41'E.), about 13 miles NW of Condor Point, has a clump of high casuarina trees on it. Anchorage has been taken, in 10m, 3 miles E of the point and 2 miles offshore.

The Ramu River, discharging W of Venus Point, has an entrance about 0.2 mile wide, and is not easily identified. It is fronted by a bar, with reported depths of 2.4m; inside the depths increase to 14.6 to 16.5m. Small vessels have ascended 17 miles, but there is a second bar, with a depth of 2.4m, about 6 miles within the entrance.

Broken Water Bay (3°57'S., 144°37'E.), entered between Venus Point and Cape Wabusi, about 10 miles NW, has irregular depths.

Cape Girgir (3°49'S., 144°34'E.) lies about 4 miles NNW of Cape Wabusi, and is marked by a light.

The Sepik River

9.94 The Sepik River discharges between Cape Girgir and **Cape Franseski** (3°51'S., 144°34'E.), about 1.5 miles SSE; it is the largest and most important river on the N coast of Papua New Guinea. The river is navigable 60 miles by large vessels and 300 miles for vessels drawing 4m; the channel, which has a width of from 0.15 mile to 1 mile, is subject to continual change. For a distance of 40 miles up river from the entrance, there are general depths of 12 to 20m and no sand banks; beyond this there are places with depths of from 4 to 5.5m, and at 300 miles the river expands like a large lake, with depths of about 2.7m. The maximum variation of the water level is 6.1m.

The flood season is in April; the low season is in September. At Ambunti, 235 miles from the mouth, there is a difference of about 7.6m between flood level and low level.

The current runs at the rate of from 2.5 to 3 knots and causes the water to be discolored as far seaward as Kadovar Island and Bam Island, about 12 to 20 miles offshore.

Depths—Limitations.—The entrance to the river has sand banks on either side. The river is best approached by deep draft vessels with the point on the S bank, about 0.75 mile SW of Cape Franseski, bearing 215° ahead. Then alter course to 224° when Cape Franseski is distant 0.35 mile and in range 152° with Cape Wabusi, about 2 miles SSE.

The bar will be crossed in depths of about 7.9m with the point on the SE bank abeam distant 0.15 mile.

Floating islands of grass, on which small trees grow, consti-

tute a danger in the river; these islands, which reach 0.5 acre in size, may float down on a ship at anchor, causing it to drag, in which case they must be cut right through to clear the ship.

Two naval vessels, with a draft of 2.4m and a length of 32.5m, ascended the Sepik River as far as Ambunti, about 320 miles upstream.

It was found that the channel generally followed the outside of the bends, that high wooded banks were an indication of deeper water, and low grassy bends indicated shallows; whirlpools and eddies always indicated very deep water. At all narrow bends, the water is deep at the outside of the bend, even if mud banks show plainly on the inside. The major danger in navigating the river is from floating debris and embedded tree trunks.

The banks in the lower reaches are dense sago swamps, sometimes fronted by beds of reeds, but higher up, breadfruit trees and sago palms abound. Crocodiles, herons, and pigeons are met with and fish are plentiful, especially eels.

Mosquitoes, which are encountered in large numbers, and are at their worst in April, are exceptionally troublesome. The type of malaria experienced on the river is malignant.

There are villages, with connecting tracks, near the river banks. About 35 miles up, the banks become a little higher, and the ground less swampy, being replaced by stout timber. About 40 miles up is Marienberg mission station, situated on a small hill. The inhabitants in this vicinity do not live near the river, but there are villages a few miles back. Angoram, 60 miles up, situated on a hill, is a government station. The country between Angoram and Malu is generally swampy and impassable. At Malu, the first high land begins.

The inhabitants are becoming more civilized, as nearly all the region adjacent to the river for a distance of over 300 miles from its mouth has been brought under government control; they are generally friendly and eager to trade.

The Schouten Islands

9.95 The Schouten Islands, lying from 13 to 28 miles off the Papua New Guinea coast, extend from Bam Island, at the E end, to Vokeo Island, at the W end. The relative position of the islands is reported to be approximate. Several reports, confirming previous reports, indicate that Kadovar Island lies between 1 and 2 miles SE of its charted position and the other islands lie between 1 and 2 miles SW of their charted positions.

Commercial Imagery—Bam Island, Kadovar Island, and Blupblup Island

http://www.redtailcanyon.com/items/13794.aspx

Bam Island (3°35'S., 144°50'E.), about 21 miles NE of Cape Girgir, is an active volcano, 684m high. At the foot of the cone, the island is covered with trees, which, on the N side, reach almost to the summit. On the N side, there is cultivation on the lower slopes, with many coconut groves and a large village, while the S side is burnt and reddish in color. The island is steep-to and there is no anchorage.

A bank, with a depth of 46m, lies 41 miles NE of Bam Island.

Kadovar Island (3°35'S., 144°36'E.), 364m high, lies 14 miles W of Bam Island. It has a steep wooded crater and is remarkable for several villages on its edge and many large coconut plantations. The island affords no anchorage, and a reef, on which the sea breaks with any swell, extends 1.5 miles W from the island.

Blupblup Island (3°33'S., 144°37'E.), about 14 miles WNW of Bam Island, is a steep cone, about 401m high, but not as sharp as Bam Island. The W side of the island is fringed by reef. Motmot Islet, showing as two hummocks, about 61m high, and covered with brushwood and coconut palms, lies about 0.5 mile W of the island; it lies on a reef extending about 1 mile W of the SW end of Blupblup Island. Boluga Islet, about 0.5 mile N of Motmot Islet, lies on a reef extending nearly 1 mile SSW from the NW end of Blupblup Island.

Anchorage.—Small vessels can find exposed anchorage, in 5 to 8m, about 0.5 mile NW of Motmot Islet and 0.35 mile W of Boluga Islet.

Small craft up to 30 tons can enter a boat passage close N of Motmot Islet and find sheltered anchorage inside the reef, in a depth of 4m. Local knowledge is required as the boat passage is tortuous.

Viai Island (Wei) (3°23'S., 144°26'E.), about 12 miles NW of Blupblup Island, is about 218m high, conical, wooded, and uninhabited. A depth of 149m is reported to lie about 4 miles W of the island.

Koil Island (3°20'S., 144°14'E.) lies about 12 miles W of Viai Island. A reef extends about 0.2 mile S from the SE end of the island; a detached reef extends 0.25 mile W from the extremity of this reef. Anchorage for small vessels may be obtained, in 13 to 27m, between the detached reef and the shore.

Vokeo Island (3°27'S., 144°07'E.), about 7.5 miles NW of Koil Island, is about 610m high, densely wooded, steep, and cliffy. The island presents a saddle-shaped appearance from NW, having two peaks with a slight depression between them. There are several villages on the island.

Vokeo Island was reported to be a good radar target at a distance of 24 miles.

Anchorage.—Anchorage can usually be obtained by small craft up to 60 tons in the bights of the reef, off the several villages around the island, according to the prevailing wind.

Caution.—An extensive reef lies SW of a line joining Koil Island and Vokeo Island.

Cape Girgir to Cape Pus

9.96 The coast from **Cape Girgir** (3°49'S., 144°34'E.) to Cape Terebu, about 44 miles WNW, is flat, rising inland to a chain of hills, 427 to 549m high, about 35 miles W of Cape Girgir.

Cape Terebu (3°37'S., 143°51'E.) is a steep, thickly-wooded hill, about 140m high, which, from a distance, appears as an island. West of the cape, the coast is hilly as far as Humbolt Bay, a distance of about 190 miles.

The shore for about 5 miles E of Cape Terebu is dark sandy beach. Krauel Bay is entered about 10 miles E of the cape.

Cape Moem (3°33'S., 143°42'E.), about 9 miles WNW of Cape Terebu, is the extremity of a narrow peninsula projecting 2 miles N from the coast. A light is shown from the N end of Cape Moem. Depths of less than 5.5m extend about 0.2 mile N of the cape.

Courtesy of Mr. Jack Lockwood, U.S. Geological Survey

Bam Island

The stretch of coast between Cape Moem and Cape Girgir is named the Hansemann Coast. This coast was reported to lie about 2 miles S of its charted position.

Boram Bay, with general depths of 7.3 to 16.5m, is entered between Cape Moem and Cape Boram, about 2.5 miles WSW.

Sixdiv Shoal, with a depth of 4.6m, lies about 2 miles NNW of Cape Moem. Byrne Shoal, with a depth of 4m, lies about 1 mile NNE of Cape Boram.

Wewak Harbor (3°34'S., 143°38'E.)

World Port Index No. 56738

9.97 Wewak Harbor is entered between Cape Boram and Wewak Point, the E extremity of the Wewak Peninsula, nearly 2 miles WNW. A reef, marked at its seaward end by a lighted beacon, extends 0.55 mile NNE of Mission Point, located nearly 1 mile WSW of Cape Boram. A drying reef extends about 0.25 mile W of Cape Boram. A wreck, in a depth of 6.4m, lies about 0.5 mile NW of Cape Boram. There are general depths of 7.3 to 16.5m in Wewak Harbor, on either side of the reef extending NNE of Mission Point.

Aspect.—A wharf lies at the end of a pier extending about 0.3 mile NE from Mission Point. The wharf is 73m long on its E side, with a depth of 6.7m alongside (1993), and can accommodate vessels up to 5,000 grt. The wharf is expected to be extended (2004) by 50 to 100m to support large tuna vessels. There is a mooring buoy off the SE corner of this pier and there is a dolphin off the NE end. Berthing may become hazardous during the monsoon season.

A conspicuos building stands on the shore 1 mile W of Cape Boram. A radio mast stands at the base of the Wewak Peninsula 0.5 mile SW of Wewak Point.

Pilotage.—Pilotage is not compulsory but a pilot is available from Madang with 48 hours notice. Pilots board about 2 miles NE of Wewak Point.

The vessel's ETA should be sent not less than 12 hours before arrival via Port Moresby Radio or Rabaul Radio and confirmed not more than 5 hours and not less than 4 hours prior to arrival.

Anchorage.—Large vessels normally anchor, in 14.6 to 16.5m, about 1.25 miles WNW of Cape Boram. Smaller vessels can anchor closer to the Wewak Peninsula. Care must be taken to avoid two foul areas situated 0.5 mile SSW and 0.7 mile S of Wewak point. In bad SE weather, these anchorages can become exposed and uncomfortable; better anchorage can be found 0.5 mile SW of Cape Boram.

Directions.—Approaching from E, steer for the highest tree on Raboin Islet, bearing 282°, until Cape Moem bears 207°. Then steer for the S shoulder of the cliff on the S side of Wewak Point, bearing 254°, which will lead about 0.6 mile N of Byrne Shoal.

9.98 **West Harbor** (3°33'S., 143°37'E.) is entered between the NW point of the Wewak Peninsula and **Cape Wom** (3°31'S., 143°36'E.), about 2.25 miles NW. A drying reef ex-

tends about 0.2 mile off the W side of the Wewak Peninsula. A shoal, with a depth of 7m, lies 0.65 mile WNW of the NW point of the Wewak Peninsula; an unexamined patch, with a depth of 6.1m, lies about 0.75 mile farther WNW. A 5.5m patch lies 0.35 mile E of Cape Wom.

Raboin Islet (3°30'S., 143°36'E.) lies nearly 0.75 mile NE of the Wom Peninsula; there are depths of 15.8 to 20m in the passage between the islet and the peninsula. The islet is fringed by reef extending about 0.2 mile from its N and NE sides.

Dallman Harbor (3°30'S., 143°34'E.), entered between the NW side of Cape Wom and Cape Pus, about 3.25 miles NW, is sheltered SE by the Wom Peninsula, E by Raboin Islet, and N by Muschu Island. The harbor has comparatively steep-to shores, with general depths of 11 to 26m; depths of less than 9.1m extend nearly 0.5 mile NNW of the SE entrance point of the bay. Sheltered anchorage may be obtained by vessels with local knowledge in Dallman Harbor, except during NW winds.

Cape Pus resembles Cape Girgir, being flat and wooded with casuarina; the cape is backed by a lagoon.

Off-lying Islands and Dangers

9.99 **Muschu Island** (3°25'S., 143°35'E.) is separated from the mainland NW of Cape Pus by Muschu Strait, which is deep and nearly 1.5 miles wide. The island is over 61m high, fertile, and well populated.

Cape Samein (3°26'S., 143°33'E.), the SW extremity of the island, is marked by a light; a shoal, with a depth of 4.5m at its outer end, extends about 0.25 mile W of the cape. Cape Barabar, the E extremity of the island, lies 5.5 miles ENE of Cape Samein. A shoal, with a least depth of 5.2m, lies between 0.7 mile and 1.25 miles ESE of Cape Barabar. A 4.6m patch lies near the 200m curve, about 3.25 miles ESE of the same cape.

Kairiru Island, close N of Muschu Island, is conical shaped and wooded; from N, it appears to rise gradually to flat-topped summit, 760m high, near its center. Kairiru Island was reported to give a good radar return from a distance of 25 miles.

A prominent rock , 9.1m high, lies about 0.2 mile from the E extremity of the island; it resembles a boat under sail.

Kairiru Strait, separating Muschu Island and Kairiru Island, is deep in the fairway, and reefs fringe its shores. A rocky bank, with a depth of 7.9m at its outer end, extends about 0.25 mile S from the S end of Kairiru Island, reducing the passage to a width of about 0.1 mile. Patches, with depths of 9.7m and 7.9m, lie in the E part of the strait, about 1 and 2 miles, respectively, E of the rocky bank.

Victoria Bay (3°20'S., 143°31'E.) indents the W side of Kairiru Island for about 1 mile, and its entrance is about 1 mile wide. There are depths of 22 to 31m in the central part of the bay. Depths of less than 5.5m extend up to 0.15 mile offshore in the E side of the bay, then deepen sharply to over 18.3m. In the S part of the bay, depths shoal gradually to depths of 5.5m 0.15 mile offshore.

Anchorage.—Victoria Bay provides snug anchorage with good anchorage in the SE season. Vessels up to 60 tons can anchor, in a depth of 7m, close to the shore at the head of the bay and also in the S corner. There is a salt hot spring on the S side of the bay.

9.100 Yuo Islet, Karasau Islet (Keresau Islet), and Unei Islet (Buni Islet) lie in the W approach to Muschu Strait. Yuo Islet lies about 3 miles WNW of Cape Samein, the SW extremity of Muschu Island, and is very low, covered with coconut palms, and inhabited. The channel between Yuo Islet and Muschu Island is deep and free of dangers. A rock, existence doubtful, is charted about 1 mile NW of YuoIslet.

Karasau Islet, wooded and inhabited, lies nearly 1.5 miles WNW of Yuo Islet, and is about 1.5 miles long in a WSW-ESE direction.

Unei Islet lies about 1.75 miles WNW of Karasau Islet, to which it is almost connected by foul ground; foul ground extends about 0.5 mile WNW of Unei Islet. A light is shown from Unei Islet.

Walis Island (3°14'S., 143°18'E.), 21m high, densely wooded, and marked by a light, 6m in elevation on its S point, lies about 11 miles WNW of the W extremity of Kairiru Island. A reef, marked by breakers, extends about 2.5 miles E of the island. Foul ground extends about 1 mile N of the E part of the island and about 1 mile S of the W end of the island.

Tarawai Island, also densely wooded, lies close WNW of Walis Island, from which it is separated by a passage, 0.35 mile wide, with a least depth of 5.8m.

Anchorage.—Protected anchorage may be obtained by vessels with local knowledge in a small bay on the SE side of Tarawai Island, remaining clear of a bank, with a depth of 4.3m, extending about 0.2 mile SE of the W entrance point of the bay.

Cape Pus to Aitape Roads

9.101 The coast between **Cape Pus** (3°29'S., 143°33'E.) and the boundary between Papua New Guinea and Irian Jaya (the 141st meridian), about 163 miles WNW, is named the Finsch Coast; it is high and densely wooded in places, with many villages. There is no fringing reef as far as **Lapar Point** (3°07'S., 142°21'E.), about 75 miles WNW of Cape Pus; anchorage may be obtained from 1 mile to 2 miles offshore. The coast here, rising in places to steep cliffs, is backed by hills from 183 to 244m high; farther inland, Mount Turu rises to an altitude of 1,219m, about 16 miles SW of Cape Pus. Mount Sapau rises to an altitude of 1,432m, about 18 miles SE of Lapar Point.

The sea is of a bright to dark green appearance for a distance of 3 or 4 miles off the coast, except for places where large rivers color it yellow. Blue water is seen close to the coast only between Robide Point, about 83 miles WNW of Lapar Point, and Hook Germania, about 8.5 miles farther W. The discharge from the Tami River discolors the water W of Hook Germania.

The mouths of rivers, lagoon, or brooks should not be used for bearings, as their positions cannot be depended on.

Good anchorage may be obtained during the Southeast Trade Winds all along the coast between Cape Pus and Altabe Roads. During the Northwest Monsoon, anchorage may be obtained between the off-lying islands.

The **Hawain River** (3°27'S., 153°05'E.) discharges about 4.25 miles WNW of Cape Pus; depths of less than 5.5m and 11m extend about 0.5 and 0.75 mile, respectively, off its mouth.

Bogim Harbor, entered between the Hawain River and a point, about 3 miles WNW, has depths of less than 11m extending up to 1.5 miles offshore.

Cape Karawop (3°25'S., 143°25'E.) lies about 2 miles WNW of the W entrance point of Bogim Harbor. A conspicuous radio tower stands on the coast about 0.75 mile W of Cape Karawop.

9.102 Aitape Roads (3°09'S., 149°29'E.), the area enclosed by Seleo Island, Ali Island, and Tumleo Island, E of **Lapar Point** (3°07'S., 142°21'E.), is known as Aitape Roads. The harbor is located W of Soleo Island. Aitape Roads provides shelter for all classes of vessels.

Lapar Point, the W entrance point of Aitape Roads, is the termination of a spur of a hill, easily identified by black rocks and stones lying in the vicinity. The wooded land in the vicinity is lower than the coast E of it, and the mountain ranges and hills backing the point are also lower than those E.

Many villages are on the mainland and the islands. Aitape, the principal settlement, lies near Rohm Point, about 1 mile SE of Lapar Point. A mission and wharf lie about 5 miles ESE of Rohm Point, and a signal station lies about 1 mile farther ESE.

Pilotage is not compulsory. Pilot boards vessels 0.5 miles S of Tumleo Island. An airfield lies about 1 mile S of the wharf.

Tides—Currents.—The tidal currents set E and W at a rate of about 0.75 knot. The tidal range is approximately 1.4m.

Caution.—Foul ground extends from a position about 3.5 miles ESE of Seleo Island for about 8 miles ESE, lying about 2.5 miles offshore and parallel to the coast.

A reef was reported about 1 mile NW of the W end of the above-described foul ground.

Islands and Dangers

9.103 Seleo Island (3°09'S., 142°29'E.), 30m high and wooded, lies about 8.5 miles ESE of Lapar Point, and nearly 3 miles offshore; the reef, fringing the island, extends about 0.25 mile from its N side. Angel Islet lies about 0.4 mile S of Seleo Island, on the W side of a detached reef extending 0.5 mile SE of it. The channel between this reef and the reef fringing Seleo Island is nearly 0.2 mile wide, with depths of 16.5 to 55m in the fairway.

Babelsberg Strait (3°10'S., 142°28'E.) is about 2.5 miles wide between the reef on which Angel Islet lies and the mainland. The strait leads into Aitape Roads, but is not recommended due to shoals in the fairway.

On the N side of the strait, Saer Laeing, a shoal, in a depth of 3m, lies about 0.55 mile SW of Angel Islet, and Dalton Shoal, in a depth of 10.4m, lies 0.65 mile farther SW. Starkey Shoal and Reeves Shoal, with depths of 5.5 and 7.3m, lie, respectively, about 1.25 and 2.25 miles W of Angel Islet. Robertson Shoal, in a depth of 7.9m, lies about 1.5 miles farther WNW.

McGee Shoal (3°08'S., 142°26'E.), with a depth of 3.4m, lies about 3 miles W of the W extremity of Seleo Island.

On the S side of the strait, Samoi Shoal, with a least depth of 2.4m, lies about 0.5 mile from the S shore, SSW of Angel Islet. Cole Shoal, with 7.9m, lies about 1 mile WNW of Samoi Shoal, and about 0.3 mile offshore.

Ali Island (3°08'S., 142°28'E.), a wooded island, 37m high, lies about 1 mile NW of Seleo Island; reefs and shoals extend up to 0.2 mile off the island. The channel between the two islands is reduced to a width of about 0.25 mile by Middle Reef and other dangers. Middle Reef lies on the S side of the channel, about 0.2 mile W of the reef extending W from Seleo Island. A shoal, with a depth of 5.5m, and Tapel Rock, with a depth of 3.4m, lie about 0.3 mile N and 0.4 mile W, respectively, of the N extremity of Middle Reef.

Sang Shoal, steep-to and in a depth 5.5m, lies about 1 mile WNW of the N end of Ali Island. Warrego Shoal, steep-to, and in a depth of 10.7m, lies about 0.5 mile farther NW.

9.104 Tumleo Island (Tamara Island) (3°07'S., 142°24'E.), about 2.5 miles ENE of Rohm Point, has a conspicuous hill, 63m high, at its NW extremity. The channel between Tumleo Island and Rohm Point is encumbered with dangers.

Tumleo Rock (Tamara Rock), 15m high, with some small trees on it, lies about 1.25 miles W of the NW extremity of Tumleo Island. It lies at the N end of a reef, with depths of less than 1.8m, extending 0.35 mile SSE of the rock. Arak Rock, with less than 1.8m, lies about 0.5 mile E of Tumleo Rock; Knight Shoals, two patches with depths of 8.5m and 7.6m, lie 0.45 and 0.65 mile, respectively, S of Arak Rock. Pultata Rock, 0.9m high, lies 0.35 mile SW of Tumleo Rock; Lamak Rock, 0.6m high, and Wolpei Rock, with less than 1.8m, lie about 0.2 mile and 0.4 mile, respectively SSE of Pultata Rock.

Stein Reef, 1.2m high, lies about 0.5 mile ENE of Rohm Point. Hunter Rocks, 1.5m high, lie on the coastal bank, about 1.25 miles SE of Rohm Point.

Anchorage.—The best shelter during the Southeast Trade Winds is in depths of 24 to 31m, in Aitape Harbor, close W of Seleo Island. Anchorage may also be obtained W of the S end of Tumleo Island during the SE season in less depths and off the SE end of the island, in depths of 14.6 to 18.3m, in other seasons of the year.

A certain amount of shelter can be obtained in 5.5 to 10m in the bight S of Rohm Point, where cargo can be handled by surf boats during the greater part of the year.

There are no pilots and fuel and water are not available.

Directions.—From any direction, the hill on Tumleo Island is a good landmark and first appears as a cone above the horizon. There are several passages to the roads and harbor, the passage between Seleo Island and Angel Islet is used by the mail boats and is the one recommended.

The passage N of Seleo Island, though narrow, is sometimes used by vessels approaching from E; a vessel bound for the harbor may passon either side of Middle Reef, the channel to the E is narrow but well-defined and clear of dangers, while that to the W is encumbered by Tapel Rock.

The passage between Tumelo Island and Ali Island is deep and nearly 4 miles wide, and may be used by vessels proceeding W from Aitape Harbor or coming from W, taking care to avoid the previously-described dangers.

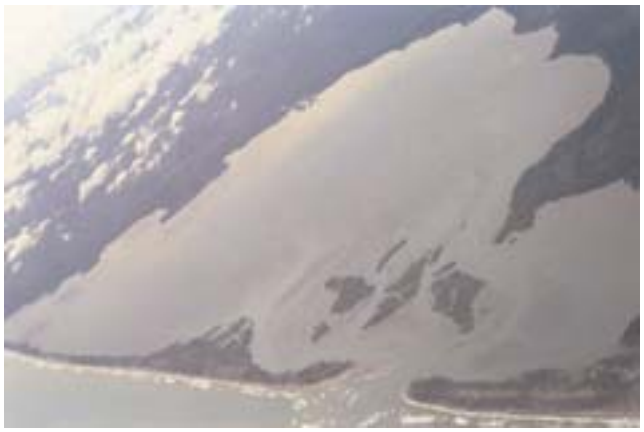
There are clear passages close W of Tumleo Island, and on either side of Stein Reef, which may be used.

Aitape Harbor to Irian Jaya

9.105 Aitape Harbor (3°08'S., 142°21'E.) consists a pier which extends 0.12 mile NE from the head of the bight S of Rohm Point and has three berths at its head. Berth No. 1 lies on the SE side of the pier and has a length of 18m, with a depth of 4.3m. Berth No. 2 and Berth 3 lie on the NW side of the pier and have a length of 8m, with a depth of 4.3m.

The coast between **Lapar Point** (3°07'S., 142°21'E.) and Cape Concordia, about 69 miles WNW, presents very few distinctive features. About 7 miles WNW of Lapar Point, a reef, with a depth of 5.8m, on which the sea breaks in heavy weather, lies about 0.75 mile off the mouth of the Yalingi River.

The entrance to Sissano Lagoon (Norovu Lagoon) lies about 16.5 miles WNW of Lapar Point. Between the entrance, and a position about 10 miles WNW, depths of 18.3m or less extend up to 2.25 miles offshore.



Entrance to Sissano Lagoon

At **Prittwitz Point** (2°55'S., 141°50'E.), about 17 miles WNW of the entrance to Sissano Lagoon, a range of mountains, 373m high, approaches the coast and terminates in steep rocks, 30.5m high. About 8.5 miles farther WNW, a coral patch, in a depth of 12m, lies about 1.5 miles offshore. The village of Leitre, with a lagoon, lies 12 miles WNW of Prittwitz Point.

The **Neumayer River** (2°45'S., 141°27'E.) discharges about 10 miles ESE of Cape Concordia; depths of less than 11m extend up to 1 mile offshore for about 7 miles ESE of the river mouth. Anchorage by vessels with local knowledge may be obtained about 0.5 mile WNW of the river mouth. Two islands, 41 and 13.7m high, respectively, to the tops of the trees, lie about 0.5 mile offshore, and 2 miles SE of Cape Concordia. Two rocks, with depths of less than 1.8m, lie about 1.25 and 2.5 miles ENE of Narimuru Island, and about 0.5 and 1 mile, respectively, offshore.

Daumlinge Bay (2°42'S., 141°19'E.) is entered between Narimuru Islet and Cape Concordia, about 1.25 miles NW. Anchorage, sheltered from NW and N winds, may be obtained by vessels with local knowledge, in depths of 9.1 to 18.3m.

9.106 Vanimo Harbor (2°41'S., 141°18'E.) (World Port Index No. 53282) is entered between **Cape Concordia** (2°40'S., 141°18'E.) and Vanimo Point, about 1.25 miles WNW; reefs extend about 0.25 mile N from both entrance points. Cape Concordia, the N extremity of a peninsula, rises to an elevation of 82.6m and is densely wooded; it is marked by a light. There is a village and mission station on the W side of the harbor, and the government station of Vanimo lies in the SE corner of the harbor. At the station, a causeway projects from the shore. At the head of the causeway is a wharf 19m long, with a depth alongside of 4.9m. The wharf is sheltered, though occasionally a swell is felt alongside. A wreck, with a depth of 5.5m, lies 0.15 mile WNW of the wharf. An airfield is situated S of Vanimo.

9.107 Mount Hartmann (2°46'S., 141°15'E.), about 610m high, with a cone-shaped summit, is conspicuous about 6 miles SSW of Cape Concordia.

The depths in the harbor decrease regularly from 31m in the entrance towards the head of the harbor.

Anchorage.—Large vessels can anchor in any part of the harbor in convenient depths, with good holding ground. Small vessels anchor near either corner of the harbor, dependent on the monsoon, fairly protected from the swell.

For vessels approaching from the E and keeping along the coast, Narimuru Islet and Buru Islet form the best guide to the vicinity of the entrance. Vessels can enter without any difficulty by keeping midway between the entrance points; the reefs fringing the entrance points should be given a berth of at least 0.2 mile.

The coast between Vanimo Point and **Robide Point** (2°36'S., 141°04'E.), about 14 miles W, is flat from 1 mile to 3 miles inland, and consists of swampy ground and bushes; it is fronted by a steep-to coral reef, drying nearly as far W as the point. Farther inland is a range of hills.

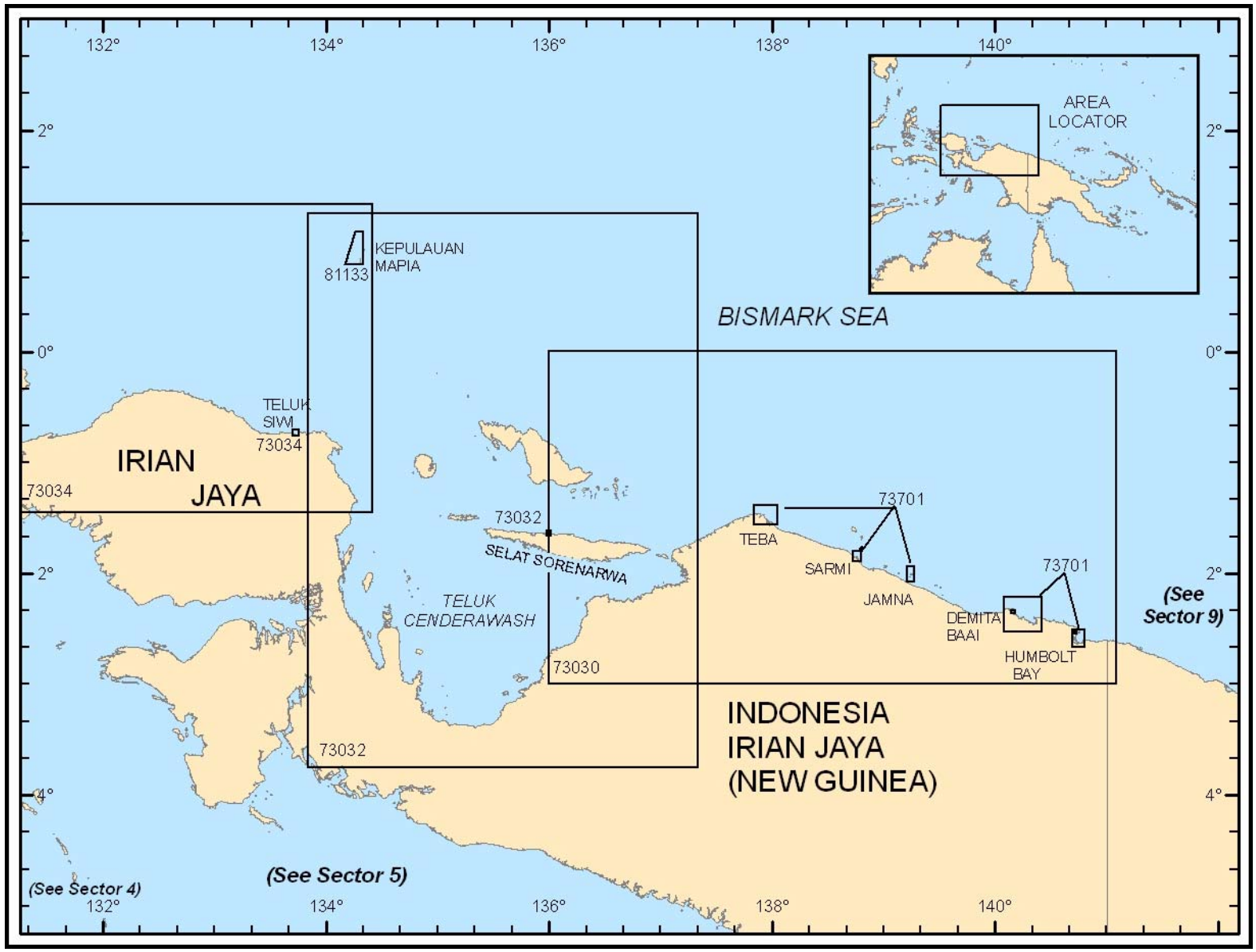
West of Robide Point, the spurs of Mount Bougainville approach the coast, which falls steeply to the sea, and the fringing reef becomes narrower. **Mount Bougainville** (2°39'S., 141°02'E.), 1,204m high, conical, and with a flat summit, lies about 4 miles SSW of Robide Point, and is conspicuous from N or NW.

A vessel took anchorage in a bay 6 miles E of Robide Point, in a depth of 14.6m, about 0.2 mile from the sandy beach. The bay is easily recognized by an off-lying rock; in the E part of the bay is a 4.6m patch, lying about 0.25 mile offshore.

9.108 Bougainville Bay (2°37'S., 141°01'E.), about 2.5 miles W of Robide Point, is about 1 mile wide at its entrance. The village of Wutung lies on the W side of the bay, near a creek discharging into the S side. Approaching the bay from E, the cliffs immediately E of the entrance are steep and conspicuous.

Anchorage may be obtained by vessels with local knowledge, in depths of 18.3 to 22m. A vessel anchored, in 20.1m, coral sand, about 0.2 mile offshore. Landing can be difficult if there is a heavy NW swell.

The 141st meridian is the boundary between Papua New Guinea and Irian Jaya. The E boundary of Irian Jaya is marked on the coast at the foot of a steep rocky cliff by a white stone pyramid, visible from seaward.



Additional chart coverage may be found in NGA/DLIS Catalog of Maps, Charts, and Related Products (Unlimited Distribution).

SECTOR **10** — CHART INFORMATION

SECTOR 10

NORTH COAST OF IRIAN JAYA—EAST BOUNDARY OF IRIAN JAYA TO TANJUNG YAMURSBA

Plan.—This sector describes the N coast of Irian Jaya from the E boundary of Irian Jaya, at the 141st E meridian, to **Tanjung Yamursba** (0°20'S., 132°25'E.). The sector includes **Teluk Cenderawasih** (2°20'S., 135°30'E.). The arrangement of the sector is from E to W.

General Remarks

10.1 The coast of Irian Jaya between its E boundary and Teluk Cenderawasih, except for the E end, is low and monotonous, with a continuous line of trees behind the beach. The line of trees is broken in places by small clumps of casuarina trees or coconut plantations and by the mouths of rivers; behind this is generally a wide plain, rising into hilly land, formed by the spurs of mountains.

The entire area is sparsely populated.

Winds—Weather.—Between the E boundary and Teluk Cenderawasih, as well as in Teluk Cenderawasih, the monsoons do not show the great difference between wet and dry weather, which is such a strong feature for the middle and W parts of the archipelago. The heavy showers of rain fall mostly in July and August.

During July, August, and September NW winds predominated in one year, and NE winds in another. These winds, however, were then not nearly as strong as in other seasons of the year and were nearly always varied in the evening by land breezes, which continued until 2200; after that it is calm, sometimes with much rain, until the early morning. During December, January, and February the NW winds are very strong day and night; they bring little rain, but cause a troublesome sea. April, May, October, and November are transition months.

Tides—Currents.—Tidal currents are only noticeable off the mouths of rivers. Elsewhere, the monsoon current sets E during the Northwest Monsoon and W during the Southeast Monsoon. This current is weak close to the coast between Teluk Yos Sudarso and Teluk Tenahmerah; however, there is sometimes a W or E current of from 2 to 3 knots after strong E or W winds, respectively.

The greatest rate in the open sea was only 1.5 knots, except on one occasion when a set of 2.5 knots was observed.

Caution.—Aids to navigation in this area are reported to be unreliable. They may be missing, unlit, or out of position.

Eastern Boundary of Irian Jaya to Teluk Yos Sudarso

10.2 The coast between the E boundary of Irian Jaya, at the 141st meridian, to **Germania Hook** (Hoek Germania) (2°37'S., 140°56'E.), about 4.5 miles W, is high and covered with vegetation. Germania Hook is the steep termination of a spur of mountain, 310m high, about 1.75 miles SE. A knob, 785m high, a spur of the Bougainville Mountains, is conspicuous about 5 miles ESE of Germania Hook.

The Tami River, navigable only by boats, discharges close W of Germania Hook. From seaward the mouth of the river is easily recognized by the quantity of timber washed up on the coast, particularly W of the mouth. Anchorage off the mouth of the river can be recommended only in fine weather, and is dangerous during the Northwest Monsoon.

The coast between the mouth of the Tami River and Tanjong Jar, about 8 miles W, is inaccessible due to the surf. Sko Sai, about 2 miles W of the entrance to the Tami River, is one of several villages along this coast, and is conspicuous due to a temple with a high conical roof.

Teluk Yos Sudarso

10.3 **Teluk Yos Sudarso** (Teluk Jos Sudarso) (Humboldt Baai) is entered between **Tanjung Jar** (Tanjung Djar) (2°36'S., 140°47'E.) and Tanjung Suaja (Tanjung Soeaja), about 4.5 miles NNW. Teluk Jayapura (Hollandia Baai) and Teluk Imbi (Imbi Baai) occupy the NW part of Teluk Yos Sudarso. Most of the commercial activity is at the head of Teluk Jayapura, where the city of Jayapura (Hollandia Haven) is situated. Teluk Yautefa (Jautefa Bay), at the head of the bay, has a least depth of 3m in the entrance, between drying sand banks.

Teluk Yautefa (Jautefa Bay) (foreground) and Teluk Yos Sudarso (Humboldt Bay) (background) from NW

Winds—Weather.—The monsoons are little felt in and off Teluk Yos Sudarso. By day, there is a sea breeze; in the evenings there is a land breeze, which dies down about 2200. During the Southeast Monsoon, the sea breeze starts fairly suddenly at 1000 and abates just as quickly at 1600. After a calm period, the land breeze sets in after sunset. In the months of June and July, squalls with a force of 5 to 6, coming suddenly from E, must be reckoned with. Strong gusts of wind occur

Teluk Jayapura (Hollandia Baai)

occasionally in the bay, probably due to the proximity of Pegunungan Cycloop (Cycloop Mountains).

In Teluk Jayapura, variable winds predominate throughout the year; from May to August inclusive, the winds are mainly E by day, during the other months they are mostly NW to NE by E, and mostly W in the evenings. The humidity at 92 per cent is very high.

Tides—Currents.—The tidal rise at Teluk Jayapura is 1.2m at mean higher HW and mean lower HW.

The tidal currents in Teluk Jayapura are weak, but there is nearly always a slight S current between Entsjau and the coast which must be allowed for when berthing at the wharves.

Aspect.—Tanjung Jar (Tanjung Djar) (2°36'S., 140°47'E.), the SE entrance point of the bay, is the N termination of a mountain which rises to an elevation of 318m about 1 mile SSE.

A peak, 504m high, backs Teluk Yautefa, about 7 miles WSW of Tanjung Jar. Leimok, a hill, 222m high, about 4 miles N of the peak, is the N termination of a yellowish ridge; there is a prominent radio mast on its summit.

Tanjung Suaja (Tanjung Soeadja) (2°32'S., 140°45'E.), the NW entrance point of the bay, is the SE termination of a peninsula which attains an elevation of 204m about 0.5 mile WNW. A light, from which a racon transmits, is shown on Tanjung Suaja. Several radio towers are situated about 1.25 miles NNW of Tanjung Suaja.

Tanjung Kassu (Tanjung Kassoe), steep and rocky, lies about 1 mile SW of Tanjung Jar. Sibir, a rocky islet, is conspicuous about 0.25 mile farther SW. Pulau Pun (Poen Island), about 0.75 mile SW of Tanjung Kassu, is covered with vegetation.

The S and W shores of Teluk Yo Sudarso, to Hamadi, an islet about 4.5 miles WNW of Tanjung Jar, are sandy and covered with coconut palms.

Caution.—Cemperia (Tjemperia), a shoal, in a depth of 6.7m, lies about 1.5 miles NW of Tanjung Jar.

A shoal, with a depth of 5.5m, lies in the N approach to Teluk Yos Sudarso, about 2.5 miles NNE of Tanjung Suaja, and about 1.5 miles offshore.

Nembawewe, a shoal, with a least depth of 3.2m, lies about 1.5 miles SSW of Tanjung Suaja; a light marks the E side of the shoal. The N side of this shoal is marked by a black buoy. Seroibi, with a swept depth of 5.5m, lies about 0.7 mile W of Nembawewe. Depths of 9.1m lie between the two shoals.

A 2.7m shoal, and a 3.2m shoal lie about 0.8 mile NE and 1.25 miles E, respectively, of Hamadi; other shoals lie farther W. A shoal, with a least depth of 2.3m and marked by piles, lies about 0.75 mile ESE of Tanjung Yogur, which lies about 1.25 miles N of Hamadi.

Several shoals, with depths of less than 5.5m, extend up to 1 mile off the entrance to Teluk Yautefa.

Teluk Jayapura and Teluk Imbi

10.4 Teluk Jayapura (Hollandia Baai) (2°32'S., 140°43'E.) and Teluk Imbi (Imbi Baai), in the NW part of Teluk Yos Sudarso, are separated by Tanjung Kayu Batu (Tanjung Kajoe Batoe), a high point. **Tanjung Yogur** (Tanjung Jogoer) (2°33'S., 140°43'E.), on the S side of Teluk Jayapura, lies about 2 miles WSW of Tanjung Suaja, and is the termination of a spur from Jarremoh, a prominent mountain about 0.5 mile WSW.

Madurau (Madoerau) (2°33'S., 140°44'E.) and Entsyau (Entsjau), two rather high islands, lie 0.35 mile ENE and 0.2 mile NE, respectively, of Tanjung Yogur. A reef, on which the sea breaks in heavy weather, extends about 0.2 mile NW of Entsyau. There is a lighted buoy, reported missing, moored on the NW edge of this reef. A detached drying reef lies about 0.25 mile W of Entsyau.

Teluk Jayapura and its approaches, and the S part of Teluk Imbi, have been wire-dragged to a depth of 14m. A patch in the middle of Teluk Imbi, nearly 0.5 mile NE of Tanjung Kayu Batu, has been wire-dragged to a depth of 12m. Lights, in range 255°, lead to the anchorage at the head of Teluk Jayapura. A lighted buoy, moored 0.3 mile ENE of the front range light, marks the edge of a reef off the N shore in the bay. The reef was reported to be extending S.

10.5 Jayapura (Hollandia) (2°32'S., 140°43'E.) (World Port Index No. 53285) extends along the shores of Jayapura Bay and 7 miles inland. Jayapura is the administrative capital of Irian Jaya.

Tides—Currents.—Tidal currents in Teluk Jayapura are weak, but there is nearly always a slight S current between Entsyau and the coast which must be allowed for when ber-

thing.

Depths—Limitations.—Oil Pier, in the NW corner of Jayapura Bay, is a concrete jetty, in poor condition 32m long with a depth of 4.9m at the accessible berthing section. This berth is suitable for mooring vessels up to 2,500 grt only.

No. 1 Wharf is 132m long, with a depth of 8.8m alongside; a vessel of 20,000 grt can berth there.

No. 2 Wharf is 116m long, with a depth 5.8m alongside.

Berthing for tankers is provided by two mooring buoys, in a depth 13.7m. Cargo is discharged over the stern by floating pipeline to storage tanks ashore.

Aspect.—The village of Imbi, built on piles, stands on the E side of Teluk Imbi. There are a number of fishing traps in Teluk Imbi.

Beacons, with white triangular topmarks, in range 000°, lead to the tanker berth on the W side of Teluk Imbi. A can buoy marks a 9.1m patch, about 0.1 mile S of the front range beacon. A cross range, consisting of two similar beacons, in range 276°, is situated about 0.3 mile N of Tanjung Kayu Batu. Another beacon, close SE of the E beacon of this range, is on the edge of a 4.6m shoal extending from the shore reef.

The offshore pipeline berth, on the W side of Teluk Imbi, is in depths of 13.7m and consists of two stern mooring buoys. A group of oil tanks stand on the shore about 0.1 mile W of the berth.

Pilotage.—Pilotage is compulsory and available 24 hours for vessels over 70 grt. Vessels should send their ETA to the Port Authority 72 hours, 48 hours, and 24 hours prior to arrival. Requests for pilots should be sent 6 hours prior to arrival. The Port Authority can be contacted on VHF channels 12 and 16, while the oil terminals can be contacted on VHF channels 16, 9, and 19. Pilots board in position 2°32.2'S, 140°43.4'E. The harbormaster's office is situated at the head of the harbor.

On arrival at the entrance to Teluk Yos Sudarso, vessels are usually advised by VHF to anchor SSW of Tanjung Suaja or proceed to the pilot boarding point.

The harbor limits of Teluk Jayapura are lines joining Jarremoh and Tanjung Suaja to the NW extremity of Madurau.

Anchorage.—Anchorage may be taken, in depths of 40 to 46m, mud and sand, near the head of Teluk Jayapura.

Safe anchorage can be taken in Teluk Imbi, but the water is rather deep. Vessels should keep clear of the 12m patch in the middle of the harbor.

Caution.—Vessels approaching from N should give the 5.5m patch, about 2.5 miles NNE of Tanjung Suaja, a wide berth.

Vessels approaching from N should give Tanjung Suaja a good berth, as a bank, with a depth of 3.7m and an above-water rock on its outer edge, extends about 135m SE from the point. After rounding the point the vessel should bring the range lights in line, bearing 255°, which leads to the anchorage.

Nembawewe should be given a berth of at least 0.2 mile.

Teluk Yos Sudarso to Tanjung Kamdara

10.6 The coast between **Tanjung Suaja** (2°32'S., 140°45'E.) and Tanjung Tanahmerah, about 26 miles WNW, is high, with numerous ridges extending N from the mountains, and terminating in steep points and rocky cliffs at the coast. There are small sandy beaches between the points, and there are several villages on the coast.

Tanjung Suaja Light is shown at an elevation of 215m. A racon transmits from the light structure.

Merah Riboh, 680m high, lies about 3.5 miles WNW of Tanjung Suaja. Remor, about 10.5 miles farther W, is the highest of three conspicuous peaks of Pegunungan Cycloop (Cycloop Mountains) and attains an elevation of 2,056m. The Dafonsero Mountains, with four peaks, lie at the W end of this section of coast; the highest peak attains an elevation of 1,623m and is conspicuous about 6 miles SE of Tanjung Tanahmerah.

Teluk Tanahmerah (Tanahmerah Baai) is entered W of **Tanjung Tanahmerah** (2°24'S., 140°21'E.), the E extremity of a peninsula rising to an elevation of about 100m. The bay is deep, with a generally rocky shore, with occasional beaches and the hills rising steeply from the sea. A peak, 647m high, and steep on its SE side, is distinctive about 4.5 miles SSW of Tanjung Tanahmerah.

A tongue of land, 155m high at its N end, projects N from the S side of the bay. Kwakeboh, 56m high, is the outermost of several islets, lying on a partly drying reef which extends 0.67 mile N of the tongue of land. Teluk Demengong lies on the W side of the tongue, and Teluk Depapre lies on the E side.

Siakammoko, a sharp conical peak, and Deparemoko, a prominent double peak, lie about 1.75 miles and 1 mile, respectively, S of the N extremity of the tongue.

Foul ground, with a small wooded islet within its outer edge, extends 0.35 mile from the head of Teluk Demengong.

Anchorage.—It is reported that safe anchorage can be taken, in 40m, in Teluk Demengong, close W of the small wooded islet. There is also anchorage, in 40m, in Teluk Depapre, close offshore. Strong continuous NW winds cause a heavy swell in the bay, but at other times there is a calm sea. The coastal reef is mostly marked by discoloration.

10.7 Teluk Iris (Iris Baai) (2°24'S., 140°13'E.) is entered about 5.75 miles W of Tanjung Tanahmerah. The shores of the bay show bright white rocky patches in places. Kiakebo, an above-water rock, lies in the NE approach to the bay, nearly 0.5 mile NW of the E entrance point. Daidokopo, a rock above water, lies in the N approach, nearly 1.5 miles NW of the E entrance point; a patch, with a depth of 4.6m lies 0.35 mile N of Daidokopo, with a 5.5m patch between. A reef, on which there are three above-water rocks, lies about 0.3 mile N of **Tanjung Hadimoko** (2°24'S., 140°14'E.), located about 1 mile WSW of the E entrance point. The passage between Daido-kopo and the three rocks is deep and clear of dangers. Anchorage, exposed N, can be taken at the head of the bay, in depths of 12.8 to 16.5m, about 0.35 mile offshore, with good holding ground. During the Northwest Monsoon, anchorage may be obtained close off the mouth of the Marubu River (Maroeboe River), in the SE corner of the bay by vessels with local knowledge.

Teluk Muris (Moeris Baai) (2°22'S., 140°10'E.) is entered about 4.5 miles WNW of Daidokopo. Anchorage, with no shelter from N, may be obtained by small vessels in Teluk Muris, with good holding ground.

Salean Segara is a reef, with a least depth of 2.7m, marked by discoloration, lying about 2.25 miles ENE of the E entrance point of Teluk Muris; it extends about 1 mile in a NW-SE direction, is steep-to, and is usually marked by heavy breakers.

A patch, with a depth of 12m, lies about 1.75 miles E of the

E entrance point of Teluk Muris. A 4.9m patch, which is seldom marked by discoloration, lies about 1 mile NE of the same entrance point. Daidokopo bearing 110°, and in range with the summit of the Dafonsero Mountains, leads between the coast and the above two patches.

10.8 **Teluk Demta** (2°21'S., 140°09'E.) is separated from Teluk Muris by a peninsula with Tanjung Ande at its N extremity. The bay is entered between Tanjung Ande and Tanjung Murugue (Tanjung Moeroegoee), about 0.2 mile NW. A reef, with depths of less than 5.5m, and on which there are several islets, extends about 0.5 mile N of Tanjung Ande. An above-water rock lies on the shore reef, close E of Tanjung Murugue. Several beacons, which cannot be relied on, mark the edge of the reef on either side of the bay.

Anchorage.—Teluk Demta affords secure anchorage, sheltered from the heavy N swell by Pulau Besar (Poelau Besar) on its W side.

Mayee (Majee) (2°22'S., 140°08'E.), a sharp 676m high peak nearly 2 miles WSW of Tanjung Ande, is a good landmark in the approach to Teluk Demta. The flat summit of Jembee, about 1 mile SE of Mayee, in range 211° with the beach at the head of the bay, leads to the anchorage. As the alignment leads rather close along the E side of Pulau Besar, it is advisable to haul E before passing Tanjung Murugue, as the reef extends about 135m from the point; then a mid-channel course leads to the anchorage.

10.9 **Teluk Matterer** (Matterer Baai) (2°19'S., 140°08'E.) is entered between Tanjung Korongwaab, at the NW end of Pulau Besar, and Tanjung Kamdara, about 1.5 miles W. Reefs and depths of less than 5.5m extend up to 0.3 mile N of Pulau Besar.

Tanjung Kamdara (2°19'S., 140°07'E.) is fringed by reefs, which extend nearly 0.75 mile ENE of the point; reefs and depths of less than 5.5m extend up to 0.4 mile N of Tanjung Kamdara.

Approaching from W, a good landmark is a hill, 90m high, about 1.75 miles WSW of Tanjung Kamdara; this hill is a spur of another hill, 119m high, close S. About 1.5 miles SE of the 90m hill, a short ridge, 443m high, is plainly visible.

Teluk Matterer, open N, does not afford good anchorage, as winds from between NW and NE prevail by day throughout the year, and the head of the bay is encumbered by reefs.

Anchorage.—Temporary anchorage can be taken, in 12 to 12.8m, good holding ground, mud and sand. There is a detached reef, with a depth of 1.8m, in the center of the harbor. A vessel should approach with Mayee bearing 186°; the white patch on the slope of the hill on the SW side of the bay is a good mark when the vessel is closer in.

A good refuge harbor during the Northwest Monsoon for vessels with local knowledge is in Tarfia Roads SE of Tanjung Kamdara; the anchorage is in a depth of 4m, with the S extremity of the peninsula on which lies the village of Tarfia bearing 277° and the N extremity bearing 313°.

Tanjung Kamdara to Kepulauan Wakde

10.10 The coast between **Tanjung Kamdara** (2°19'S., 140°07'E.) and the point abreast Kepulauan Wakde, about 70 miles WNW, is low and bordered by an almost continuous sandy beach backed by trees; inland, marshy plains extend to the hills, which approach the coast abreast Kepulauan Podena.

Teluk Walckenaer is the bight formed between Tanjung Kamdara and **Tanjung Wiruwai** (2°17'S., 139°39'E.) about 28 miles W. Tanjung Wiruwai can be identified by the mouth of the Wiruwai River (Wiroewai River) close E of it; the coast is thickly populated in the vicinity of the river. Anchorage can be taken in any part of Teluk Walckenaer, but there is always a ground swell near the coast.

Pulau Kaicebo (Kaitjebo) (2°14'S., 139°34'E.), a sandy cay covered with vegetation and high trees, and **Pulau Mengge** (Mengge) (2°12'S., 139°32'E.), a low rocky islet with high trees, lie about 1.5 miles offshore, about 5.75 and 8.75 miles, respectively, NW of Tanjung Wiruwai. Mopkai and Warko, each with a depth of 5.8m, lie about 0.5 mile and 1.25 miles, respectively, NNW of Pulau Kaicebo; the reefs are not marked by discoloration.

Kepulauan Podena (2°07'S., 139°29'E.), lying about 12 miles NW of Tanjung Wiruwai and within 5 miles of the coast, consists of Pulau Anus (Anoes), 40m high; Pulau Yarsun (Jarsoen); and Pulau Podena (Podena), 28m high. The islands are covered with fairly high trees and there are small villages on each island. A reef, with depths of less than 5m, extends about 1.25 miles NNW from Pulau Anus; a patch, with a depth of 8.8m, lies about 0.25 mile E of the E extremity of Pulau Yarsun.

Anchorage may be obtained, in 28m, about 135m from the S extremity of Pulau Yarsun, but it is not recommended due to the swell.

10.11 The coast SW of Kepulauan Podena is backed by the Siduarsi Mountains (Sidoearsi Mountains), attaining an elevation of 851m about 9 miles inland. This range is especially conspicuous from E, and appears from N as a chain of peaks extending E-W. The Gauttier Mountains, farther SW, attain an elevation of 2,272m, about 38 miles from the coast. The Gauttier Mountains are connected E to the Foja Mountains, 2,194m high, by a high ridge. The latter two ranges can be identified in clear weather.

Of the many rivers along this coast, the Biri River, entered about 6 miles WSW of Pulau Podena, is the only one accessible by small craft; it is about 37m wide near its mouth.

Pulau Yamna (Jamna) (2°01'S., 139°15'E.) and Pulau Mademo (Mademo), two low islands, principally occupied by coconut plantations, lie about 14 miles WNW of Kepulauan Podena. A light is shown from the W extremity of Pulau Yamma.

A shoal, with a depth of 1.8m, slightly marked by discoloration, and a shoal, with a least depth of 12m at its N end, lie about 0.5 mile N and 1.25 miles NNE, respectively, of Pulau Yamma. A shoal, with a depth of 6.4m, and a shoal, with a depth of 4m, lie about 1 mile ENE and 0.67 mile E, respectively, of the SW end of the same island. A 2.4m patch, with a 7m patch close S, lies about 0.25 mile SW of the W extremity of Pulau Yamma. The shoals off Pulau Yamma are frequently marked by rips; with the wind against the current, the sea appears to break over the 12m shoal NNE of the island. The velocity of the tidal current is variable but does not exceed 1.5 knots.

A shoal area, with depths of 2.7m at the outer end, extends about 0.7 mile NNE of Pulau Mademo. A 4.9m patch lies about 0.3 mile SE of the SE end of Pulau Mademo, and a 5.8m patch lies about 0.25 mile WNW of the N end of the same island.

A 5.8m patch, with a 4.9m patch about 0.25 mile WSW of it, lies about 1.25 miles SW of Pulau Mademo, about midway between the island and the mainland.

Anchorage can be taken in the bight on the SW coast of Pulau Yamma, or farther offshore, in a depth of about 14.6m.

10.12 Pulau Masi-Masi (Masi Masi) (2°00'S., 139°08'E.), an island, 52m high to the tops of the trees, lies about 6 miles W of Pulau Yamma and about 1.5 miles offshore. A shoal, with a depth of 4.6m, lies midway between the island and the mainland. Sefieri, a rock, awash, lies about 2 miles ESE of Pulau Masi-Masi. A rock, with a depth of 0.3m, lies about 3.75 miles W of the N end of Pulau Masi-Masi; a 0.9m patch lies about 1.25 miles farther NW; they are not marked by breakers and show only slight discoloration.

Kepulauan Wakde (1°56'S., 139°01'E.) consists of Insumoar (Insoemoar) and Insumanai (Insoemanai), close S of it, lying about 7.5 miles WNW of Pulau Masi-Masi, and about 1.5 miles offshore. Both islands are low and covered with coconut trees, which attain an elevation of 41m on Insumoar. A patch, with a depth of 5.5m, lies about 0.5 mile SSE of the S extremity of Insumoar.

Anchorage may be obtained, in 12 to 12.8m, between the islands, where there is no swell. Tidal currents are irregular, but never exceed velocities of 1.5 knots. A jetty, reported in poor condition, is situated on the S side of Insumoar.

Rocks, with depths of 1.5 and 1.8m, lie about 1.5 miles W, and 2.75 miles WSW, respectively, of the W end of Insumoar.

Kepulauan Wakde to Tanjung Perkham

10.13 The coast between the village of **Arare** (1°58'S., 139°00'E.), on the coast abreast Kepulauan Wakde, and Tanjung Perkham, about 71 miles WNW, is entirely flat, and bordered by a wide dark-colored sand beach. Behind the beach, there are high trees of uniform height; the coast presents no noticeable features, except at Tanjung Verkami.

A peak, 610m high, SW of Kepulauan Wakde, and about 20 miles E, is conspicuous from NE. The Irier Mountains, running in a N-S direction, lie between the peak and the coast; Basbassi, 688m high, is the highest peak of the range. Near the N end of this range and 5 miles inland, a peak, 610m high, is conspicuous from E.

The **Tor River** (1°57'S., 139°54'E.) flows into the sea about 6 miles W of Kepulauan Wakde, and can be entered by small craft at HW. A dangerous spit extends about 1 mile N of the entrance. The E entrance point of the river can be identified by a group of high casuarina trees. There is a strong current in the river, and muddy water extends from 4 to 5 miles offshore; the dividing line between fresh and sea water is often marked by heavy ripples, which frequently have the appearance of reefs.

Teluk Maffin (1°58'S., 138°52'E.) indents the coast about 1.5 miles WSW of the mouth of Tor River. Anchorage may be obtained, in 13.7m, close off the village of Maffin, with good holding ground of mud and sand, and out of the tidal current. Anchorage can be taken, in 66m, farther offshore, but care must be taken to avoid a deep gully, with depths of 92 to 110m, which extends into the middle of the bay close W of Maffin.

The village of Sawar, about 8 miles WNW of the mouth of the Tor River, is backed by coral stone, rising vertically to elevations of about 30.5 to 40m.

Sarmi Anchorage (1°51'S., 138°45'E.) is formed by a peninsula extending from the coast, about 3.5 miles NW of Sawar. The peninsula is fringed by reef which extends about 0.2 mile from its N end. There are conspicuous, high, round-topped trees on the peninsula. The village of Sarmi, on the peninsula, is the headquarters of a government official.

A light is shown from the N part of the peninsula.

Pulau Sarmi (Poeloe Sarmi) and Pulau Sawar (Poeloe Sawar) are low reef-fringed islets lying nearly 1 mile NNW, and 1.5 miles SSE, respectively, of the N end of the peninsula.

A reef, with a depth of 1.8m, lies 0.35 mile E of the N end of the peninsula. A rock awash liesa bout 0.7 mile SSE of Pulau Sawar. A sunken wreck, dangerous to navigation, lies 1.1 miles SSE of the N end of the peninsula. This wreck is marked by an obstruction buoy N and S of the position.

Anchorage.—Good anchorage may be obtained, in depths of 7.6 to 12m, mud and sand, on either side of the peninsula. During the Northwest Monsoon, some swell sets into the SE anchorage. A stone pier for boats extends over the reef on the S side of the peninsula.

10.14 Kepulauan Kumamba consists of **Pulau Armo** (Armo) (1°41'S., 138°48'E.), 143m high and marked by a light, and Pulau Liki (Liki), 328m high, about 4 miles NW, with the small island, Pulau Lamsutu (Lamsoetoe), 104m high, midway between. The islands are located on a plateau which is separated from the mainland by a deep passage. The S extremity of Pulau Armo lies about 9 miles NNE of Sarmi.

There are patches, with depths of 2.8 to 11m, between Pulau Liki and Pulau Armo. Isyuma Light is shown from the N extremity of Pulau Liki. A reef extends about 0.5 mile N of Pulau Liki, and a rock lies 1 mile SSW of the S extremity of Pulau Armo. These dangers are seldom marked by discoloration. Vessels of deep draft should not pass between Pulau Armo and Pulau Lamsutu. Kepulauan Kumamba has been reported to lie 3.3 miles 320° from its charted position.

Currents were reported to set W, with a velocity of 3 to 4 knots, off the S end of Pulau Armo. A maximum velocity of 1.5 knots was observed between the islands.

Anchorage may be obtained off the lee sides of the islands, but the depths are considerable.

The coast between the peninsula of Sarmi and Tanjung Perkam, about 55 miles WNW, has regular depths, shoaling gradually shoreward. Anchorage may be taken fairly close offshore along this coast. The coast in the vicinity of Tanjung Perkam should not be approached within 3 miles as a bank fronts the entrance of theMatabori River and the mouth of the Mamberamo River. The coast in the vicinity of the mouths of rivers is constantly changing; during the Southeast Trade Wind, it silts up, while during the Northwest Monsoon, the surf causes erosion.

A moderate ESE current is usually experienced along this coast and large trunks of trees are frequently encountered.

Tanjung Verkami (1°48'S., 138°41'E.), about 5 miles NW

of Sarmi, is conspicuous due to a group of high trees protruding above the surrounding foliage.

The **Matabori River** (1°31'S., 137°59'E.), entered about 5.5 miles SE of Tanjung Perkam, is accessible to small vessels with local knowledge at HW. The ebb tidal current may attain a velocity of 4 knots. There are high trees on the W entrance point of the river and some low casuarina trees on the E entrance point.

Tanjung Perkam (Kaap d'Urville) (1°28'S., 137°55'E.) can be identified by a very high clump of trees on its extremity and also by the wide mouth of the Mamberamo River, close W, when viewed from NNE.

The Mamberamo River

10.15 The **Mamberamo River** (1°28'S., 137°54'E.), one of the largest rivers in Irian Jaya, is entered W of Tanjung Perkam. A deep channel leads to the river entrance from depths of over 183m. Close outside the river entrance there are two patches, in depths of 5.5m and 6.4m, respectively, in the middle of the channel, with a deep channel on either side of them. Close inside the patches there is a bar, with depths of 7 to 9.1m.

The banks of the river are sparsely populated. The village of Teba lies on the E bank of the river, about 1 mile within the entrance. There is a light on the W shore of the entrance.

The river has been safely navigated by a surveying vessel as far as Kerkhoven Island and Morris Island, abut 50 miles from its entrance. A vessel of 2.4m draft can reach Marine Falls, nearly 50 miles farther upriver, but there are rapids and whirlpools on this stretch of river.

Tides—Currents.—The level of the river shows little variation at the different seasons, the greater difference so far recorded being 4m below Marine Falls.

The velocity of the outgoing fresh water current is 4 knots at LW and 2.5 knots at HW. This layer of fresh water flows over the salt water, which lies in the deep channel in the approach and is not subject to this current.

Anchorage.—Good anchorage can be obtained, in 12m, off the village of Teba, where the river is about 0.2 mile wide. Vessels anchor E of the main stream where they are clear of the ocean swell.

Directions.—The mouth of the Mamberamo River is not easy to identify, but the clump of high trees on Tanjung Perkam is a good guide. Approaching from W, several isolated trees on the W entrance point are a good guide.

When about 4 miles N of Tanjung Perkam, keep the W entrance point in range with the inner point on the E side, bearing 202°, until the outer point on the E side of the entrance to the Matabori River is in range with Tanjung Perkam, bearing 131°. Then steer to make good a course of 180°, allowing for the NNE stream of fresh water, in order to pass W of the 5.5m patch close outside the entrance. When the outer point W is shut in by the W entrance point of the river, steer for the inner point on the E side, bearing 207°, until the first point on the W side is abeam, and then keep near the W bank. A good lookout should be kept for large tree trunks which are frequently carried downstream.

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The Mamberamo River

Tanjung Perkam to Selat Kurudu

10.16 The coast between **Tanjung Perkam** (1°28'S., 137°55'E.) and Tanjung Dombo, about 56 miles WSW, is low, almost uninhabited, with several unimportant rivers entering the sea. **Mabri Hill** (1°51'S., 137°15'E.), a hill, 169m high, about 9.5 miles ENE of Tanjung Dombo, is the only elevated land along this coast; it has high trees on its summit, and is a good landmark due to its isolated position.

Depths on this coast are regular, shoaling gradually shoreward. The coastline at the mouths of rivers are subject to constant change; it silts up in the NE trade and in the Northwest Monsoon the surf causes portions to fall away.

Pulau Kurudu (Koeroedoe) (1°51'S., 137°00'E.), a hilly island, 169m high at its E end, lies about 3 miles WNW of Tanjung Dombo, from which it is separated by Selat Dombo (Dombo Strait). A bank, with a least known depth of 0.9m, extends about 1.25 miles N from the NE extremity of Pulau Kurudu; depths of less than 7.8m extend about 2.5 miles farther N.

Anchorage.—Safe anchorage, during the Southeast Trade Winds, may be obtained off the village of Kaipuri, situated in the middle of the S coast of the island, and also off the village of Kurudu, on the NE coast, W of the projecting bank. During the Northwest Monsoon, there is a swell at both anchorages and landing cannot be made.

10.17 Selat Kurudu (Koeroedoe Strait) (1°49'S., 136°56'E.), deep and clear, separates the W extremity of Pulau Kurudu from **Tanjung Rainbawi** (1°47'S., 136°54'E.), the E extremity of Pulau Sorenarwa, nearly 4 miles NW. A reef, with a depth of 3m at its outer extremity, extends about 0.75 mile offshore from the W extremity of Pulau Kurudu; a reef, with a depth of 0.9m, lies about 0.5 mile S of Tanjung Rainbawi.

A light is shown from Tanjung Rainbawi.

The strait is navigable at night with good visibility, care being taken to avoid mistaking Selat Dombo for Selat Kurudu; soundings, however, are a good guide.

Tides—Currents.—There are strong tidal currents in the strait. During springs the tidal currents set constantly SW, with a maximum velocity of 3.5 knots.

A shoal, with a depth of 8.8m, lies about 10 miles S of Tanjung Rainbawi.

Island in the Approach to Teluk Cenderawasih

10.18 Kepulauan Schouten (Schouten Islands) (1°00'S., 136°00'E.), in the approaches to Teluk Cenderawasih (Teluk Sarera), consist of Biak and Supiori, separated from each other by a narrow channel; Kepulauan Padaido, SE of Biak; and Bepondi and Ayawi, NE of Supiori. Biak and Supiori are mountainous; the others are low and hilly, but most of them are densely covered with high trees.

Farther S, the islands of Pulau Sorenarwa, Mios Num, and Numfoor extend across the entrance of Teluk Cenderawasih, and are separated from Kepulauan Schouten by Selat Sorenarwa.

During the Northwest Monsoon, the heavy seas in the E entrance to Selat Sorenarwa can be avoided by passing N of Kepulauan Padaido, taking care to avoid Wundumimas, then proceeding midway between Biak and Owi.

Winds—Weather.—In the vicinity of Kepulauan Schouten, November and April are the transition months. The change from the Northwest Monsoon to the Southeast Monsoon and the beginning of this last season is characterized by a period of long calm called "Wampasis" (quiet wind) by the natives. In both monsoons, the sky is overcast and, especially near the Equator, much rain was experienced. During the Southeast Monsoon, there was often a thick mist over the sea for months on end.

Land and sea breezes usually occur over Pulau Supiori and Pulau Biak 3 hours after sunset and sunrise. They are only of any importance during the periods that the monsoon wind is less strong.

Tides—Currents.—During the Northwest Monsoon, the E current divides into two branches W of the NW extremity of Pulau Supiori. One branch sets N of Kepulauan Schouten; the other branch sets SE between Pulau Supiori and Pulau Numfoor, then E through Selat Sorenarwa, and then NE out though its E end. From the latter branch another branch sets between NNE and NE, along the S coast of Pulau Biak, and unites off the W end of Pulau Biak with the N branch. During the Southeast Monsoon, the reverse occurs.

Kepulauan Padaido

10.19 Kepulauan Padaido (Padaido Islands) (1°15'S., 136°35'E.) consist of a large number of wooded islands and islets. Some are hilly, with elevations up to 137m, and others are low and sandy.

Pulau Workbondi (Mios Workbondi) (1°13'S., 136°42'E.), 56m high, the E island, lies about 37 miles NNW of Tanjung Rainbawi. Urbinasi, a bright white sandy patch, lies on the W extremity of a drying reef, S of Pulau Runi (Roeni), an islet about 4 miles S of Pulau Workbondi. Urbinai (Oerbinai), an extensive shoal, with a least depth of 4.6m, lies about 2 miles E of Pulau Workbondi. Kassinampia is an extensive bank, with a least depth of 5.8m at its NW extremity, about 2.75 miles NNW of Pulau Workbondi.

Pulau Bromsi (1°13'S., 136°36'E.), about 5 miles W of Pulau Workbondi, attains an elevation of 137m and is the highest of the group. Pulau Pakriki (Pakriki), about 3 miles farther WSW, has a table-topped summit, 136m high, which is very prominent. Pulau Manggwandi (Mios Manggwandi), about 2.5 miles S of Pulau Bromsi, is 77m high at its N end. Pulau Rasi (Rasi), the S islet of the group, and a reef, with a depth of 0.9m and plainly marked by discoloration, lie about 1.5 miles SE and SW, respectively, of the S end of Pulau Manggwandi.

A light is shown from Pulau Rasi.

A coral patch, with a depth of 4.6m and a 7.6m patch about 0.5 mile E of it, lies about 6.5 miles WSW of the S extremity of Pulau Manggwandi. A 0.9m patch lies about 1 mile SW of the S end of Pulau Manggwandi.

A 7.9m patch, about 2 miles WNW of Pulau Pakriki, is marked by eddies and tide rips, but does not discolor.

The passage between Pulau Manggwandi and Pulau Pasi (Pasi), about 1 mile N, is clear of dangers. The narrow passage between Pulau Pasi and Pulau Bromsi has a least depth of 18.3m in mid-channel; a current was reported setting W in the passage, with a velocity of 1 to 3 knots. There is a least depth of 6.9m in the fairway between Pulau Bromsiand and Pulau Padaidori (Padaidori), the N island of the group; a strong current runs through this passage.

10.20 Pulau Pai (Pai) (1°13'S., 136°26'E.) lies at the NE extremity of an atoll, about 3 miles W of Pulau Pakriki. Pulau Nusi (Noesi), Pulau Wundi (Mios Woendi) and Pulau Auki (Auki) also lie on the atoll; the above islands are inhabited. Jumni, an islet, 42.4m high, lies about 1 mile E of Pulau Auki. A shoal, which partly dries, lies about 1 mile SW of Pulau Komori, an islet on the SW side of the atoll; it shows as a bright white sand bank, and is plainly marked by discoloration when covered. **Pulau Wurki** (Mios Woerki) (1°17'S., 136°19'E.), about 3.5 miles WSW of Pulau Wundi, has coconut plantations on it, and is uninhabited.

Anchorage.—Anchorage may be obtained, in 18.3 to 26m, good holding ground of mud, sand and coral, by vessels with local knowledge, in the lagoon off Pulau Wundi.

The entrance to the lagoon, at its S end, is marked on its W side by a red conical buoy. The entrance to the lagoon, with a least depth of 9m, lies between a patch, with a depth of 4.9m, on the W side, and the S extremity of the reef extending about 1 mile S from Pulau Nusi, on the E side; there is often a strong current setting across the entrance.

Vessels should enter the lagoon with the W side of Pulau Wundi, bearing 332.5°, in range with Jumni, 0.75 mile from its W end. When well within the entrance change course to 027°, which leads to the anchorage.

10.21 Pulau Owi (Owi) (1°14'S., 136°13'E.), 94m high and inhabited, lies about 3.75 miles W of Pulau Auki, and is the W island of the group.

Pulau Rurbasbeba (Roerbasbeba), with Pulau Rurbaswedari about 0.4 mile E, are the SW islets of the group and lie about 3 miles S of Pulau Owi. The islets have practically no coastal

reefs, and the pass between them is deep and clear of dangers.

Karana Wundumimas (Woendoemimas), with a swept depth of 5.9m, lies about 4 miles N of Pulau Pai, in the passage between Kepulauan Padaido and Pulau Biak. A rectangular area, extending about 0.6 mile N and W, and about 1.25 miles S and E, respectively, of Karana Wundumimas, has a clear swept depth of 17m.

Tides—Currents.—During a survey, the tidal currents set strongly S with the falling tide and weakly N with the rising tide, in the channels between Pulau Pakriki and the islands on either side. In the vicinity of Pulau Pakriki, S of line joining Pulau Padaidori and Pulau Pai, there were constant heavy tide rips; at the same time there was a constant layer of water setting S from the W side of Pulau Pakriki and a whirlpool E of the line.

While anchored off the E side of Pulau Pasi, it was observed on several occasions that there was a constant S set with a maximum velocity of 2 knots.

During October and November, between Kepulauan Padaido and the SE end of Pulau Biak, there was a constant SSW set, with a maximum velocity of 2 knots, with a SW wind, which raised a heavy sea, especially between Tanjung Warari, the E extremity of Pulau Biak, and Pulau Padaidori.

During the Southeast Trade Wind, the current sets NW, dividing at Tanjung Warari and setting along both sides of Kepulauan Padaido.

Pulau Biak

10.22 Manseren Baken (0°44'S., 135°51'E.), 740m high, and Sombunen, 695m high, the highest peaks in Pulau Biak (Biak), lie about 3 miles SE and 2.75 miles S, respectively, of Tanjung Praisbari, the N extremity of the island. The land then slopes gradually to the SE end of the island. There are some fairly conspicuous hills on the coast between Tanjung Praisbari and the NW entrance point of Teluk Korim (Korim Bay), about 18 miles SE. A ridge, 412m high, lies about 2.25 miles S of Tanjung Snerisbari, the S entrance point of Teluk Korim.

The NE coast of Pulau Biak is reported to be a good radar target at a distance of 27 miles.

Pulau Biak—South and West Coasts

10.23 The S coast of Pulau Biak is mostly low and bordered by sandy beaches. Some high white rocks are on the shore of the bight E of **Tanjung Samersbari** (1°11'S., 135°54'E.). There are numerous villages visible from seaward. Except at **Mokmer** (1°12'S., 136°09'E.), where there is a steep cliff, conspicous from E, there are no outstanding features on this coast; a light is shown at an elevation of 105m at Mokmer.

Tanjung Warari, the E extremity of Pulau Biak and marked by a light, is low; a reef, on which there is an islet, extends about 0.2 mile E of the point. There are whirlpools off the point.

The village of Bosnik, the headquarters of a government official, lies about 11.5 miles WSW of Tanjung Warari; a boat pier extends to the edge of the coastal reef. Anchorage, in 20 to 40m, can be taken by vessels with local knowledge, about 0.1 mile off the head of the boat pier. Vessels should leave the anchorage when strong SW winds spring up. Working cargo is difficult during the Northwest Monsoon.

Suanggarai Roads (Soeanggarai Roads) lie off the coast between **Tanjung Faknik** (1°11'S., 136°10'E.), about 3.75 miles WSW of Bosnik, and the village of Mokmer, about 2 miles farther WSW. Maidurip, an islet, lies on the coastal reef, about 0.6 mile SW of Tanjung Faknik, and is conspicuous due to its light green color against the dark green rocky coast behind it. A detached drying reef lies with its N extremity about 0.25 mile SE of Tanjung Faknik.

A patch, with a depth of 4.6m, and about 0.25 mile offshore, lies about 0.3 mile E of Tanjung Sapori, which is located about 1 mile SW of Tanjung Faknik. A detached drying reef lies between the patch and Tanjung Sapori; the edges of the reef are steep-to and plainly marked by discoloration.

Anchorage.—The anchorage may be approached with the W extremity of Pulau Owi (Kepulauan Padaido) bearing 161° astern, in range with the E extremity of Pulau Rurbasbeba; Tanjung Faknik will then be slightly on the starboard bow. When Maidurip bears 292°, steer for it on that bearing and anchor, in 40 to 50m, about 0.4 mile from the islet, where a vessel will be almost outside the tidal current. Small vessels can anchor farther in, in about 42m, with Maidurip bearing 323°, distant about 0.1 mile.

Small vessels with local knowledge can obtain fairly good anchorage, in 29 to 40m, in a bight in the coastal reef NE of Maidurip. Anchorage may also be obtained between the islet and Tanjung Faknik. Both anchorages are protected NE by the detached drying reef SE of Tanjung Faknik.

Sorido Lagoon

10.24 From Tanjung Sapori to the entrance of **Sorido Lagoon** (1°12'S., 136°05'E.), about 3 miles W of Mokmer, the fringing reef and shoals extend only about 0.25 mile offshore, beyond which is deep water.

Sorido Lagoon, a natural harbor, lies between Pulau Biak and a barrier reef which lies parallel to the coast until it joins the coastal reef at **Sorido** (1°10'S., 136°03'E.), a village at the head of the lagoon, 3.5 miles within the entrance. The lagoon is 0.25 mile wide at its entrance, widening gradually to 0.5 mile opposite Waupenor, a town situated on the coast about 1.25 miles within the entrance, where there is a government wharf. The barrier reef is plainly visible. From the entrance to a position opposite the wharf it is submerged with occasional drying patches; then to the head of the lagoon the reef dries except for a secondary entrance through the reef, less than 0.1 mile wide, about 1.5 miles W of Waupenor.

Sorido Lagoon is the most important trading center of Kepulauan Schouten. Biak is the official name of the chain of settlements situated along the N side of the lagoon. The headquarters of the government officials of the Teluk Cenderawasih area and the islands are located here.

Port of Biak

http://www.portina4.go.id/biak.htm

Tides—Currents.—The tidal rise at Sorido Lagoon is 1.6m at MHHW and MLHW.

The tidal currents are weak and do not exceed 0.5 knot. In-

side the lagoon, the flood current sets W and the ebb current sets E.

Winds—Weather.—Because of sudden heavy squalls, vessels may have to get underway on short notice.

Aspect.—The channel to the wharf and for about 0.25 mile W of the wharf has been swept to 11m. The berth is 142m long and has depths of 11m alongside. Vessels up to 30,000 dwt can use the harbor. The area NW of the swept area is encumbered with reefs.

A lighted buoy, painted in red and white vertical stripes, with a red cylindrical topmark, is moored on the W side of the entrance to the lagoon, and marks the E extremity of the barrier reef.

Pilotage.—Pilotage is compulsory, but is not undertaken at night. The pilot boards in the anchorage in position 1°12.2'S, 136°°05.0'E.

Anchorage.—There are several anchorage berths in the E part of the lagoon. To seaward there is an anchorage area with good holding ground which should be approached with caution due to strong currents.

Caution.—Several shoals lie outside the barrier reef S of Sorido Lagoon. A 7.6m shoal, and an 8.2m shoal, lie 0.67 mile S, and 1 mile SW, respectively, of Waupenor, and about 0.25 mile off the barrier reef. A 3.4m shoal lies 0.35 mile off the SW part of the barrier reef.

White rocks lie about 0.25 mile offshore about 6 miles WNW of Waupenor. A 3.4m patch lies about 0.75 mile W of these rocks. **Tanjung Sambersbari** (1°11'S., 135°54'E.) lies about 4 miles farther WSW. A high, gray rock lies on the coast about 5 miles NW of Tanjung Sambersbari.

Between Tanjung Snerisbari, a low point, about 8 miles NW of Tanjung Sambersbari, and the S entrance to Sorendidori, about 18 miles farther NNW, there are no off-lying dangers, except **Japonda** (1°03'S., 135°49'E.), a drying reef, about 0.5 mile offshore and 2.5 miles NNE of Tanjung Snerisbari.

Sorendidori, the narrow channel separating the NW end of Pulau Biak from Pulau Supiori, has considerable depths at its S end, but the N end is only navigable by small vessels with local knowledge. A detached reef, plainly marked by discoloration, lies in the S entrance; the channel lies between it and the E shore, which is steep-to, with no coastal reef. A rock lies about 1.5 miles E of this detached reef at the entrance. Anchorage may be obtained by vessels with local knowledge in the S entrance, close to the detached reef. There is no tidal current in the channel.

Pulau Biak—Northeast Coast

10.25 The coast between **Tanjung Warari** (1°05'S., 136°23'E.) and Tanjung Snerisbari, about 23 miles NW, affords no anchorage.

Korim Bay (0°53'S., 136°03'E.) is entered between Tanjung Snerisbari and Tanjung Nubee (Tanjung Noebee), nearly 2 miles NNW. The bay is clear of dangers, and has steep sides. Anchorage can be taken at the head of the bay, in depths shoaling gradually from 20 to 5.5m; vessels lie safely during the Southeast Monsoon, but in depths of less than 14.6m there may be a ground swell. The town of Korim, where there is a landing pier for boats, lies at the S entrance point of a shallow lagoon in the SW corner of the bay.

Wari Bay, entered W of Tanjung Nubee, affords good anchorage, in about 20m, for small vessels during the Southeast Monsoon. Reefs fringe the entrance points.

Tanjung Kwaree (0°48'S., 135°58'E.) is about 5.5 miles NW of Wari Bay. A conspicuous waterfall, which shows as a white rocky wall in the dry season, lies about 1 mile S of Tanjung Kwaree. The headquarters of a government official is at Warsa, about 2 miles NW of Tanjung Kwaree. The coast between Wari Bay and Tanjung Praisbari, about 17 miles NW, is densely populated; Tanjung Praisboro can be recognized by a rock lying close off it.

Pulau Supiori

10.26 Pulau Supiori (Soepiori) (0°45'S., 135°33'E.) is traversed by two mountain ranges, lying in a NW-SE direction and parallel with one another. The island attains an elevation of 1,034m about 5 miles NNW of its SE extremity, and Bumbeffor (Boembeffor), 850m high, with a white rocky patch, at an elevation of 681m, about 0.5 mile ESE of it, lies near the NW extremity of the NE range. A peak, 454m high, in the SW range, is fairly conspicuous about 4 miles SSE of Tanjung Mandundi (Tanjung Mandoendi), the NW extremity of the island; the point is low, rising to a 303m hill, close inland.

Pulau Supiori—Southwest Coast

10.27 Korido Bay, entered between **Tanjung Pimonsbari** (0°53'S., 135°39'E.), the SE extremity of Pulau Supiori, and Tanjung Mankekesdi, about 6.5 miles W, is divided into two parts. The inner part is encumbered with reefs. The outer part is clear of dangers except for two small rocks close offshore close WNW of Tanjung Pimonsbari, the reef fringing Tanjung Mangkekesdi and the W shore, and a detached reef about 1.5 miles ESE of the latter point.

Anchorage.—The best anchorage is in 70m, coral, in Korido Roads, off a break in the coastal reef off the village of Korida, about 4.5 miles NW of Tanjung Pimonsbari. Bransfari, an islet, lies on the coastal reef, close E of the break; a beacon, surmounted by a triangle, lies about 0.1 mile SW of the islet, on the SW corner of the coastal reef, and marks the E entrance point of the break in the coastal reef. There is a pier, with a depth of 0.9m alongside, at Korido, and a conspicuous round-topped tree at the village of Ababiadi, about 1 mile NW.

Vessels should approach the anchorage with the conspicuous round-topped tree at Ababiadi, in range with a sharp peak, bearing 318°, and anchor when the pier at Korido bears 020°. Small vessels can anchor closer in.

10.28 The SW coast of Pulau Supiori for about 10 miles NW of Tanjung Mangkekesdi is fringed by a reef extending up to 1.5 miles offshore, and on which there are several above-water rocks.

Sowek Roads (0°50'S., 135°29'E.) is a basin inside the coastal reef, about 4.5 miles NW of Tanjung Mangkekesdi, and W of the village of Sowek, which is built on piles. Several islets lie on the coastal reef around the basin. The approach to Sowek Roads, marked by a beacon, is about 35m wide, and is always available to vessels not exceeding a draft of 1.8m.

Nearly 2 miles SW of Sowek, and nearly 1 mile outside the entrance to the basin, there is a shoal, with a depth of 0.5m, and

a 1.8m patch about 0.25 mile farther E. The detached reefs and coastal reef are usually marked by discoloration.

Anchorage.—Vessels with local knowledge may obtain anchorage, in about 61m, sand and coral, between the detached shoals and the entrance to Sowek Roads.

Caution.—An extensive drying reef lies with its SE extremity about 9.5 miles SW of Tanjung Pimonsbari; it extends NW, parallel with the SW coast of Pulau Supiori at a distance of about 3.5 miles. **Rani** (0°57'S., 135°30'E.), a sandy island covered with coconut palms, lies at the SE extremity of the reef, with Insobabi, another islet, about 4 miles NW; both islands are uninhabited, but the plantations on Rani are visited periodically. A light is shown from the S extremity of Rani.

A ridge, with depths of 1 to 9.1m, extends about 16.5 miles NW of the drying reef. Numerous shoals, with depths of less than 9.1m and steep-to, lie between this ridge and the SW coast of Pulau Supiori; vessels are recommended to avoid this area.

Pulau Supiori—North Coast

10.29 Anchorage may be obtained, in 62m, about 0.2 mile offshore, off the N entrance to **Sorendidori** (0°44'S., 135°45'E.).

Wafordori Bay (0°43'S., 135°42'E.) lies about 4 miles WNW of N entrance to Sorendidori. A reef extends nearly 0.5 mile W of the E entrance point of the bay. Anchorage can be taken by vessels with local knowledge, in about 20m, mud and sand, in the bay.

Wabudori Bay (Waboedori Bay) is entered about 4.5 miles WNW of Wafordori Bay. The E entrance point is hilly, and the W entrance point is low; reefs fringe both entrance points, leaving a deep channel, 0.23 mile between them. A steep-to drying patch lies near the middle of the bay.

Anchorage.—The bay affords a safe anchorage at all times to vessels with local knowledge. Anchorage may be obtained in about 26m, with the village of Wabudori (Waboedori), on the W shore of the bay, bearing 245°, distant about 0.3 mile; this berth is about 0.2 mile S of the drying patch.

The coast between Wabudori Bay and **Tanjung Imbieri** (0°37'S., 135°23'E.), a steep, red, rocky point, about 13 miles WNW, is much indented and fronted by drying reefs, on which lie the islands of Pulau Puri (Mios Poeri), Pulau Wundi, and Pulau Pandi (Mios Pandi); the islands are low but covered with high trees. The coastal reef extends up to 0.5 mile offshore for about 6.5 miles W of Wabudori Bay, and there is foul ground between the coastal reef and the islands.

A spit, extending about 3.5 miles WNW of Pulau Pandi, has a least depth of 6.8m at its outer end, which is about 1.5 miles offshore. A deep channel lies between the spit and the coast, with Fando and Fanda, two conspicuous rocks, lying close together, about 2 miles W of Pulau Pandi. A 5m patch lies about 1 mile E of the rocks.

Anchorage by vessels with local knowledge can be taken, in 12.8m, sand, with the NW extremity of Pulau Pandi bearing 030° and the S extremity of Pulau Puri bearing 102°. The anchorage should be approached on the latter bearing, which leads S of Fando and Fanda.

Islands and Dangers Northwest of Pulau Supiori

10.30 Isabel Reef (0°30'S., 135°14'E.), with a least depth of 4.6m, lies about 12 miles NW of **Tanjung Imbieri** (0°38'S., 135°23'E.). The reef is marked by discoloration and sometimes by the sea breaking on it.

Pulau Bependi (Bependi) (0°24'S., 135°16'E.), about 14.5 miles NW of Tanjung Imbieri, has two summits, 137m high, and is densely wooded. It lies on Bependi Bank, which has very irregular depths, and extends about 7.5 miles ENE of the island; there is a least depth of 9.1m on the bank, about 2.5 miles NW of the N end of the island. Anchorage may be obtained fairly close to the island on all sides, in depths of 10 to 20m, coral. A village on the SW side of the island is only inhabited during the SE trade winds. A light is shown from the SW extremity of the island.

Pulau Ayawi (Ajawi) (0°11'S., 134°59'E.), an island, 46m high and covered with trees, lies about 21 miles NW of Pulau Bependi; it is uninhabited. The island lies on the SE extremity of bank, extending about 13 miles NW, with depths of 5.8 to 39m. Due to the clear water the bottom can be seen at a depth of about 26m.

Caution.—The island was reported to lie 2 miles SE of its charted position.

Pulau Sorenarwa

10.31 Pulau Sorenarwa (Yapen) (1°45'S., 136°10'E.) is separated from Pulau Kurudu at its E end by Selat Kurudu, which was previously described in paragraph 10.17. A central chain of mountains traverses the entire length of the island, attaining an elevation of 1,496m about 29 miles from its E extremity, and sloping gradually at its E and W ends. **Bumpekki** (Boempekki) (1°45'S., 136°19'E.), a sharp peak, 1,275m high, about 6.5 miles WNW of its summit, is very conspicuous from N or S.

Winds—Weather.—It is calm in both monsoons on the S coast of Pulau Sorenarwa. During the Southeast Monsoon a "Wambrau" from a SW direction is occasionally experienced.

Tides—Currents.—The tidal currents close off the N coast of Pulau Sorenarwa, and off the S coast, except near the E and W ends, set E and W and does not exceed a velocity of 1 knot. Farther N they come under the influence of the currents.

In the month of December, a current setting NNE at a velocity of 1.25 knots was observed from Tanjung Perkam and W through Selat Yapen until clear of the islands.

Pulau Sorenarwa—North Coast

10.32 The coast between **Tanjung Rainbawi** (1°47'S., 136°54'E.) and Tanjung Ormoana, about 43 miles W, is low with high trees. At Tanjung Marapa, about 7.5 miles farther W, the coast rises and remains steep as far as Serewen Bay, about 21 miles farther W. The coast is then flat to the village of Saribi, about 9 miles farther W, and then is high and rocky to Tanjung Woka, the W extremity of the island. A light is shown from Tanjung Woka. The N coast of Pulau Sorenarwa is more sparsely populated than the S coast.

Anchorage may be obtained by vessels with local knowledge in the bights off numerous small villages. Anchorage can be taken off the village of Awek, about 5 miles W of Tanjung Marapa, in a depth of about 37m, 0.25 mile offshore.

Pulau Indi (Mios Indi) (1°31'S., 135°50'E.), about 17 miles WNW of Tanjung Marapa, lies on a drying reef, about 7 miles offshore. Aibai, a reef-fringed islet, lies about 2.5 miles W of Pulau Indi; both are densely wooded. Anchorage, in favorable conditions, can be taken, in 37m, SSW of the village of Samberi, on the S side of Pulau Indi.

A shoal, with a depth of 9.1m, lies about 5.5 miles SE of Pulau Indi, and about 2 miles off the coast of Pulau Sorenarwa. A 7.8m shoal lies about 5.5 miles farther W, and about 1.5 miles offshore. Except for these dangers there is a deep channel between Pulau Mios and Pulau Sorenarwa.

Teluk Pom, a small inlet, lies about 17 miles E of Tanjung Woka. **Pom** (1°38'S., 135°42'E.) (World Port Index No. 52960) lies on the drying shore reef in the bight on the S side of the E entrance point. The landing place is on the W side of the bay. Anchorage can be taken by vessels with local knowledge, in 46m, about 0.1 mile from the fringing shore reef. Vessels entering must take care to avoid the drying reef extending about 0.1 mile W from the E entrance point.

Pulau Sorenarwa—South Coast

10.33 The coast between **Tanjung Rainbawa** (1°47'S., 136°54'E.) and Mampuri, a hill, 184m high, on the coast about 5 miles WSW, is low and covered with casuarina trees. Tanjung Rainbawa was previously described with Selat Kurudu in paragraph 10.17.

Ambaijawappi (1°51'S., 136°54'E.), consisting of two detached shoals, with depths of 1.8 and 2.4m, lie about 9.5 miles WSW of Tanjung Rainbawi, and about 1 mile offshore. A depth of 0.6m lies about 0.75 mile ESE of Ambaijawappi.

Samberbaba Bay is entered E of Tanjung Tekopi, located about 12.5 miles WSW of Tanjung Rainbawi. A detached reef lies about 0.2 mile offshore, about 0.75 mile NE of Tanjung Tekopi. The village of Samberbaba, the headquarters of a government official, and where there is a boat pier, lies about 1.25 miles N of the same point. Anchorage can be taken by vessels with local knowledge, in 18.3m, with the point about 4 miles W of Mampuri bearing 086°.

Randowaja Bay is entered N of Tanjung Arrareni, which is located about 9.5 miles WSW of Tanjung Tekopi. A 3.4m shoal lies 0.35 mile S of Tanjung Arrareni. Anchorage can be taken by vessels with local knowledge, in convenient depths, in the bay.

Obaurippi (1°53'S., 136°27'E.), a 203m high hill, is conspicuous on the coast about 6 miles W of Tanjung Arrareni. Two mountains, 440 and 476m high, lie about 2 miles N and 3 miles NW, respectively, of Obaurippi.

10.34 Kepulauan Ambai (Ambai Islands) (1°55'S., 136°20'E.) consists of a group of islands and islets lying off the coast between Obaurippi and Tanjung Awokarupi, about 13 miles W, and extending about 5.5 miles from the coast. Pulau Ambai (Ambai), the largest and most conspicuous of the group, has three hills lying in a N-S direction, with Pakini, the middle and highest, with an elevation of 326m. Pulau Monoparaiapi (Monoparaiapi) is the E island of the group. A patch, with a depth of 0.3m, lies midway between the SW end of Pulau Monoparaiapi and the E side of Pulau Ambai.

Urampi lies about 0.75 mile SE of Pulau Monoparaiapi. Urang Kaitui (Oerang Kaitoei), a saddle-shaped islet, lies about 1 mile farther SE. A detached 1.5m patch lies close off the E side of Urampi.

Pulau Saweru (Saweroe), the W island, lies about 1.75 miles W of Pulau Ambai, and is lower and slightly undulating. Three islets, forming a chain, extend about 2.25 miles SE from the SE end of Pulau Saweru.

Anchorage.—Sheltered anchorage may be obtained off the N side of Pulau Monoparaiapi by vessels with local knowledge. Sheltered anchorage can be taken off the village of Saweru, lying near the middle of the E side of Pulau Saweru; farther N there are heavy squalls during the Northwest Monsoon; there is a 4.5m patch about 0.25 mile E of the village.

10.35 Teluk Serui (Seroei Bay) (1°54'S., 136°15'E.) is entered between Tanjung Awokarupi (Abori) and a point about 1.75 miles E. Tanjung Awokarupi, a steep point, is the SE extremity of a high peninsula. The E side of the bay is formed by the spur which slopes gradually from the very prominent Tafel van Serui, a flat-topped mountain, 318m high, about 1.5 miles N of the E entrance point. Mawampi, a rocky wooded islet, lies 0.35 mile S of the E entrance point, and another islet lies on the shore reef on the W side of the bay, about 0.5 mile N of Tanjung Awokarupi.

Serui (Seroei) (1°53'S., 136°15'E.) (World Port Index No. 52940), the headquarters of a government official, lies at the head of the bay. A pier, at the head of the bay, is marked at its head by a light.

Anchorage can be taken, in 33m, S of the pier. During the Southeast Trade Wind, there is a heavy sea in the bay at times. Approaching Teluk Serui from S or SSW, Pulau Ambai will be distinguished before Tafel van Serui, as the latter is not so prominent from these directions.

The coast is flat and sandy from a position about 4 miles NW of Teluk Serui to Pulau Janusi, the E entrance point of Teluk Kanawa. Tanjung Worui (Tanjung Woroei), about 7.5 miles WNW of Teluk Serui, and Tanjung Panduami (Tanjung Pandoeami), nearly 3 miles farther W, are covered with high trees. The village of Mariarotu (Mariarotoe), with a waterfall about 0.5 mile NNW, lies about 3.5 miles WNW of Tanjung Panduami. Anchorage by vessels with local knowledge may be obtained off the latter village and other villages on this section of coast, mostly with mud bottom but good holding ground.

A coral patch, with a depth of 3.4m, lies about 1 mile SSE of Tanjung Worui. A patch, with a depth of 3.4m, lies about 1.25 miles offshore, about 2.5 miles SE of Pulau Janusi.

Teluk Kanawa (Kanawa Bay) is entered between **Pulau Janusi** (1°48'S., 135°56'E.), a high island connected by a reef to Tanjung Sumboi (Tanjung Soemboi), close NNE, and a point about 2 miles WNW. The village of Kanawa is built on piles in the water on the W side of the bay. Anchorage by vessels with local knowledge can be obtained E or W of Uwandeipi, an islet lying on a reef in the middle of the bay close inside its entrance.

Teluk Papuma (Papoema Bay) (1°36'S., 135°53'E.) lies W of Teluk Kanawa, and is separated from it by a peninsula, from

Ansus Village

which a reef, marked by discoloration, extends about 0.5 mile from its S and W sides. Kwajuni, with a reef extending about 0.5 mile S, lies close SE of the W entrance point, to which it is connected by a reef. Two patches, close together, with a least depth of 0.3m, lie about 1.75 miles W of the E entrance point.

10.36 Teluk Parumi (Paroemi Bay) (1°46'S., 135°51'E.), W of Teluk Papuma, is separated from it by a peninsula; a reef extends about 0.75 miles SSW from the S extremity of the peninsula. A reef, on which there are two islets, extends about 1.25 miles SSE from the W entrance point, and another reef extends about 0.5 mile E of the same point. A 0.3m patch lies about 1.25 miles S of the W entrance point.

Kepulauan Kuran (Koeran Islands) (1°53'S., 135°49'E.), three in number, lie with Pulau Bawei (Bawei), 151m high, the S and largest of the group, located about 9.5 miles SW of Pulau Janusi. Pulau Karuati lies about 0.5 mile NE of Pulau Bawei, to which it is joined by a reef; the islet is saddle-shaped, with a settlement and coconut plantation on it. Anchorage maybe taken, in 55m, E of Pulau Karuati. Pulau Nuori (Noeori) lies about 1 mile NW of Pulau Bawei, with a deep channel between. A reef extends 0.5 mile NE from the island, and a reef, with a depth of 2.7m, lies about 0.5 mile N of the island.

A shoal, with a depth of 5m, lies about 4.25 miles ENE of Pulau Karuati, and another shoal, with a similar depth, lies about 2.25 miles NNW of Pulau Nuori.

Pulau Manupampi (Manoepampi) (1°48'S., 135°48'E.), a wooded and rocky island, lies about 6.25 miles W of Pulau Janusi. It has two peaks conspicuous from E or W; the S peak is 313m high.

Two 3.2m shoals lie about 3 and 5.5 miles, respectively, W of the W extremity of Pulau Manupampi.

Ansus Bay lies on the NW side of **Pulau Ansus (Ansoes) (1°46'S., 135°46'E.)** and Pulau Keiari, close NE; these islands are connected by a reef, on which there are several islets. Pulau Ansus lies about 1 mile NW of Pulau Manupampi. Tanjung Maraiworeh, about 1 mile NW of Pulau Ansus, is the SW extremity of Marai, the high peninsula forming the NW shore of the bay. A reef, with a depth of 1.8m over its outer end, extends 0.67 mile S of Tanjung Maraiworeh, and a reef, with a least known depth of 0.9m, lies about 0.5 mile farther W.

Ansus (Ansoes), built on piles, and the largest village of Irian Jaya, lies at the head of the bay; a prominent church is on the hilly land in the vicinity.

The channel leading to Ansus is tortuous, with reefs on either side, so that only vessels with local knowledge should use it. A reef, with a depth of 1.2m, extends about 0.2 mile W from the N end of Pulau Keiari.

The E approach to Ansus lies between Pulau Ansus and Pulau Manupampa, passing W of a reef, with Nuwowa, an islet at its S end, about 1 mile N of Pulau Manupampa; the reef is about 1 mile long in a N-S direction. This channel is easier to navigate, as the reefs are usually marked by discoloration, and the channel is less tortuous, but there is a 3m patch lying about 0.4 mile WSW of Nuwowa. A reef, with two islets on it, extends about 0.65 mile S from the SW end of Pulau Ansus.

Vessels approaching from W, should keep the S extremity of Pulau Ansus in range with the N extremity of Pulau Manupampi, bearing 100°, until a short distance from Batu Pendita, a group of rocks on the outer edge of the reef extending from the W extremity of Pulau Ansus. Then alter course ENE into the bay, being careful to avoid the 1.8m patch, about 0.5 mile S of Tanjung Maraiworeh.

Pulau Janusi (Janoesi) (1°43'S., 135°41'E.), a high island,

lies about 6 miles NW of Pulau Ansus. **Tanjung Orearo** (1°42'S., 135°37'E.), also high, lies about 4.5 miles farther WNW. A rock, with a depth of 1.8m, lies about 1.5 miles WSW of Pulau Janusi; a drying reef lies about midway between the rock and the island. Another drying reef lies about 2.5 miles W of the island.

10.37 Teluk Jaimaria (Jaimaria Bay) (1°41'S., 135°36'E.), entered between Tanjung Orearo and Tanjung Wopore, about 2 miles WNW, is fronted by four islets. The best entrance to the bay is between Pulau Kariori, the large island in the W part of the bay, and the first of two islets lying E of it. A drying reef extends about 0.4 mile SW of Pulau Kariori, and shoal water, with a depth of 2.4m extends about 0.2 mile NW from the islet on the opposite side of the entrance.

Teluk Wooi (Wooi Bay) (1°41'S., 135°31'E.), entered about 3.75 miles W of Tanjung Wopore, is backed by high land. The shores at the entrance are cliffy, but inside they are low and covered with mangroves. Aroja, a rock covered with vegetation, lies about 0.75 mile W of the W entrance point, and is difficult to identify; it lies on the coastal reef which extends about 0.4 mile offshore. The reefs fronting the entrance points are usually marked by discoloration. The village of Wooi, lies on the W shore, about 0.4 mile NW of the W entrance point.

Anchorage may be obtained, in about 46m, NE of Wooi. A vessel should approach the bay with the double peak of Marai, 536m high, located about 3.5 miles NNE of the E entrance point, bearing 037.5°; only one peak will be seen on this bearing. There is sometimes a very strong current setting across the entrance of the bay, so it is necessary to enter at a moderate speed.

Islands and Dangers Northwest of Pulau Sorenarwa

10.38 Pulau Num (Mios Noem) (1°30'S., 135°11'E.) lies with its E extremity about 8 miles NNW of the W extremity of Pulau Sorenarwa. It is densely wooded and traversed by a range of mountains, attaining an elevation of 448m about 6 miles from its W end. The island is uninhabited.

Kepulauan Pono Kabai (Pono Kabai Islands) consist of three islets fringed by drying reefs lying within 2 miles of the E end of Pulau Num. A 6.9m shoal lies between the E islet and Pulau Num. A 12.8m depth lies about 5 miles E of the E extremity of Pulau Num. A 7.8m shoal lies 1.25 miles W of the NE point of Pulau Num. Navigation between the islets is dangerous due to the moderately strong tidal currents.

The S coast of Pulau Num is steep-to and affords no anchorage.

Selat Pulau Num (Mios Noem Strait) (1°33'S., 135°23'E.), separating Pulau Num and Pulau Sorenarwa, is clear of dangers, and can be navigated at night without difficulty. Tanjong Woka, the W extremity of Pulau Sorenarwa, is steep-to, and rocky.

Anchorage.—On the N coast of Pulau Num there are two bays close together. Both bays can be safely entered by keeping in mid-channel. The W bay affords the better anchorage to vessels with local knowledge, in 70m, sand.

A 7.8m patch lies about 1 mile E of the NW extremity of Pulau Num.

10.39 Slamiapien (1°28'S., 135°06'E.), two rocky islets covered with vegetation, lie about 1 mile W of the NW extremity of Pulau Num.

Sewandeh (1°29'S., 135°01'E.), an island, 104m high and densely wooded, lies about 4.5 miles W of Pulau Num. It lies on the SE edge of a drying reef, which extends about 1 mile NW of the islet; numerous rocks, covered with vegetation, lie on the reef.

Selat Sewandeh (Sewandeh Strait) (1°29'S., 135°03'E.), separating Sewandeh from Pulau Num, is deep and clear of dangers.

An area of irregular depths, with a greatest width of about 9 miles, extends about 31 miles WNW of Sewandeh. It has a least known depth of 10m, about 9 miles W of the island.

Tides—Currents.—In Selat Sewandeh and over the shoals W of Sewandeh, the tidal currents attain a maximum velocity of 2 knots.

Pulau Numfoor

10.40 Pulau Numfoor (Noemfoor) (1°00'S., 134°53'E.), 204m high, and densely wooded, lies about 23 miles NW of Pulau Num. It has no prominent peaks and has a flat appearance. The island is fringed by coral reef, except on its SW side; on its S side the reef extends about 2.25 miles offshore. Several openings in the reef give access for boats to the numerous coastal villages.

Manim, a low islet, covered with high trees, lies about 2.5 miles offshore, about 5 miles NW of Tanjung Aikar, the SW extremity of Pulau Numfoor. A spit extends about 0.25 mile S of Manim, and another spit, with a least known depth of 5.8m extends 0.65 mile NNW of Manim.

A light is shown at the village of Jenmanu, on the NW side of Pulau Numfoor.

Winds—Weather.—During the survey from June to October, the "Wambrau," a strong hot and dry mountain wind, was only experienced from SW at the beginning of August and the beginning of September; at both times it came through with storm force for 3 to 4 days, after which the wind became normal again from S to SE. On one occasion, a heavy SE squall was experienced which came up rapidly, raising a troublesome sea, with heavy rain. After a couple of hours, the squall was over and not long afterwards the sea was calm. At the end of September, there were some weak N winds, a long N swell was felt on the N coast of Pulau Numfoor, and much rain fell; sometimes the rain squalls, often accompanied by thick weather, lasted a couple of hours and were so dense that visibility was nil.

Anchorage.—A vessel with local knowledge may obtain anchorage, in 35m, sand, off Jenmanu. A boat can land on the beach by passing through a nearby opening in the reef which is easily found.

Anchorage can be obtained by vessels with local knowledge, in 35m, sand, off the village of Jensamberi, about 5 miles SE of Tanjung Keretsbari, the N extremity of the island. There is an opening in the reef NE of the village, for which three pairs of range beacons are established; the junction of the first two pairs of range beacons is marked by a buoy, painted in black and yellow stripes. Then a channel, marked by beacons, leads to the village of Bawe, about 3 miles S, which is available for power boats at HW. There is a pier at the village of Menggarai,

about 2.5 miles N of Bawe, with a depth of 1.8m at its head. The tidal current may attain a velocity of 2 knots at springs off the pier.

Anchorage may be obtained by vessels with local knowledge, in 26 to 35m, coral and sand, in Teluk Rumboi (Teluk Roemboi), an open bay on the SW side of the island, entered between **Tanjung Indabandarai** (1°06'S., 134°50'E.) and Tanjung Insowendi, about 1.25 miles NNW. There is a landing pier for boats in the N part of the bay. A reef lies parallel to and up to 0.25 mile off the reef-fringed N and NE shores of the bay.

A bank, with depths of 66m at its E end and 73m at its W end, was reported about 10.5 miles N of Pulau Numfoor.

Teluk Cenderawasih

10.41 Teluk Cenderawasih (Sarera), lying between Tanjung Dombo and Tanjung Saweba, about 205 miles WNW, is fronted by two groups of islands which afford it considerable protection against heavy seas. During both monsoons, however, rough seas are encountered between the E end of Selat Sorenarwa (Yapen Strait) and Tanjung Perkam (Cape d'Urville).

The E coast of the bay is, in general, low and flat; a number of large rivers discharge along it. The W coast, on the other hand, is steep and high. The rivers that discharge into this bay discolor the water for a distance of 5 to 6 miles offshore and carry out large trees and other debris which constitute a distinct menace to navigation. Furthermore, the E and S coasts of the bay are subject to such constant change that the lead must be the main reliance of vessels in these waters; it is deemed inadvisable to take a vessel into depths of less than 20m, particularly in the E and SE parts of the bay.

The densely-wooded shores of the bay are but sparsely settled. The natives live in a very primitive manner. The villages along the coast and on the various rivers consist of houses built on poles. Vessels call at various places along the shores of the bay where jungle products are gathered for shipment.

Winds—Weather.—In Teluk Cenderawasih, a warm, dry, SW wind sometimes blows off the W shore, and is known as the "Wambrau." As it sets in, the coast temperatures rise considerably, the air becomes very dry and rather hazy at sea level. It has been known to last a week, decreasing slightly in strength at night. It usually blows force 4, but may reach gale force for short periods. It sometimes raises a rough sea in the bay.

During May and June, between Pulau Kurudu (Koeroedoe) and Tanjung Worisanua, the direction of the wind was very variable, the rainfall was considerable and generally occurred at night.

Between Pulau Kurudu and **Tanjung Bumi** (Boemi) (3°22'S., 135°25'E.) during the Southeast Monsoon, rain squalls were repeatedly experienced, especially over the land. Although during this monsoon the wind is generally E to SE, force 1 to 2, W winds occurred many times. The state of the sea was calm in both monsoons, especially in the N part. There is much rainfall in both monsoons.

Tides—Currents.—Along the W shore of the bay there is both a diurnal and semidiurnal tide, but the latter predominates. The spring lows of the two tides may coincide. As a consequence of this coincidence the LW level occurs in December or January and June or July. The maximum rise and fall that can be expected are, respectively, about 0.79m above and 1.09m below the mean sea level.

Fronting Teluk Cenderawasih, in Selat Sorenarwa and N Kepulauan Schouten (Schouten Islands), there are no tidal currents, but there is a weak drift to the E during the Northwest Monsoon and to the W during the Southeast Monsoon. The islands, however, cause some deflection from these general directions. The maximum recorded velocity of this drift is 2 knots, although in the vicinity of the SE coast of Biaka velocity of 3 knots has been reported.

Inside the bay there are weak tidal currents but no monsoon drift. The general set of the currents is into the bay at flood tide and out at ebb. In the S part of the bay the currents change about 2 hours after HW and LW. The maximum recorded velocity of the currents is 1 knot.

The tidal currents between Tanjung Dombo and Tanjung Worisanua are weak and irregular. S of Selat Dombo the most perceptible current sets N, with a velocity of 1 knot.

The 10m curve extends S from the S shore of Pulau Kurudu about 6.5 miles W of Tanjung Dombo and fronts the bight thus formed by the coastline, and then irregularly follows the coastline from 1 to 5 miles offshore.

Selat Dombo (Dombo Strait) (1°52'S., 137°04'E.), separating Pulau Kurudu from the coast of W Irian Jaya N of Tanjung Dombo, has depths of 11 to 53m and is 2 miles wide. The strait is approached from N, in depths of 11 to 12.8m, and from the S over a bank with a least depth of 5.9m.

Caution.—Apparently the outermost dangers area 1.8m spot lying about 3 miles offshore at a position 21.5 miles SW of Tanjung Dombo, and a 4.6m patch lying 2 miles NE of **Tanjung Waba** (Geelvinks Oosthoek) (2°11'S., 136°31'E.).

Teluk Cenderawasih—Southeast Shore

10.42 The coast, trending SE from **Tanjung Dombo** (1°54'S., 137°06'E.) to the mouth of the Kariferi River, a distance of 12 miles, and then WSW to Tanjung Worisanua (Valsche Hoek), a distance of about 53 miles, is low, swampy, and overgrown with mangroves which are submerged at HW. Inasmuch as the land is subject to seaward extensions, by reason of the rapid deposit of silt, alternating with periods of destructive erosion, particularly during the Northwest Monsoon, the various points, such as Tanjung Waba, along this coast are of no value as landmarks.

The principal landmark within this stretch of coast is Kamusopedai (Kamoesopedai) (Great Kerkberg), rising to 1,023m about 37 miles ESE of Tanjung Worisanua. Other fairly prominent peaks are: Tolaterri, a dome-shaped peak 660m high, about 8 miles W of Kamusopedai; Vandori, 281m high, located 20 miles ESE of Tanjung Worisanua; and Mambai, 178m high, with a large round-topped tree on it, located 16.5 miles ESE of Tanjung Worisanua. Within 3.25 miles SW of this point are three hills, the NE of which is 185m.

Few villages are to be seen close along the shore. The principal coastal villages are Napuai (Napoeai), near the mouth of the Kai River, close SE of Tanjung Waba; Wonti (Wainoei), near the mouth of the Wonti River (Wainoei River), 9.5 miles ESE of Tanjung Waba; Dombo, on the W side of Pulau Dombo; and Pamai, on the E side of the island.

Anchorage.—Vessels can anchor in mud or muddy sand

anywhere along this coast. The preferable anchorages seem to be in depths of 40 to 49m off Tanjung Waba and off the mouths of the Kai River, the Sajati River, and the Wonti River, all of which empty into the sea between 2.5 and 9 miles SE of Tanjung Waba. During the Northwest Monsoon, landing is generally impossible along the coast between Tanjung Worisanua and Tanjung Waba.

10.43 The coast between Tanjung Worisanua and **Ujung Auri** (Jacobus Opdekams Hoek) (2°47'S., 135°57'E.), 45 miles to the SW consists of a wide coastal belt of low, marshy land fronted by a narrow strip of tree-covered sand that is broken in many places by wide river mouths. Inasmuch as the mud banks fronting this coast extend off not more than 2 miles, vessels can proceed along it closely enough to take bearings on the various headlands and the mouths of the rivers.

The coast is bordered by a narrow strip of sand, overgrown with casuarina trees, and interspersed by the wide mouths of several rivers. The water from these rivers causes the sea to be discolored for 5 or 6 miles offshore, and large trunks of trees, stuck in the mud, are often encountered at this distance, and may render navigation dangerous within depths of 10.1m.

Among the elevations along this coast that are useful landmarks are three hills, 117m, 145m, and 185m high, respectively, rising SW of Tanjung Worisanua. Sanoringga Hill, 125m high, rises 13.25 miles SSW of Tanjung Worisanua. A group of nine hills, of which the highest, named Olifant (Riwoi), has an elevation of 302m and rises 8.5 miles E of **Tanjung Karang Senu** (Olifants Hoek) (2°42'S., 136°01'E.). Groote Doodkist, a hill 197m high, rises 6.5 miles SE of Tanjung Karang Senu. Farther inshore, at a distance of about 30 miles ENE of Tanjung Karang Senu is Little (Kleine) Kerkberg, a group of mountains consisting of three peaks with elevations of 610m, 617m, and 681m, respectively.

Tanjung Karang Senu is marked by a light

This coast is very sparsely settled; the only village along it is a very small one named Waren, situated at the mouth of the Waren River, 6 miles SW of Tanjung Worisanua.

Wai Poga (Wapongga), the largest river along this stretch of coast, empties into the sea at a position about 2 miles NE of Tanjung Karang Senu. It rises far in the interior and, for the last 50 miles of its course, flows through low marshy plains that are generally flooded during the rainy season. In the lower reaches the width of the river varies between 0.16 and 0.22 mile. On the bar there is a depth of 1.8m but the depths inside increase to 18.3 or 20m. At 40 miles above its mouth the river branches into two arms, one rapidly diminishing in depth and width and the other continuing for a considerable distance into the hilly hinterland.

Pulau Naufi (Naoefi) (Nawi) (2°14'S., 136°15'E.), lying about 9.5 miles W of Tanjung Worisanua and marked by a light, is an excellent landmark for the vicinity. It is a heavily wooded island with several peaks,the highest of which has an elevation of 99m. The island is surrounded by a drying reef, but outside of that fringing reef there are no dangers.

Anchorage.—Vessels can anchor everywhere along this coast, in depths of 29 to 40m, but during the Northwest Monsoon these berths can be uncomfortable.

10.44 The coast between Ujung Auri and Teluk Rarewarai, 18 miles SW, is low and cut by the numerous mouths of the Warenai River and the Siriwo River. A steep-to bank over which the greatest depth is about 2.7m extends 1 to 1.5 miles off the coast. The bottom in this vicinity is generally of mud, but off Ujung Auri it consists of hard sand and stones.

Kepulauan Moor (Moor Islands) (2°56'S., 135°44'E.), two large islands, Pulau Nuto Rutomorja (Noeto Roetomordja) and Pulau Ratewo, and a small islet named Utaina (Oetaina) lie on a bank of soundings that extends out from a line joining Ujung Auri and Ujung Rarewa (Hodge Westhoek). These islands are heavily wooded and the two larger ones are hilly but have no conspicuous peaks. Nuto Rutomorja has a maximum elevation of 125m, and Ratewo, the largest has a maximum height of 150m. Drying reefs extend out in places from all of the islands. A detached patch of 1.4m lies nearly 1.5 miles NW of the NE extremity of Nuto Rutomorja. Utaina is low, covered with high trees, and uninhabited.

The bottom over the bank of soundings on which these islands lie consists of hard mud. The water around them is very dirty and normally contains much debris that has been brought down by the rivers; occasionally small islets consisting of vegetable matter are seen floating around. During the Northwest Monsoon there is frequently a heavy sea over this bank.

Pulau Nuto Rutomorja is the only inhabited island of the group; on its SE side is Moor village, around which there are extensive coconut plantations.

10.45 Teluk Rarewarai (Rarewarai Bay) (3°02'S., 135°48'E.) is an inlet formed between Pulau Nusariwe (Noesariwe Island) and the mainland. Tanjung Warisano, the NE extremity of Pulau Nusariwe and the N entrance point of the bay, is a good landmark, as is also a large tree on the island. The branches of the Siriwo River that empty into the bay make the water very dirty. A drying reef extends out a short distance from Tanjung Warisano. On the E side of the bay is a wide drying shore bank; off the outer edge of this bank, opposite Tanjung Warisano and 0.65 mile off the E shore of the bay, is a patch over which there is a depth of less than 0.3m.

About midway between Tanjung Warisano and Tanjung Ufai, an inner entrance point about 0.55 mile to the S, there is a small bight in which vessels can anchor, in 29m, mud. In the inner part of the bay, beyond Tanjung Ufai, there are numerous reefs which, because of the muddiness of the water, can not be sighted. A small drying channel leads from the head of the bay around the W end of Pulau Nusariwe and then into Weinami inlet. Local knowledge is necessary.

Anchorage.—Anchorage can be taken anywhere around Kepulauan Moor except to the NW of the group, where the bottom rises too steeply. The currents between the islands are sometimes strong.

Anchorage may be obtained by vessels with local knowledge, in a depth of about 29m, mud, midway between Tanjung Warisano and Tanjung Ufai, about 0.5 mile S.

From Tanjung Warisano to Pulau Nusi, a distance of about 11.5 miles, the coast takes a general SW direction, but is considerably indented between Ujung Rarewa and Pulau Nusi. A sharp-topped hill, 340m high, rises 1.25 miles S of the entrance to the Musario River (Moesario River), and is a good landmark for the vicinity.

Close SW of Pulau Nusariwe (Noesariwe) is a peninsula

which terminates in Ujung Rarewa, and on which there is a hill 160m high closely backing the point. The shores of this peninsula are covered with mangroves except at three small villages, named Weinami, Napan, and Masipawe. Near these villages there are white sandy beaches. The houses at Weinami extend along the shore of the inlet between the peninsula and Pulau Nusariwe. This inlet is used by the schooners of the Chinese traders who live at Weinami; it is connected by very shallow channels with Teluk Rarewarai (Rarewarai). Two villages are situated, respectively, at the mouths of the Legare River and the Musario River. Between these two, on a steep sand and gravel beach, is Makimi village.

10.46 Pulau Nusi (3°09'S., 135°40'E.) is a small thickly-wooded island, 50m high, located close off the Irian Jaya coast. It is not easily distinguished against the high coastal hills. On the island is a settlement belonging to a European trading company.

A shoal, with a depth of 3m, lies about 0.25 mile NW of the W extremity of Pulau Nusariwe.

Anchorage.—Anchorage can be taken, in 35m, between Pulau Nusi and the mainland. In as much as several detached reefs, one of which has a depth of only 0.5m, lie off the E end of the island, vessels should approach the anchorage from the W. Local knowledge is necessary.

Caution.—Vessels should exercise great caution in approaching this coast because the water is muddied by sediment carried down by the rivers. Furthermore, in the S part of this stretch of coast, between the Musario River (Moesario River) and Pulau Nusi, there are several reefs, some of which dry.

Between Pulau Nusi and Tanjung Bumi (Boemi), 19 miles SW, the coast is low, monotonously wooded, and very sparsely settled. The only villages are at Teluk Kimi, a small inlet 1 mile NE of Pinkster Oosthuk (Pinkster East Point), and 6.5 miles SW of Pulau Nusi, and Nabire village, situated 4 miles E of Tanjung Bumi.

A light is shown from the head of Teluk Kimi. At about 0.75 mile ENE of Nabire, a pier serves an oil depot.

10.47 Kepulauan Mamboor (Haarlem Islands) consist of two large and several small islands lying 6.25 to 12 miles W of Ujung Rarewa. **Kopataar** (3°05'S., 135°35'E.), Awaar, Kunur (Koenoer), Her, and Numini (Noemini) islands are so grouped as to form a basin about 1.5 miles in diameter and 37 to 46m deep; in the center of this basin, however, there is a 4.6m patch. The best entrance to this basin, which is a safe and spacious anchorage, is from the N, between the N end of Kopataar and the reef that projects W nearly 0.25 mile from the NW extremity of Awaar; the other entrance channels are somewhat restricted by the reefs and stones that extend from the islands. The maximum elevation of the trees on the principal islands of the group are Awaar, 110m; Kopataar, 100m; Her, 70m; and Numini, 65m. Pulau Roin, located close off the SE extremity of Awaar, is a small, wooded sand bank. Jaunan (Djaoenan), 33m high, is a well-wooded islet located 1.75 miles SWof the W extremity of Kopataar Island, near the E end of a drying reef about 1 mile long. Pulau Waider, covered with high trees, stands at the S end of a drying reef 0.75 mile W of the W end of Kopataar.

A light is shown from Juanan.

A group of houses on the SE extremity of Kopataar and on the N end of Numini comprise the village of Sihaam. On the NE extremity of Kopataaris the village of Bore.

Winds—Weather.—There is sometimes a considerable sea on the plateau on which Kepulauan Moor islands lie during the Northwest Monsoon, but this quickly dies down as soon as the wind drops.

Anchorage.—Vessels can anchor in a safe and spacious basin formed by the islands of Kopataar, Awaar, Kunur, Her, and Numini.

Small vessels can find good anchorage in Teluk Kimi, in 15m.

Caution.—Three reefs, with depths of less than 1.8m, lie between 0.75 mile S and about 0.42 mile WSW of the E end of Kopataar. Unofficial beacons, which are unreliable, mark the E and W reefs. A drying reef lies about 0.5 mile S of the SE end of Awaar, and a shoal with a depth of 0.9m, lies about 0.2 mile S of the SW end of the same island. A 0.3m patch lies about 0.6 mile SW of the W end of Numini. A 0.9m patch lies about 0.75 mile NW of Jaunan, and a 3.2m shoal lies about 0.5 mile W of Pulau Waider. A patch, with a depth of 4.6m, lies about midway between Awaar and Kopataar. A rock lies about 0.75 mile SW of the S end of Numini.

Teluk Cenderawasih—South and West Shores

10.48 Between Tanjung Bumi and Tanjung Hamuku (Hamoekoe), 15 miles to the W, is low and devoid of conspicuous points. A fairly wide mud bank skirts the shore here and there, but no detached dangers have been discovered along this stretch of coast. Vessels approaching the coast, however, should exercise caution because the mud bottom shelves steeply in many places, the water is, at times, muddied to a distance of 5 or 6 miles by discharge from the rivers, and large, heavy tree trunks may be encountered floating around at a considerable distance offshore. These tree trunks, which often are seen with one end sticking in the mud, are a menace to navigation inside the 10m curve.

Among the villages along this sparsely-settled coast are Wanggar, near the mouth of the Wanggar River 5.5 miles WSW of Tanjung Bumi, and Hamuku (Hamoekoe), situated 2 miles W of Tanjung Hamuku which is a small but conspicuous point. The Wanggar River can be ascended by flat-bottomed proas for a considerable distance.

Winds—Weather.—Between Tanjung Bumi and Tanjung Busurua (Boesoeroea), about 72 miles NW, from February to June no predominating winds from any fixed direction were observed. Land and sea breezes were however, noticeable. The sea breeze blew from 1200 to 2000 from NE to NW, the land breeze blew for the remainder of the day from SW to SE. Heavy squalls occurred principally between 1600 and 1800, mostly from W to NW. The rain fell chiefly between 1600 and 0800, and was heaviest between 2000 and 2400.

Anchorage.—Anchorage can be taken, in 6.9m, on the bank at the E side of the trough-shaped depression abreast the mouth of the Wanggar River. This area is for temporary anchorage.

10.49 Between Tanjung Hamuku and Tanjung Busurua the coast sweeps around through a W, NW, and N direction for about 80 miles. It is broken only by a few inlets and by two peninsulas which terminate, respectively, in Tanjung Maniburu

(Maniboeroe) and Tanjung Mangguar (Manggoear).

Most of this stretch of coast is rather closely backed by high hills and mountains. Among the more conspicuous of these are the 204m hill S of Tanjung Maniburu, the 1,100m Jauer Peak, 6.25 miles S of Tanjung Mangguar, and the high mountain ridge that lies along the longitudinal axis of the peninsula that forms the E side of Teluk Wandamen (Wandamen Bay); this ridge has numerous peaks the highest of which has an elevation of 2,239m. Yauer Peak, one of the most remarkable points in Teluk Cenderawih (Sarera), can be seen from all directions at a great distance; the slopes of this peak extend N to the Drie Gebruders (Gebroeders), 400m, 411m, and 428m, respectively, located about 1.5 miles SW of Tanjung Mangguar; these peaks are good landmarks from the N and SE. The S slopes of Yauer Peak connect with a fairly high mountain ridge near the coast about midway between Tanjung Maniburu and Tanjung Mangguar. South of this ridge and across the inlet W of Tanjung Maniburu the land again rises near the coast; the highest peak of this ridge has a flat top and rises to an elevation of 712m.

Vessels seldom if ever come into this part of Teluk Cenderawasih. Vessels do not, as a rule, come farther S than Teluk Wandamen.

Caution.—A chain of islands, reefs, and banks extends from a position abreast the coast about 8 miles W of Tanjung Hamuku to about the parallel of Tanjung Busurua, roughly paralleling the coast at an average distance of about 13 miles. Northward of the parallel of Tanjung Busurua, at which position there is a rather wide break in the chain of dangers, they continue along a NE line to the reefs and islets comprising Pulau Mios Auri (Aoeri). In the daytime the navigation of the area along the E side of this barrier reef presents no difficulties.

The S end of the chain consists of a group of dangerous reefs that extend for a distance of 2 to 4 miles off the shore between Tanjung Hamuku and Tanjung Mariburu. **Numburi** (Noeboeri) (3°18'S., 135°06'E.) is a small, wooded islet located near the S end of a drying reef 9.75 miles WNW of Tanjung Hamuku and 3 miles offshore. Nu Sariwanni (Noe Sariwanni) is another small wooded islet that lies on the central part of a drying reef 4.5 miles N of Nuburi; a drying reef nearly 2 miles long lies about midway between these islets. A shoal, with a depth of less than 0.3m, lies 0.75 mile W of Nu Sariwanni. Karei (Enkhuizer), located 7 miles N of Nu Sariwanni, is a large, irregularly-shaped drying reef on which are two light-colored sand banks; between Nu Sariwanni and Karei there are several smaller drying reefs. Nu Tabari (Noe Tabari), lying 2.75 miles E of the E edge of Karei and separated from it by a clear passage, is a small, wooded islet on a drying steep-to reef. Aikei, a light-colored sand bank on a drying reef, lies 2.5 miles NW of the NW extremity of Karei.

10.50 Kumbur (Koemboer) (3°01'S., 135°03'E.), located near the center of an elongated drying reef about 3 miles N of Aikei, is a low, sandy islet which, because of its high trees, is the most important landmark on this part of the barrier reef. A shoal with a depth of less than 0.3m lies 0.5 mile W of Kumbur. There is a 2.3m shoal 2.25 miles W of Kumbur and a 6.9m shoal 0.75 mile S of this island.

Pasir Nabadi, a coral reef on which there is a large light-colored drying sand bank, is located 14.5 miles NW of Kumbur. Between these two reefs there is a deep passage in which the only danger is a 2.7m patch, located 7.5 miles E of Tanjung Mangguar.

10.51 Pulau Angra Meos (2°42'S., 134°50'E.), located about 11 miles N of Tanjung Mangguar, is a large hilly uninhabited island; it has a maximum elevation of 205m but has no conspicuous peaks. The W, E, and NE points of the island are sandy and covered with tall trees. A detached 7.8m patch lies 3 miles NE of the E extremity of Angra Meos.

Pulau Kabuai (Kaboeai) (2°33'S., 134°53'E.) is a low sandy islet covered with tall trees, which makes it an important landmark for the N end of the barrier reef; it is located at the S end of a small steep-to drying reef 9.5 miles N of the E extremity of Angra Meos. Within a distance of 3 miles N and NW of Kabuai are several reefs on two of which there are drying sand banks that are marked by breakers at high tide. West of Kabuai are several shoals, all lying within a distance of 4 miles of the islet. A 1.8m patch lies 1 mile SE and a 7.8m shoal lies 3.5 miles SW of Kabuai.

Anchorage.—Anchorage can be taken near all of the above-mentioned islets except Nu Tabari. All of these islets are uninhabited, but on some of them there are temporary shelters that are used by the natives who occasionally come out to them on fishing expeditions.

Care should, however, be taken to avoid the 0.3m patch about 0.75 mile W of Nu Sariwanni, and a similar patch about 0.5 mile W of Kumbur; there are also other patches farther W. Reference should be made to the chart.

10.52 The coast between Tanjung Hamuku and Tanjung Maniburu, about 15 miles WNW has three unimportant indentations, the largest and westernmost of which is Tu Wasoi (Toe Wasoi). It is very dangerous to attempt to approach this stretch of coast, because it is fronted by numerous reefs and has not been fully examined.

Tanjung Maniburu (Maniboeroe) (3°14'S., 134°57'E.), a steep point that is closely backed by a 204m hill, is the extremity of the irregularly-shaped Kwatisore Peninsula.

Teluk Kwatisore (Kwatsore Bay) (3°15'S., 134°57'E.) is an indentation, about 1.25 miles wide, in the W side of the Kwatisore Peninsula immediately S of Tanjung Maniburu. There are four detached reefs in the S and SW parts of the bay. Three lie close together about 0.25 and 0.4 mile, respectively, NNW of the village. About 0.4 mile NE of the middle of the village lie the third and fourth detached reefs, which have depths of less than 0.9m. Kwatisore village is situated on the S side of the bay.

Anchorage.—Anchorage can be taken, in 38m, soft mud, about 0.2 mile WSW from the village. This anchorage is unsheltered and the holding ground is poor. In order to avoid E squalls which sometimes blow over the lowlands S of Tanjung Maniburu, vessels should anchor N of the detached reef, in about 40m.

Directions.—Vessels bound for Teluk Kwatisore from N round Tanjung Mangguar at a distance of at least 1 mile and then steer a course of 180° until Pulau Numangguri (Noemanggoeri Island), located 6.25 miles S of Tanjung Mangguar, is abeam, when the 204m hill at Tanjung Maniburu, bearing 160°, should be steered for. At that distance the point appears as a small island. This course, on which the peaks of the Drie Ge-

bruders, located close SW of Tanjung Mangguar, are directly astern, is continued until Pulau Nusir, located about 5 miles NW of Tanjung Maniburu, is abeam and then course 180° is resumed. When Nu Sariwanni is almost in range with Tanjung Maniburu course is changed to the SE in order to proceed to the anchorage.

Vessels coming from the E pass through the barrier reef S of Nu Sariwanni on course 279° and then steer toward Tanjung Maniburu, rounding that point at sufficient distance to clear the 0.9m shoal that lies 0.5 mile NW of the point.

The coast between Teluk Kwatisore and Tanjung Mangguar trends S, W, and N for a total distance of 28 miles; it is fronted by several islands and has a number of indentations the largest of which lies W of the Kwatisore Peninsula. Between Teluk Kwatisore and Tanjung Womosisore, about 10.5 miles NW of Tanjung Maniburu, the coast is covered with mangroves, and almost uninhabited. The only settlement along this coast is a small one on the S shore of Teluk Waobu (Waoboe), 5 miles WSW of Tanjung Maniburu.

Tanjung Womosisore (3°06'S., 134°50'E.), located 10.5 miles NW of Tanjung Maniburu, is a very conspicuous, bare, light green-colored point at the end of a small, low, and narrow peninsula. Teluk Wororomi, an inlet just S of Tanjung Womosisore, dries over its greater part.

10.53 Pulau Nusir (Noesir), a drying reef 0.75 mile long about 5 miles NW of Tanjung Maniburu, is high and well-wooded; it is a good landmark. Pulau Manimaje and Pulau Nurage (Noerage) are two islands connected by a drying reef and located in the bight N of Tanjung Womosisore at a distance of about 2 miles offshore; Pulau Nurage is 252m high. About 1 mile E of Nurage is an elongated drying reef on which are three wooded rocky islets, Kirkir, Rori, and Runggabor (Roenggabor), and several other rocky formations. In a valley on the NW shore of the inlet, W of the N end of Nurage, is Jauer Manokwari village, off which small craft with local knowledge can anchor. Close NE of Tanjung Yauer (Jauer), located 1.5 miles NE of the N end of Pulau Nurage, is Pulau Numangguri (Noemanggoeri), which is 82m high and is conspicuous from the N.

Tanjung Mangguar (Manggoear) (2°53'S., 134°51'E.) is a high rocky point at the NE extremity of the peninsula that forms the E side of Teluk Umar. A narrow reef on which there are several rocky islets extends NE for a distance of 0.5 mile from the point.

Caution.—Detached shoals and patches, which dry, extend about 5.75 miles N of Tanjung Maniburu and in the bight between this point and Pulau Nusir.

A patch, with a depth of 1.8m, and a patch with a depth of 4.1m lie about 1.25 miles SSE and 0.75 mile, respectively, of Tanjung Womosisore.

10.54 Teluk Umar (Oemar Bay) (2°55'S., 134°44'E.) is a roughly rectangular indentation in the coast S of the point at the N end of the peninsula, close W of Tanjung Mangguar, and **Tanjung Woibi** (2°54'S., 134°41'E.), located 9.75 miles to the WSW. The bay ranges in width from 8.25 miles at the N end to 5.25 miles at its head, and it extends south 6 miles from the line joining the entrance points.

Pulau Rorenggi is a rocky islet close off the E entrance point of the bay. The E shore, S of Rorenggi, is likewise rocky and is marked by two indentations, Teluk Nappan and Teluk Singgajebi, it is closely backed by a mountainous ridge. The S shore of the bay is a steeply rising, sandy beach that is unbroken except at Tanjung Yarior, located at the head of the bay, where there is a rocky section on which there is a conspicuous white patch that can be made out at a considerable distance. The W side of the bay to and including Tanjung Woibi, the W entrance point, is low and covered with mangroves; immediately S of Tanjung Woibi is a small inlet named Teluk Nanggu (Nanggoe Bay).

10.55 The land around Teluk Umar is moderately well settled. On the W coast, just S of Teluk Nanggu, is the village of Nanggubi. On the S shore of the bay are Jaratur (Jaratoer); Armini, which is easily identified by a small group of trees; Bawe; and Wakobi. On the E shore of Teluk Umar, at the head of the small Teluk Nappan, is the village of Nappan. Boats can land abreast Yaratuar (Jaratoear) village. Fresh fruit and vegetables are obtainable at the villages.

Mount Yauer (Jauer) (2°59'S., 134°48'E.), about 1,100m high, rises about 6.5 miles SSW of Tanjung Mangguar; it is one of the most prominent landmarks in Teluk Cenderawasih, and can be identified from all directions. At the N end of the peninsula stand the Three Brothers, the highest of which attains an elevation of 427m; these peaks are prominent from N and SE.

Anchorage.—Anchorage can be taken anywhere in the bay close to the shore, in 29 to 49m. Vessels entering the bay should steer in on course 180°, making directly for the white patch near Tanjung Jarior.

Caution.—An 8.2m shoal is located nearly midway between the E and W shores 1.75 miles from the head of the bay; although there are several shoals and rocks close to the shores of the bay, this is the only detached off-lying shoal in the bay.

A reef, with a depth of 2.7m, marked by discoloration, lies 7.5 miles E of Tanjung Mangguar. Pasir Nabadi is a coral reef on which there is a bright patch of sand which dries, lying 6.5 miles NE of Tanjung Mangguar. About 1.5 miles NE of the reef is a shoal with a depth of 14.6m.

Teluk Cenderawasih—West Shore

10.56 The coast between Tanjung Woibi and **Tanjung Busurua** (Boesoeroea) (2°29'S., 134°38'E.) is steep, uninhabited, and lacking in anchorage places. It is clear of dangers N of Goni village, situated 2 miles NNW of Tanjung Woibi.

A detached 5m patch lies about 1.25 miles N of Goni village.

From Tanjung Busurua to Tanjung Oransbari, 71 miles to the NNW, the coast is high and is fronted by the larger Pulau Roon, Pulau Waar, and Pulau Rumberpon (Roemberpon), and a number of smaller islands and reefs. Roon lies off the N end of a peninsula which forms the large Teluk Wandamen (Wandamen Bay). A deep and clear channel will be found off this coast, leading E of Pulau Wairundi (Wairoendi) and Pulau Waar into Teluk Wandammen, or E of those two islands and Roon and to the S part of Teluk Cenderawasih.

Teluk Yoppingar (Joppingar) (2°29'S., 134°36'E.) is entered between Tanjung Busurua and a point about 3.5 miles WNW.

The peninsula on the E side of Teluk Wandamen consists mainly of Pegunungan Wondiwoi a range of mountains which attains an elevation of 2,239m. At the head of this bay is a low

Yende (Jende) village

area with only a few elevated sections. Along the W side of the bay and the coast to the N a range of hills and mountains lies a short distance inland. These mountains are of little importance as far as navigation is concerned, but the numerous points and islands are sufficient for that purpose. Southwestward of Tanjung Oransbari, however, where the land adjacent to the sea is low, are two hills, Sek Fur (Foer) and Masimi, 468m and 200m high, which will serve as landmarks.

Pulau Roon (2°25'S., 134°35'E.) is a very irregularly-shaped island, lying NW of Tanjung Busurua and separated from the peninsula on the E side of Teluk Wandammen by Selat Numamuran (Noemanoeran Strait), which is deep and clear. The island is hilly and rises to a height of 380m.

Pulau Rariei, Pulau Mansineer, and Pulau Rariau are high rocky islands on the NW side of Pulau Roon; Numberapi (Noemberapi) and Auri (Aoeri), two rocky formations, 35m and 23m high, lying N and NE of Pulau Rariau, constitute good landmarks.

Rippon, and another islet E of it, lie close W of the SW point of Roon and form part of the N shore of Selat Numamuran. Pinai, a high islet 0.75 mile N of Rippon, lies 0.5 mile W of the S entrance of Teluk Kayob to which it is connected by a reef with a depth of 0.9m.

Labuan Yende (Jende Roads) (2°22'S., 134°32'E.) on the S side of the large bight on the NW side of Pulau Roon, is best approached from the W by passing S of Pulau Rariei. A conspicuous church stands about 0.25 mile W of Jende.

Yende (Jende) village, abreast of the roads, consists of the houses of the natives built on poles in the water, and the dwellings of other people on the narrow sandy beach. In back of it the steep cliffs rise to a considerable height. Drinking water can be obtained from a waterfall.

10.57 Kepulauan Auri (Mios Aoeri) (2°02'S., 134°44'E.), NE of Pulau Roon and E of Pulau Waar, is separated from those islands by a deep and clear passage. The group consists of several islands and a number of shoals lying on a bank of soundings with very irregular depths. The W edge of the bank is very steep-to and has practically a continuous shoal of 9.1m, and less close within it. The three southernmost islands are low, but the other islands, farther to the N, are steep and rocky. Pulau Maransabadi, the largest, has a height of 125m. These islands are not inhabited, but are frequently visited by people from Pulau Roon.

Miei Village (2°44'S., 134°30'E.) (World Port Index No. 53000) is the storage place for products of the district on the E side of Teluk Wandammen. The coastal section is rich in sago palms; nutmeg and bark are brought down from the higher sections. Fishing is carried on by the natives near the beach. A government official is stationed at Miei, and a government vessel makes regular call at the roads. The European houses and mission school are situated on the hills beyond the village.

For the most part the tidal currents in the roads are negligible. There is a sandy beach, unobstructed by reef, in front of Miei and lighters are landed here.

A 175m long stone pier is situated at Wassior, a place about 0.75 mile N of Miei, and there is a partially completed jetty nearby.

Good drinking water can be obtained from a water line at Miei.

10.58 Teluk Wandamen (Wandamen Bay) (2°45'S., 134°28'E.) lies W of the peninsula off the extremity of which Pulau Roon is located. Its W shore is steep but the E shore is bordered by a strip of low land which is thickly populated though little can be seen of the villages. The bay itself is comparatively clear and deep.

Pulau Yop (Jop) lies in the entrance to the bay and rises to a height of 145m at its N end.

Labuan Miei (Miei Roads) (2°44'S., 134°30'E.) lie in a bight of the E shore 12 miles SE of Pulau Yop. A light green spot on the slopes of the mountains SE of the village constitutes a good landmark.

Labuan Windissi (Windissi Roads) (2°25'S., 134°13'E.), 11 miles NW of Pulau Yop, may be located by the high Tanjung Ronsore which lies SE of it. Off the village of Windissi are a number of low but heavily-wooded islets, all surrounded by drying reefs in which navigable channels and inlets are found.

Between Labuan Windissi and the S end of Pulau Rumberpon only a few scattered habitations are found along the steep coast and there are no anchorages except that mentioned below. Along the S part of this stretch of coast the reefs are well marked by discoloration, but farther N where the islets and reefs fronting it are more numerous discoloration cannot be depended on to locate the reefs as the water is rather muddy.

Pulau Waar (Mios Waar) (2°05'S., 134°22'E.), NW of Pulau Roon and about 12 miles off the N part of this stretch of coast, is hilly and attains a height of 450m, but there are no conspicuous peaks; a red patch on the SE side 3 miles NNE of Tanjung Riarwepam is a good landmark. The fairly large village of Wandoswaar lies on the NW side, the small village of Nusumboni (Noesoemboni) lies on the W side, and the large village of Yomber (Jomber) lies on the E side.

Pulau Wairundi (Wairoendi) (1°48'S., 134°26'E.), 11 miles N of Pulau Waar, is located more toward the SE end of a narrow bank of soundings. It is a low, sandy, uninhabited island covered with tall trees; it constitutes an important landmark.

10.59 Pulau Rumberpon (Roemberpon) (1°50'S., 134°10'E.), NW of Pulau Waar and close to the Irian Jaya coast, is hilly at its N end and W side, but its eastern side is comparatively low and covered with mangroves. The 224m hill at the N end of the island constitutes a good landmark, even at a great distance. Yaliali (Jaliali) and Senebuai (Seneboeai) villages on the E coast can be reached by channels through the drying reefs; Yembekiri (Jembekiri) and Yamakaan (Jamakaan) villages lie on the W coast. Jenimerai, a rocky islet, lies on the coastal reef close NE of Tanjung Tjidi, the NW point of Rumberpon.

The Teluk Cenderawasih National Marine Park and Conservation Area has been established along 120 miles of coastline, coastal waters and off-lying islands and reefs. The northernmost boundary of the park extends from the N coast of Pulau Rumberpon SE towards the village of Hamuku.

Selat Rumberpon (Roemberpon Strait) (1°43'S., 134°09'E.), which separates Pulau Rumberpon from the Irian Jaya coast, has a large number of islets and dangers which greatly encumber its narrow S end. This channel is tortuous and demands local knowledge.

Teluk Mawi (Mawi Bay) (1°39'S., 134°07'E.) is located between Tanjung Syeri (Tanjung Sjeri) and Tanjung Runaki (Tanjung Roenaki), the N and S entrance points, respectively. The 1,400m peak of the Pegu-Nungan Mawi (Mawi Mountains) rises 3 miles W of the bay. Anchorage may be obtained in Teluk Mawi about 0.25 mile S of Tanjung Syeri, in a depth of 58m, sand.

Labuan Syeri (Sjeri Roads) (1°39'S., 134°06'E.) lies in the N part of Teluk Mawi W of Tanjung Syeri. The roads are protected from the N swells that are encountered in Teluk Cenderawasih. With E or S winds there is a shore sea in the roads. There is no current.

Tanjung Yori (Tanjung Jori), 7 miles NE of Tanjung Syeri, is low and marked by high, dead tree trunks.

Rapaowi, a village on the coast, is situated about 2.5 miles N of Tanjung Jori. A road connects Rapaowi and Ransiki, about 3 miles W. A government official resides at Ransiki. There is a boat passage, about 0.12 mile wide, abreast of the village of Rapaowi, which is entered through the coastal reef.

10.60 Tanjung Oransbari (1°20'S., 134°17'E.) is low but has a tall, conspicuous tree on it. On the S side of the point is an inlet where proas often wait for more favorable weather before continuing their journey N. Vessels rounding the point should pass either close to it or at a considerable distance off to avoid the shoals. A light is shown from a white beacon on Tanjung Oransbari.

Winds—Weather.—Along the W coast of Teluk Cenderawasih between Teluk Wandamen and **Tanjung Saweba** (0°43'S., 133°57'E.), the weather conditions are subject to change both from place to place as well as from hour to hour. During a survey in May and June, when proceeding SE from Tanjung Saweba, SE winds were experienced, moderate at first, later stiff, with a sea, but little swell. In December, there was a heavy N swell as far S as the parallel of Tanjung Oransbari.

During a survey from Tanjung Onsbari to Tanjung Mangguar, in January and February the wind blew with moderate force from a N and NW direction. Periods of strong NW winds, locally known as "Timorlaut" occurred regularly; there was much rain.

Tides—Currents.—Currents set across the shoals and around Tanjung Oransbari sometimes cause a difficult sea when the monsoon winds are strong.

Caution.—Off the W side of Pulau Roon are a number of islands and several dangerous shoals and rocks. **De Klerk Reef** (Karang Num) (2°15'S., 134°28'E.), the outer danger, lies 5.35 miles WNW of the N end of the island and has a depth of 11m.

In Teluk Yoppingar, a patch with a depth of 4.9m, marked by discoloration, lies about 0.3 mile NNW of Tanjung Busuru. Three detached reefs extend on an E and W line from the W shore of the bay. The easternmost reef, with a least known depth of 9.1m, lies about 2.25 miles W of Tanjung Busuru; each of the other reefs has least known depth of 3.0m.

A shoal, with a least depth of 5m, lies about 0.4 mile SW of the S end of Pulau Rariau. Shoals, with depths of 6.8m and 5.9m, lie about 1.75 miles SW and 1 mile S, respectively, of the S extremity of Pulau Rariau. A shoal, with a depth of 5.9m, lies about 1.5 miles SE of the same point.

There are several detached shoals with depths of less than

5.9m within 15 miles NE through SE of Pulau Maransabadi. A drying reef lies E of the S end of the bank.

A string of reefs, some of which dry at LW, extends about 20 miles SE from the bank of soundings mentioned above. Among these reefs are two islets, Pulau Kuwom (Koewom) and Pulau Rorebo, 7 and 16 miles SE of Pulau Matas, the southernmost island of Pulau Auri. Both of these islets are low but well-wooded. The N end of this string of reefs is a drying reef 2.5 miles N of Pulau Kuwom; the S end consists of three small drying patches 22 miles E of Tanjung Busurua. A deep channel separates these reefs from those near Pulau Kabuai (Kaboeai). There are patches in this area that uncover. Reference should be made to the chart.

10.61 Tydeman Reefs (Karang Gajebi) (2°09'S., 135°15'E.), about 20 miles E of Pulau Iweri, the southeasternmost island of Pulau Auri, is a string of reefs, 10 miles in length, lying in an area which is normally deep and clear. They consist of a number of drying and very shoal dangers. The westernmost group of the string has a least depth of 1.4m; the NE danger is a drying reef, marked by a light.

Some shoals of 1.8 to 6.9m lie up to 3.4 miles off the E side of Teluk Wandamen N of Tanjung Sobiei; near the shore are several drying reefs. A wide mud bank and some islets front the shore at the head of the bay. A reef, with a least depth of 2.7m, lies on the W shore about midway in the bay. The rivers Wosimi and Ambbumi (Ambboemi) discharge here. About 2.25 miles from the head of the bay and nearly 1 mile from the W shore lies Pulau Abuwami (Aboewami), a small islet with reefs N and NW of it. Five miles farther to the N are two patches of 0.9 and 1.5m. Uresi (Oeresi) is a drying rock near the W shore 4.25 miles still farther to the N. A 2.7m shoal patch lies close offshore, about 1.25 miles SSE of Uresi.

In the entrance to the bay is Pulau Yop with a drying reef extending nearly 2 miles to the N; a 7.8m shoal lies 0.5 mile farther to the N. There is a deep and clear channel on each side of Pulau Jop.

In Labuan Miei (Miei Roads), an area from about 0.1 mile offshore, W for about 2 miles, and N and S for about 3 miles, has a clear swept depth of 14m.

About 2.5 miles SE of Tanjung Kananisoe is a reef with a least depth of 1.5m, which discolors well; about 3 miles N of the roads is a 7.3m shoal which is not marked by discoloration.

The N coast of Pulau Waar is clear, and along the E coast the dangers with depths of 9.1m or less lie within a mile off the shore. Shoals of less than 7.3m extend 3 miles off the S point. Off the W coast the dangers are more numerous and shoals of 4.6 to 11m lie up to 6.5 miles offshore.

Reefs and shoals of less than 9.1m extend up to 3.4 miles NW from Pulau Wairundi (Wairoendi).

The reefs near Pulau Rumberpon (Roemberpon) are not marked by discoloration.

There is a least depth of 0.9m in the fairway of Selat Rumberpon (Roemberpon Strait); the reefs are usually well marked by discoloration and there is not much current. Vessels entering from the N must take care to avoid the dangers in the N part. The fairway then leads W of Nusero Ketjiland and Nusero Besar. When abreast of Kasibi and Tanjung Pekiriwaisai favor the W shore, pass W and S of Apong, and then out at the S entrance between Batu (Batoe) and Masoon or between the latter and Tanjung Sassoi.

10.62 Tanjung Runaki (Roenaki) (1°41'S., 134°06'E.) is formed by a sloping rock, off which a coastal reef extends some distance. Surf breaks on this reef much of the time. A detached 5.9m shoal and a 1.8m detached shoal lie about 0.5 mile NNE and close SE, respectively, of the coastal reef. A 18.7m bank lies between the above-mentioned shoals.

A bank of soundings, on which current rips are often seen, extends about 5 miles SE of Tanjung Yori. On the bank are three shoals of 11.9m, 9.6m, and 4.6m. Vessels can pass close to the point, between it and the above shoals. A small military garrison is situated at the village of Momi, 4 miles SW of the point.

Batu Haiwai (Batoe Haiwai) is a drying reef 4.5 miles NNE of Tanjung Yori. There is a deep and clear channel between it and the coast.

Depths of from 6.1 to 20m extend up to 1 mile from Rapaowi.

Extending E from Tanjung Oransbari is a bank of soundings on which are some shoal patches with depths as little as 5m.

Anchorage.—The only anchorage on the E coast of Pulau Roon is in Teluk Menarbu (Menarboe Bay). On the W coast there is anchorage, in a depth of 5.5m, at the head of Teluk Kayob (Kajob Bay) and at several places in the large bight on the NW side of the island.

In Labuan Yende (Jende Roads), a vessel that is not too large can anchor, in 46m, between two projecting points of the shore reef. The roads are dangerous during squally weather, as the holding ground is not very good.

10.63 On the E side of Teluk Wandamen, at the N end of the peninsula forming this side, are the two narrow bays of Teluk Raimu (Raimoe) and Teluk Van Dosterzee (Ainsendammen), which are deep and clear, and afford safe anchorage. There are no permanent settlements on the high shores which form these bays.

On the W side there is a safe anchorage W of Pulau Sombroko, an island 4 miles NW of Pulau Yop. Teluk Watiriraro and Teluk Kurio, two narrow but clear inlets, lie 1 and 5 miles S of Sombroko; their shores are uninhabited. These anchorages require local knowledge.

Other than the above, anchorage can be found most anywhere along the shores of the bay, in depths of 55 to 60m.

In Labuan Miei, suitable anchorage, in a depth of 29.3m, mud, will be found abreast the village.

10.64 In Labuan Windissi, SE of the SE islet lying off the village there is suitable anchorage for large vessels, in 46m. Smaller vessels can proceed into the inlet W of this anchorage; here there are depths of 10.1 to 11m. The edges of the reefs are not very well marked by discoloration.

Anchorage may be found off Kali Werror, close S of Mamisi village and 7.5 miles NNW of Windissi. At this place the rocky coast is broken by a sandy beach, 0.35 mile in length, which vessels can approach on a SW bearing. Anchorage can be taken at most any depth and distance offshore, as the bottom rises gradually and consists of sand and mud. Large vessels can anchor in 35 to 40m. Local knowledge is necessary.

Anchorage may be found most anywhere near the drying

coastal reef off Pulau Rumberpon, even though the depths are great.

Labuan Syeri (Labuan Sjeri) offers good anchorage, in depths of 49 to 80m. The most protected anchorage lies about 0.25 mile due S of Syeri (Sjeri) village, in about 59m, mud and sand. Elsewhere the sea and swells will be felt sooner. The shore bank between Sjeri village and Tanjung Sjeri is steep, composed of sand, and free of stones. Boats and lighters can be landed on the beach here.

Anchorage may be taken, in 55m, about 0.15 mile offshore abreast a small boat pier situated at the village of Momi about 4 miles SW of Tanjung Jori.

Anchorage can be obtained, in 7.3 to 14.6m, about 135m SE of the entrance of the boat passage situated abreast the village of Rapaowi.

10.65 The coast between Tanjung Oransbari and Tanjung Saweba, a distance of 43 miles, is backed by high mountains, some of which extend very close to the shore. Of these mountains, Pegunungan Arfak (Arfak Mountains), which rise to a height of 2,950m, are rather prominent. These high mountains are usually enveloped by clouds, which render them of little value to navigation. The coastal hills may be of some use as landmarks, however. In general, vessels can navigate close along this coast.

The coast for about 28 miles NNW of Tanjung Oransbari is generally low but the hills come close to the shore in some places. About 5 miles NW of Tanjung Oransbari is Wantoki, a conspicuous grove of trees near the end of a range of hills. About 10 miles, 14 miles, and 22 miles NW of the point are conspicuous openings in the woods at War Moi, War Nasi, and War Mupi (Moepi). The bottom along this coast is too steep for anchorage.

Tanjung Memori (0°52'S., 134°08'E.) is the NE projection of the entrance to Teluk Doreh (Doreh Hum). It is the low wooded point of a hilly peninsula with two rather vague summits; the W of these two summits is 230m in height and has a conspicuous tree on it.

Pulau Mansinam (0°54'S., 134°06'E.) lies SW of Tanjung Memori and forms the E side of Teluk Doreh, a hilly island that rises to 75m at its N end. This latter elevation has a conspicuous tree on it.

The reefs are hard to make out, but the E and N side of Pulau Mansinam can be approached close to Pulau Wappi, W of the N end of Pulau Mansinam, is low and covered with coconut trees on the N side and with mangroves on the S side.

A small detached 9.1m shoal patch lies about 2 miles SSE of Tanjung Memori Light.

Menokwari (Manokwari) (0°52'S., 134°05'E.)

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10.66 Menokwari, a commercial port and settlement, lies in the inlet on the N side of Teluk Doreh. It is the administrative capital of Irian Jaya. The housing area consists of rows of houses on each side of a road extending along the shore. Menokwari is the site of a repair base.

Port of Manokwari

http://www.portina4.go.id/manok.htm

Depths—Limitations.—New Wharf, situated on the W side of the harbor to the N of the repair yard, is a T-head offshore wharf. It will accomodate large vessels and has full facilities.

Old Government Pier, situated on the E side of the harbor, has a berthing length of about 70m with a depth alongside of about 4.3m.

A T-headed pier is situated at Tanjung Rarisamberi, about 0.5 mile SSE of Menokwari. A buoy is moored close off the pier head.

The port can accommodate vessels up to 7,000 dwt, with a maximum length of 150m and a maximum draft of 9.6m.

Fuel is available by road tanker.

Aspect.—A light is shown from a white iron skeleton structure on the NE extremity of Tanjung Memori.

Range lights are shown on request at the port of Menokwari, situated about 0.6 mile NNE of Tanjung Sanggen, the W entrance point of Labuan Menokwari. These lights in range 006.5° lead into the inlet clear of the dangers lying in the entrance.

Karang Butsuiri is a dangerous reef which lies about 0.3 mile ESE of Tanjung Sanggen, the W entrance point to Menokwari.

Mooring buoys are situated in Labuan Menokwari, 0.25 and 0.5 mile, respectively, NNW of the light at the entrance. Another mooring buoy is situated close SW of the range lights.

A beacon, from which a light is occasionally shown, lies about 92m SSE of the front range beacon.

Pilotage.—Pilotage is compulsory in Menokwari for vessels over 70 grt. Vessels should send their ETA 72 hours, 48 hours, and 24 hours prior to arrival. Requests for pilots should be sent 6 hours prior to arrival and 3 hours prior to departure. Pilots board in the following positons:

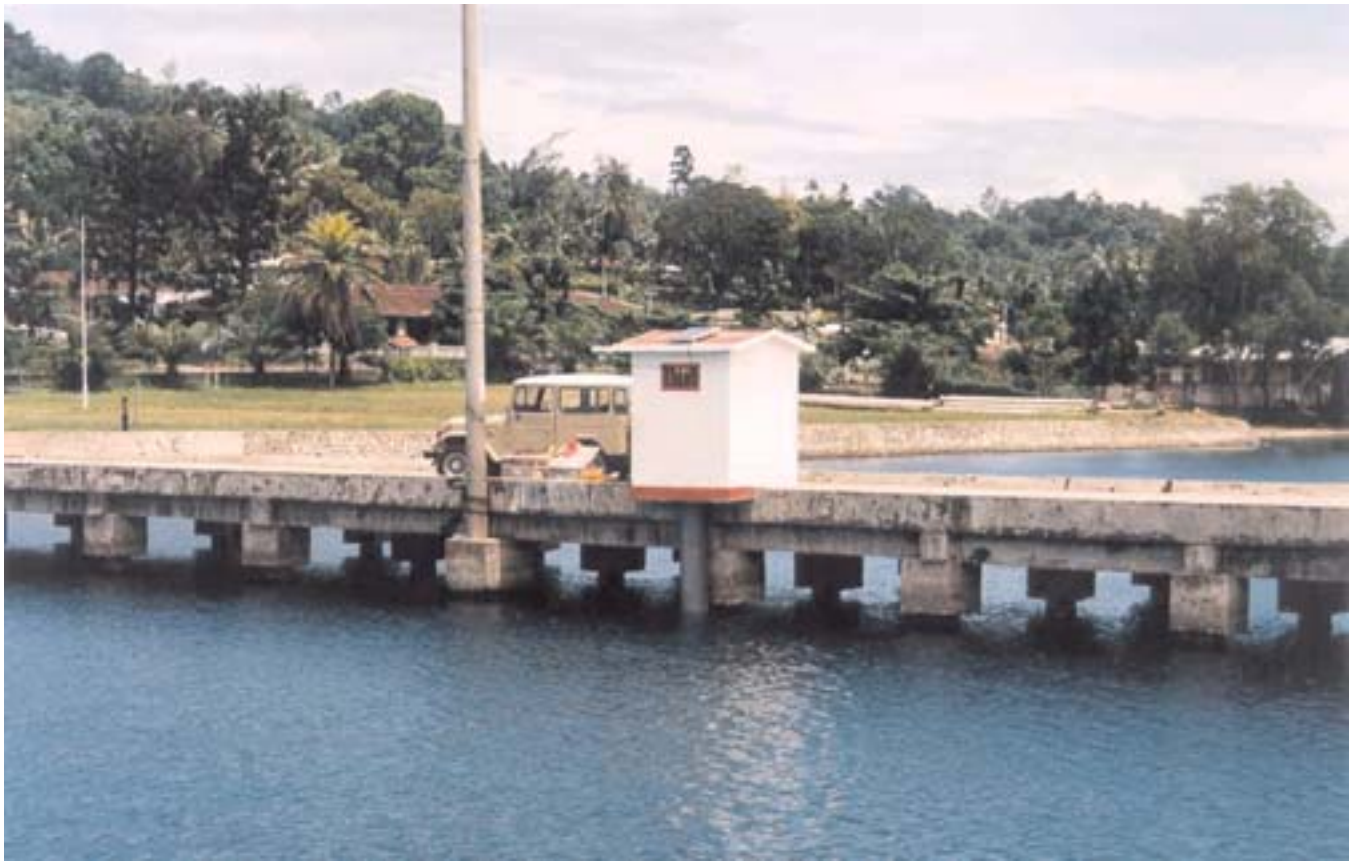
1. South approach—W of Pulau Lemon.
2. East approach—N of Pulau Mansinam.

Anchorage.—Near the mouth of War Andai, in the bight S of Teluk Doreh, there is anchorage in 35 to 55m. This little river has a wide mouth and can be navigated for a short distance by small craft.

Anchorage in sheltered locations, with depths of 29 to 38m, can be taken in the roads. The bottom is not good, and a vessel may drag in strong gusts. In case of a prolonged stay or a crowded berth, vessels should moor head and stern.

Directions.—Vessels pass S of Mansinam and W of Mios Wappi, which is 4 miles NW of the NW point of Mansinam; then steer 006.5° on the range to the anchorage.

Mansinam and Mios Wappi may also be passed on their N sides by steering for the light on Karang Butsuiri bearing 290°; this leads through the swept channel. When Mios Wappi is about abeam, alter course N to pass between Karang Butsiuri and Tanjung Rarisamberi, the E entrance point of Menokwari, and then to the anchorage.



Menokwari—Auto-Tide Gauge

From Tanjung Memori, the coast trends 14 miles NW to Tanjung Saweba. It is high and steep-to and vessels can proceed at a short distance offshore. Only sailing proas and light-draft vessels will find anchorage back of Pulau Auri (Mios Aoeri), a small islet E of Tanjung Saweba. An islet, about 38m in diameter, lies about 0.5 mile 308° from the N tip of Pulau Auri. The islet stands on a drying reef which is about 95m in diameter. Some dangers are charted off the S end of and near the coast NW of Pulau Auri.

Tanjung Saweba, which can be approached within a short distance, is low but is backed by hills of about 305m elevation. The small Pulau Auri, about 3 miles SE of the point, is covered with high trees and can be easily recognized.

A bank, with a depth of 73m, lies about 34 miles NE of Tanjung Saweba.

10.67 Kepulauan Mapia (Mapia Islands) (St. David) (0°49'N., 134°17'E.), about 95 miles NNE of Tanjung Saweba, consists of three islands, Pulau Pegun, Pulau Bras, and Pulau Fanildo, which are located on an oval atoll, 9 miles in length, N and S. The islands are low and have a number of high coconut trees on them which can be seen from a considerable distance.

Pulau Fanildo reaches an elevation of 30m over the coconut palms. Pulau Bras reaches a elevation of 40m and Pulau Pegun an elevation of 30.5m over the coconut palms.

When approaching the islands, especially from the NE, great caution should be exercised. This is especially true when approaching against a low sun or with smooth water, as the edges of the atoll cannot be seen except at LW springs. The use of the lead is out of the question as the atoll is steep-to.

There is usually a surf over the reef, but it does not mark the outer edges, as it is, on the whole, inside them.

The edges of the reef dry at LW springs.

The lagoon within the atoll is filled with rocks. It is possible for a boat to enter through a narrow winding channel on the W side, more than 2 miles NNW of the N end of Pulau Pegun.

There is a settlement on the S part of Pulau Pegun.

Winds—Weather.—Winds observed from the middle of June to the middle of August were principally from E and ESE. They were often of considerable force, were accompanied by much rain, and made landing difficult, or impossible, because of the high surf and the rollers.

A W wind reportedly prevailed in mid-November and the weather was in general brighter.

Tides—Currents.—During a survey, a 1.5 knot current setting W was observed at Pulau Pegun; during another survey, a current of the same strength was observed to be setting constantly in a W by N direction.

Anchorage.—In general, there are no satisfactory anchorages, but small vessels can find temporary anchorage during good

weather off the N side of the atoll.

The usual landing place is near the settlement on the S part of Pulau Pegun. Landing is accomplished at high tide but during inclement weather, or with high rollers, it is very dangerous, if not impossible.

Kepulauan Mapia is reported (1992) to lie 1 mile E of its charted position.

10.68 The coast between Tanjung Saweba and **Tanjung Boropen** (0°43'S., 133°33'E.), 22.5 miles to the W, the coast is very sparsely inhabited. The principal settlements along this stretch of coast are Befoor, Warikau (which is conspicuous), Maseni, and Sidai.

Teluk Siwi (Kleine Geelvink Bay) (0°44'S., 133°44'E.), 13 miles W of Tanjung Saweba and S of Tanjung Wibain (Wilbain), is much frequented by proas but cannot be used by larger vessels as the shore is steep.

West of Tanjung Sidai, between the point of the same name and Tanjung Boropen, there is a very small proa harbor, with a depth of 14.6m.

Anchorage.—Suitable anchorage for large vessels can be found W of Tanjung Boropen.

10.69 From Tanjung Boropen, the coast trends W for 11 miles and then NW for 12 miles to Tanjung Manganeki. The settlements along this coast are Kaironi, S of Tanjung Boropen, and Mubrani (Moebrani), in the angle of the coastline.

Byenkorf Mountain (0°46'S., 133°34'E.), 415m in height, stands 3.5 miles S of Tanjung Boropen and is conspicuous.

About 4 miles W of Mubrani there is a conspicuous double top, 430m high, with a conspicuous tree on its W side; about 4.5 to 5.5 miles farther NW are three conspicuous peaks, with heights of 680m, 755m, and 735m, respectively.

Tanjung Manganeki (0°36'S., 133°14'E.) may be recognized by a hill, 210m high, close in back of it.

From Tanjung Manganeki, the shore trends W with several indentations for 19 miles to **Tanjung Saukris** (Saoekris) (0°27'S., 132°58'E.). There are several settlements on this shore and between those of Saukorem (Saoekorem) and Warpaperi; about 6.5 miles NW of Tanjung Manganeki, there is a projecting reef, through which there is a channel that enables boats to land regardless of the surf.

A light is shown from Saukorem.

A conspicuous flat-topped hill, 500m high, stands 3.5 miles W of Tanjung Manganeki and is visible for a considerable distance from E.

Tanjung Srabapan (0°31'S., 133°05'E.), 3 miles WNW of Warpaperi settlement, is low with high trees on it.

Boltop (0°33'S., 133°02'E.), a conspicuous round-topped peak, 930m high, stands 4 miles WSW of Tanjung Srabapan.

Piekye (Piekje) (0°28'S., 132°55'E.), a 650m elevation standing 2.5 miles SW of Tanjung Saukris, is very conspicuous from the E.

From Tanjung Saukris, the coast trends WNW for 15 miles to Tanjung Weios (Valsche Kaap). There are steep rocky sections along this coast, interrupted by low, flat places.

About 4 miles W of Tanjung Saukris is a point on which the settlement of Wau stands.

From Tanjung Weios, the shore trends W for 18 miles to Tanjung Yamursba (Jamoersba) (Cape of Good Hope).

The 295m hill, which stands about 6 miles E of Tanjung Yamursba has a conspicuous round top and drops sharply toward the sea.

On the E side of the foot of Tanjung Weios, there is a chimney-shaped rock.

10.70 Tanjung Kambrini (0°21'S., 132°37'E.), 6.5 miles W of Tanjung Weios, is a rocky formation, 50m high, at the end of a chain of hills.

Warmandi settlement, 2 miles E of Tanjung Kambrini, is W of a 130m hill which drops sharply to the sea.

Anchorage.—Under favorable weather conditions, vessels can find anchorage in certain places between Tanjung Boropen and Tanjung Manganeki.

Anchorage can be found, in 13.7m, inside the two patches of 5.9m and 5m mentioned below.

There is good temporary anchorage almost everywhere between Tanjung Saukris and Tanjung Yamursba; in favorable weather vessels can even anchor between the 10m and 20m curves.

Directions.—Byenkorf Mountain, seen open of the fairly sharp 271m peak, one of the three distinct elevations in the ridge in back of the coast, leads clear of the shallow patches between Mubrani (Moebrani) and Tanjung Manganeki.

To keep outside the shallow patches between Tanjung Boropen and Mubrani, keep the 150m summit of Tanjung Wibain open of Tanjung Boropen.

Caution.—Several shallow depths lie in the vicinity of the 20m curve between Tanjung Boropen and Tanjung Manganeke.

A 1.4m shoal lies 1.25 miles SE of Tanjung Srabapan. A 5.9m patch lies E of a point located 4 miles W of Tanjung Saukris; a 5m lies SE of the same point. Another shoal, with a depth of 7.8m, lies 2 miles ESE of this same point.

Indonesian

INDONESIAN	English
A	
air	water
air masin	salt water
air mentah	fresh water
air pasang	high tide
air pelajaran	bay, inlet, creek
air perpani	neap tide
air surut	low tide
ajer	river, water
alang	bar
alur	channel
ambang	shoal
angin	wind
api	light
arus	current
B	
baharu, baru	new
bandar, bendar	harbor, port
barat	west, western
batang	river
batu	stone, rock, islet
bengawan	river, large stream
besar	large, great
beting	reef, sandbank, shoal
biduk	river boat
biru	blue
bukit	hill, mountain
bulan	moon
D	
darerah tingkat	administrative division
dalam	deep
danau	lake
dnagkal	shallow
darat	landward
delapan	eight
dua	two
E	
empat	four
enam	six
G	
gosong	shoal, sandbank
gunung	mountain
gunung api	volcano
H	
hari	day
hijau	green
hilir	downstream
hitam	black, dark
hujan	rain
hulu	upper course of a river
hutan	jungle, forest
I	
inggris	english
J	
jalan	street, road
jambatan	bridge
jermal	fishing stake, fish trap
jernih	clear
K	
kali	river
kampung	village
kapal	ship
kapal api	steamship
kapal dadang	cargo ship
kapal lajar	sailing vessel
kapal mualim	pilot boat
kapal muatan	freighter
kapal pandu	pilot boat
kapal penambang	ferry
kapal pangangkut	cargo vessel
kapal penumpang	passenger vessel
kapal perang	warship
kapal peronda	coastguard vessel
kapal tangki	tanker
kapal uap	steamship
kapal udara	aircraft
karang	coral, coral reef, atoll
kelelap	submerged, sunk
kepulauan	archipelago, large group of islands
kering	dry
ketjil	small
kota	city, town, fort
kuala	estuary, river mouth, confluence of two rivers
kulon	west
kuning	yellow
L	
labuan, labuhan	anchorage
lapan	eight
laut	sea, seaward
lebar	broad, wide
lima	fire
lubuk	deep pool
lumpur	mud
lurah	valley, ravine, gully
M	
malam	night
malim	pilot

INDONESIAN	English
mas	golden
merah	red
mualim	pilot
muara	estuary, river mouth
musim	season
N	
nelajan	fisherman
nol	naught
nusa	island
O	
ombak memetjah	breakers
ombak selabu	rollers
P	
pabean	customhouse
pagi	morning
paja	swamp
pangkalang	anchorage, landing place, pier
panjang	long
pantai	beach, coast, shore
pantjang	stake, pile
parigi	well, spring
parit	ditch, small stream
pasang kering	ebb, low tide
pasang naik	high tide
pasang purnama	spring tide
pasang surut	the tides
pasanggrahan	rest house
pasir	sand, sandy beach
pegunungan	mountain range
pelabuhan	roadstead, anchorage
pelabuhan udara	airport
pendaratan	landing place, quay, pier
pengkapalan	shipping
perahu	boat
perahu majang	deep-sea fishing boat
perahu tambang	ferry, boat
perkapalan	fleet shipyard
petang	evening
pinggir laut	coast
pohon, pokok	tree
prau	boat, small craft
propinsi	province
pulau	island
pulau-pulau	small group of islands
puntjak	summit, peak
puri	town
putih	white

INDONESIAN	English
R	
rujut	fish net
rawa, rawang	swamp, marsh
rendah	low
riam	waterfall, rapids
rimba	jungle, forest
rumah	house
S	
sampan	small boat
satu	one
selat	strait, narrows, channel
selatan dajh	southwest
sembilan	nine
sepulah	ten
sjarbandar	harbormaster
sumur	well
sungai	river
T	
tanjung	cape, point, promontory
teluk	bay, bend in a river
tengah	middle
tenggara	southeast
tepi laut	south
terumbu	rock awash at low water
terusan	canal
tiga	three
timur	east
timur laut	northeast
tinggi	high
tjetek	shallow
tji	stream
tjukuh	cape
tohor	shallow
tokong	reef, below-water bank
tongkang	lighter (for cargo)
tua	old
tujuh	seven
U	
ujung	cape, point, headland
ulu	upper reaches of a river
utara	north
utara barat	northwest
W	
waduk	reservoir
wai	river
wetan	east

Dutch

DUTCH	English
A	
aan	at, near, on
ankerplaats	anchorage
archipel	archipelago
B	
baai	bay
baak	beacon
bank	bank, shoal
beloodsen	embark (pilot)
berg	mountain
binnen	inner
blauw	blue
bocht	bight
boei	buoy
bol	ball
boom	tree
bosch	forest
brug	bridge
brul	whistle
buiten	outer
bult	hump
D	
dag	day
dam	dam, breakwater
de, den	the
diep	deep
diepgaande	deep-draft
dijk	dike
donker	dark
dorp	village
draaikalk	eddy
dremel	bar
drie	three
driehoek	triangle
droogte	shoal
duin	dune, sandhill
dwars	across, athwart
E	
eiland	island
eilanden	islands
eilandje	islet
G	
gat	channel
geel	yellow
gebergte	mountain range
getijseinen	tidal signals
geul	narrow channel
golf	gulf
groen	green
gronden	grounds
groot	great
H	
haven	harbor
helft	half
het	the
heuvel	hill
hoek	cape, point
hoofd	headland
hoog	high
hout	wood
K	
kaai	quay
kaap	cape, headland
kake	quay
kanaal	channel
kegel	cone
kil	channel
klein, kleine	little, small
klip	rock, cliff
kolen	coal
kop	head
kreek	creek
kust	coast
L	
laag, lage	low
lang	long
licht	light
lichtboei	light buoy
lichtenlijn	leading lights, range lights
loods	pilot
loodswegen	pilotage
M	
meer	inland sea, lake
midden	middle
moessan	monsoon
modder	mud
mond	mouth, estuary
N	
nauw	narrows
nieuw	new
nood	distress, emergency
noordoost	northeast
noordwest	northwest
O	
olie	oil
ondiepte	shoal
ontzeggen	forbidden

DUTCH	English
oranje	orange
oud	old

P

peilschaal	tide gauge
plaat	shoal
plat	flat
polder	reclaimed land
punt	point

R

rak	channel
rechthoekig	rectangular
reddingboote	lifeboat
rede	roadstead
rif	reef
riffen	reefs
rivier	river
rood, ruode	red
rots	rocks
rug	ridge
ruitvormig	diamond-shaped

S

schaar	channel
schiereiland	peninsula
schor	shoal
sein	signal
smal	narrow
spits	pointed
spoorweg	railway
springtij	spring tide
staart	tail (of a bank)
stad	town
steen	stone
steiger	jetty, pier
steile	steep
stompe	blunt
stompe boei	can buoy
straat	strait
strand	beach, shore
stroom	current, stream

T

tijstip	tide
toegang	access
topteken	topmark
toren	tower

U

uit	out

V

vaart	canal
vaarwater	fairway, channel, navigable water
valsch	false
van	of
veerpont, veerschuit	ferry
verbieden	forbidden
verkeerseinen	traffic signals
verlikker	warning light
vlakte	plain, below water flat
vliegtingen	aircraft
vulkaan	volcano

W

wad	drying coastal bank
wal	bank, wall
waterweg	waterway
watergetijden	tidal current
weg	way
werk	work
wit, witte	white
wrak	wreck

Z

zand	sand
zandplaat	sandbank
zee	sea
zon	sun
zuidoost	southeast
zuidwest	southwest
zwart	black

How to use the Index—Gazetteer

Geographic names of navigational features are generally those used by the nation having sovereignty and are listed alphabetically. Diacritical marks, such as accents, cedillas, and circumflexes, which are related to specific letters in certain foreign languages, are not used in the interest of typographical simplicity.

Geographic names or their spellings do not necessarily reflect recognition of the political status of an area by the United States Government. Positions are approximate and are intended merely as locators to facilitate reference to the charts.

To use as a Gazetteer note the position and Sector number of the feature and refer to the Chart Information diagram for the Sector. Plot the approximate position of the feature on this diagram and note the approximate chart number.

To use as an Index of features described in the text note the paragraph number at the right. To locate this feature on the best scale chart use the Gazetteer procedure above.

Index—Gazetteer

	Position				Sec. Para
	°	'	°	'	
KAMPUNG KILGAH	3	38 S	130	52 E	3.33
KAMPUNG KLIS	8	13 S	127	57 E	4.74
KAMPUNG KOKAS	2	42 S	132	26 E	5.51
KAMPUNG KOKUS	2	42 S	132	25 E	5.54
KAMPUNG LEKSULA	3	47 S	126	31 E	3.7
KAMPUNG LIANG	3	30 S	128	19 E	3.41
KAMPUNG LIBANO	2	29 N	128	21 E	2.53
KAMPUNG LIRUNG	3	56 N	126	42 E	1.7
KAMPUNG LONTOR	4	33 S	129	52 E	3.67
KAMPUNG LUHU	3	23 S	127	58 E	3.48
KAMPUNG MARLASSI	5	29 S	134	39 E	4.46
KAMPUNG MODAN	2	23 S	133	55 E	5.60
KAMPUNG MUTURI	2	11 S	133	41 E	5.58
KAMPUNG NAAM	5	33 S	132	48 E	4.23
KAMPUNG NAIRA	4	32 S	129	54 E	3.70
KAMPUNG NAMLEA	3	17 S	127	06 E	3.12
KAMPUNG NGAIBOR	6	43 S	134	04 E	4.44
KAMPUNG NJAULAKU	1	17 N	128	05 E	2.67
KAMPUNG NONIALI	2	52 S	128	24 E	3.22
KAMPUNG OHA	0	30 S	127	55 E	2.13
KAMPUNG OHOIWAIT	5	45 S	132	57 E	4.29
KAMPUNG PATANI	0	17 N	128	45 E	2.77
KAMPUNG PATI	8	13 S	127	52 E	4.74
KAMPUNG RITABEL	7	09 S	131	43 E	4.90
KAMPUNG ROEMAKAN	3	27 S	128	32 E	3.51
KAMPUNG RUMAKAI	3	27 S	128	32 E	3.51
KAMPUNG SAGEA	0	28 N	128	06 E	2.78
KAMPUNG SAID	3	35 S	128	02 E	3.41
KAMPUNG SAILOLOF	1	15 S	130	45 E	5.46
KAMPUNG SAMASURU	3	16 S	128	46 E	3.52
KAMPUNG SAMATE	0	58 S	131	04 E	5.44
KAMPUNG SAMGOWO	2	06 N	128	33 E	2.56
KAMPUNG SAONEK	0	28 S	130	47 E	5.19
KAMPUNG SAUMLAKI	7	59 S	131	18 E	4.93
KAMPUNG SEGET	1	24 S	130	58 E	5.47
KAMPUNG SEPA	3	21 S	129	07 E	3.54
KAMPUNG SERUAWAN	3	26 S	128	25 E	3.51
KAMPUNG SUPE	3	13 S	127	52 E	3.19
KAMPUNG TAMILAOE	3	23 S	129	12 E	3.54
KAMPUNG TANIWEL	2	51 S	128	28 E	3.22
KAMPUNG TELALORA	8	12 S	129	50 E	4.84
KAMPUNG TEPA	7	52 S	129	36 E	4.79
KAMPUNG TIFU	3	43 S	126	24 E	3.6
KAMPUNG TIHOELALE	3	27 S	128	31 E	3.51
KAMPUNG TIJO	2	25 N	128	18 E	2.53
KAMPUNG TOHULALA	3	27 S	128	31 E	3.51
KAMPUNG TOTOAD	5	45 S	132	41 E	4.18
KAMPUNG TUAL	5	38 S	132	44 E	4.25
KAMPUNG WAAI	3	34 S	128	19 E	3.42
KAMPUNG WAMSASI	3	33 S	126	10 E	3.4
KAMPUNG WARWAWANG	8	13 S	128	09 E	4.75
KAMPUNG WERKA	5	42 S	132	57 E	4.33
KAMPUNG YEMBRO	5	32 S	132	19 E	4.11
KANA KOPI BAY	10	29 S	150	39 E	7.26
KANIMENO POINT	9	01 S	149	06 E	9.43
KAOENOET SOLLON	2	10 S	130	20 E	2.98
KAPAKUPA	1	37 N	127	59 E	2.63
KAPAL	3	47 S	128	06 E	3.38
KAPALATMADA	3	16 S	126	12 E	3.3
KARAKITANG ISLANDS	3	10 N	125	29 E	1.25
KARANG BAIS	2	55 S	130	26 E	3.28
KARANG BATA	0	42 S	130	25 E	5.23
KARANG BATANTA	0	47 S	131	00 E	5.30
KARANG ELANG	1	20 S	130	31 E	2.95
KARANG ENDER	5	20 S	132	41 E	4.15
KARANG GAJEBI	2	09 S	135	15 E	10.61
KARANG LEGLI	0	14 N	128	49 E	2.75
KARANG MATALEL	0	22 N	128	29 E	2.77
KARANG NUM	2	15 S	134	28 E	10.60
KARANG PASIR TIDORE	0	19 N	127	59 E	2.81
KARANG SAARU ARRUNGESI	4	38 S	130	03 E	3.70
KARKAR ISLAND	4	39 S	145	58 E	9.87
KARUP	3	53 S	133	23 E	5.70
KASIEM	1	00 S	131	09 E	5.41
KASIM OIL TERMINAL	1	18 S	131	02 E	5.40
KATAPATJAN ROCK	0	56 S	131	06 E	5.44
KATHERINE ISLET	0	44 N	129	07 E	2.71
KAU KAU BAY	10	33 S	149	55 E	6.57
KAWA ROADS	2	56 S	128	08 E	3.20
KAWAI POINT	9	41 S	150	54 E	9.24
KAYELI ROADS	3	22 S	127	07 E	3.11
KAYOA ISLANDS	0	03 N	127	26 E	2.23
KEAUNA HILLS	8	00 S	145	48 E	6.19
KELANOA HARBOR	6	02 S	147	31 E	9.73
KELI BADIR	3	29 S	130	43 E	3.29
KELI DUKUN	3	25 S	130	44 E	3.29
KEPLER POINT	5	34 S	146	16 E	9.76
KEPPEL POINT	10	10 S	147	58 E	6.42
KEPPEL POINT	9	19 S	149	13 E	9.40
KEPULAUAN AMBAI	1	55 S	136	20 E	10.34
KEPULAUAN ARU	6	10 S	134	30 E	4.35
KEPULAUAN ASIA	1	03 N	131	15 E	5.2
KEPULAUAN AURI	2	02 S	134	44 E	10.57
KEPULAUAN AYU	0	30 N	131	07 E	5.2
KEPULAUAN BANDA	4	25 S	129	55 E	3.64
KEPULAUAN BOO	1	10 S	129	22 E	2.91
KEPULAUAN DARAM	2	07 S	130	53 E	2.97
KEPULAUAN DOEA	1	32 S	130	31 E	2.95
KEPULAUAN DOWORA	0	50 S	128	08 E	2.15
KEPULAUAN DUA	1	32 S	130	31 E	2.95
KEPULAUAN FAM	0	37 S	130	14 E	5.22
KEPULAUAN GORAITJI	0	01 N	127	11 E	2.23
KEPULAUAN GORONG	4	03 S	131	20 E	3.61
KEPULAUAN JEDAN	5	23 S	134	40 E	4.36
KEPULAUAN KAWIO	4	35 N	125	35 E	1.9
KEPULAUAN KUR	5	20 S	131	59 E	4.8
KEPULAUAN KURAN	1	53 S	135	49 E	10.36
KEPULAUAN KUSU	0	20 S	127	44 E	2.13
KEPULAUAN LETI	8	11 S	127	55 E	4.73
KEPULAUAN LOLODA UTARA	2	13 N	127	47 E	2.2
KEPULAUAN LUCIPARA	5	29 S	127	31 E	4.2
KEPULAUAN MAPIA	0	49 N	134	17 E	10.67
KEPULAUAN MENON	1	20 S	130	42 E	5.45
KEPULAUAN MOOR	2	56 S	135	44 E	10.44
KEPULAUAN NENUSA	4	45 N	127	08 E	1.3
KEPULAUAN OBI	1	30 S	127	35 E	2.39
KEPULAUAN PADAIDO	1	15 S	136	35 E	10.19
KEPULAUAN PENYU	5	23 S	127	47 E	4.3
KEPULAUAN PISANG	2	38 S	131	35 E	5.61
KEPULAUAN PODENA	2	07 S	139	29 E	10.10
KEPULAUAN ROMBOMBO	0	56 S	131	06 E	5.44
KEPULAUAN SCHOUTEN	1	00 S	136	00 E	10.18
KEPULAUAN SULA	1	50 S	125	20 E	2.46
KEPULAUAN TALAUD	4	08 N	126	46 E	1.4
KEPULAUAN TOADE	3	46 N	125	34 E	1.15
KEPULAUAN TOBELO	1	49 N	127	56 E	2.62
KEPULAUAN TUJUH	2	45 S	129	01 E	3.23
KEPULAUAN WAKDE	1	56 S	139	01 E	10.12
KEPULAUAN WATUBELA	4	33 S	131	43 E	4.5
KEPULAUAN WATULAI	5	49 S	134	46 E	4.48
KEPULAUAN WIDI	0	35 S	128	27 E	2.83
KEPULAUAN WODA	0	23 N	127	35 E	2.10
KEREMA BAY	7	58 S	145	45 E	6.19
KERKA	1	26 S	127	27 E	2.43
KERWIN REEF	10	14 S	148	45 E	6.48
KETAKERUA BAY	9	05 S	148	37 E	9.43
KETJITOT	2	03 S	130	17 E	2.98
KIBIRISI POINT	9	38 S	150	01 E	9.36
KILLERTON BAY	10	21 S	150	40 E	7.29
KILLERTON POINT	10	21 S	150	38 E	7.27
KILMOERI ROADS	3	40 S	130	27 E	3.56
KILMURI ROADS	3	40 S	130	27 E	3.56
KIMUTA ISLAND	10	51 S	152	59 E	8.58
KIRIWINA ISLAND	8	35 S	151	08 E	9.13
KISALAOET ROADS	3	36 S	130	19 E	3.56
KISALAUT ROADS	3	36 S	130	19 E	3.56
KISWUI	7	32 S	131	09 E	4.97
KITAVA ISLAND	8	37 S	151	20 E	9.13
KITIMULA POINT	6	20 S	147	49 E	9.71
KIVI KIVI PASSAGE	11	08 S	152	45 E	8.22
KIWAI ISLAND	8	37 S	143	29 E	6.13
KLEINE GEELVINK BAY	0	44 S	133	44 E	10.68
KOELTOEBAI ZUID	6	52 S	134	43 E	4.55
KOEMBOER	3	01 S	135	03 E	10.50
KOERAN ISLANDS	1	53 S	135	49 E	10.36
KOEROEDOE	1	51 S	137	00 E	10.16
KOEROEDOE STRAIT	1	49 S	136	56 E	10.17
KOIL ISLAND	3	20 S	144	14 E	9.95
KOKAS ROAD	2	42 S	132	25 E	5.54
KOKKA BAY	0	27 N	128	10 E	2.78
KOLFF BANK	7	00 S	136	50 E	5.86
KONSTANTIN HARBOR	5	29 S	145	50 E	9.79
KOPATAAR	3	05 S	135	35 E	10.47
KORIM BAY	0	53 S	136	03 E	10.25

	Position				Sec. Para
	°	'	°	'	
PANA MUN PASSAGE	11	08 S	152	40 E	8.20
PANA NIU	10	49 S	152	11 E	8.6
PANA NUMARA ISLAND	11	10 S	152	47 E	8.22
PANA SAGU SAGU ISLET	10	58 S	152	37 E	8.28
PANA TATONI ISLET	11	03 S	152	34 E	8.15
PANA TINANI ISLAND	11	14 S	153	10 E	8.33
PANA UDU UDI ISLAND	11	03 S	152	29 E	8.13
PANA VARA VARA ISLET	11	08 S	152	18 E	8.10
PANA WINA ISLAND	11	10 S	153	01 E	8.26
PANAETE ISLAND	10	41 S	152	21 E	8.63
PANANGARIBU ISLAND	11	08 S	152	49 E	8.23
PANANTANIAN ISLAND	11	09 S	152	50 E	8.23
PANARORA ISLAND	11	07 S	152	30 E	8.13
PANASIA ISLAND	11	08 S	152	20 E	8.11
PANA-UYA-WANA ISLAND	10	44 S	152	25 E	8.63
PANNIET ISLAND	10	41 S	152	21 E	8.63
PANTAI WONRELI	8	05 S	127	09 E	4.72
PANTAI WONRELI ROAD	8	05 S	127	09 E	4.71
PANTAWI POINT	11	33 S	153	21 E	8.47
PANUA KEIKEISA ISLET	11	06 S	152	36 E	8.19
PAONI ROADS	2	52 S	129	05 E	3.24
PAPOEMA BAY	1	36 S	135	53 E	10.35
PARAMA ISLAND	9	00 S	143	23 E	6.9
PARAMA POINT	10	10 S	148	00 E	6.42
PAROEMI BAY	1	46 S	135	51 E	10.36
PASIR BALE	0	14 S	127	26 E	2.28
PASIR LAMO	0	53 N	127	27 E	2.8
PASIR RADJA	0	36 N	127	28 E	2.10
PASIR RADJA	1	47 S	127	32 E	2.40
PASIR RAJA	0	36 N	127	28 E	2.10
PASIR RAJA	1	47 S	127	32 E	2.40
PATAKI ISLAND	4	22 S	145	15 E	9.91
PATANI ROADS	0	16 N	128	45 E	2.76
PATINGROE	5	17 S	133	07 E	4.31
PATIPI	2	43 S	132	04 E	5.53
PENTAKO EF	1	25 S	130	29 E	2.95
PERRY ISLET	9	49 S	150	49 E	9.20
PESCHEL POINT	5	57 S	147	09 E	9.74
PETA	3	39 N	125	34 E	1.18
PHIPI REEF	9	33 S	142	36 E	6.5
PIEKJE	0	28 S	132	55 E	10.69
PIEKYE	0	28 S	132	55 E	10.69
PIROE	3	04 S	128	11 E	3.50
PIROE BAY	3	20 S	128	10 E	3.48
PIRU	3	04 S	128	11 E	3.50
PIRU ROADS	3	04 S	128	11 E	3.50
PISANG ISLET	4	30 S	129	56 E	3.68
PITT BAY	10	38 S	151	04 E	7.20
PLUM POINT	7	40 S	144	49 E	6.17
POCKLINGTON REEF	10	48 S	155	44 E	8.57
PODBIELSKY POINT	4	15 S	144	58 E	9.92
POEA	2	56 S	127	54 E	3.17
POELAU TOEDJOEH	2	45 S	129	01 E	3.23
POM	1	38 S	135	42 E	10.32
POMMERN BAY	5	32 S	146	09 E	9.76
POPULAI ISLAND	10	40 S	150	53 E	7.16
PORI PASSAGE	11	09 S	152	51 E	8.23
PORLOCK BAY	9	02 S	149	00 E	9.44
PORLOCK HARBOR	9	03 S	149	04 E	9.44
PORNANI PASSAGE	11	09 S	152	49 E	8.23
PORT CHALMERS	8	08 S	146	06 E	6.20
PORT GLASGOW	10	22 S	149	31 E	6.53
PORT HARVEY	8	54 S	148	31 E	9.44
PORT MORESBY	9	28 S	147	08 E	6.34
PORT ROMILLY	7	42 S	144	48 E	6.17
POSA POSA HARBOR ENTRANCE	9	36 S	149	47 E	9.39
PRITTWITZ POINT	2	55 S	141	50 E	9.105
PROTECTORATE REEFS	11	00 S	153	21 E	8.57
PROVIDENTIAL BANK	5	40 S	137	50 E	5.82
PUA	2	56 S	127	54 E	3.17
PULAK DOLAK	7	50 S	138	30 E	5.86
PULAU ABDON	0	30 N	131	07 E	5.3
PULAU ADUAR	5	45 S	134	47 E	4.48
PULAU AI	4	32 S	129	46 E	3.66
PULAU AIDUMA	3	58 S	134	06 E	5.73
PULAU ALDUNA	3	58 S	134	06 E	5.73
PULAU AMBELAU	3	51 S	127	12 E	3.9
PULAU ANGRA MEOS	2	42 S	134	50 E	10.51
PULAU ANSOES	1	46 S	135	46 E	10.36
PULAU ANSUS	1	46 S	135	46 E	10.36
PULAU ARAR KULA	5	36 S	134	46 E	4.47
PULAU ARMO	1	41 S	138	48 E	10.14
PULAU ASAP	2	28 S	133	19 E	5.57
PULAU AYAWI	0	11 S	134	59 E	10.30
PULAU AYEMI	0	48 S	130	54 E	5.21
PULAU BABAR	7	55 S	129	45 E	4.78
PULAU BABI	3	10 S	127	48 E	3.16
PULAU BABI	3	13 S	128	10 E	3.49
PULAU BABI	5	55 S	134	09 E	4.41
PULAU BAEER	5	27 S	132	42 E	4.16
PULAU BAMBU	0	46 N	129	47 E	2.88
PULAU BANDA BESAR	4	33 S	129	55 E	3.67
PULAU BATANPELE	0	18 S	130	13 E	5.8
PULAU BATANTA	0	51 S	130	40 E	5.25
PULAU BATOENDERANG	3	22 N	125	37 E	1.21
PULAU BATU PUTIH	2	57 S	131	58 E	5.62
PULAU BATUNDERANG	3	22 N	125	37 E	1.21
PULAU BEBALANG	3	20 N	125	34 E	1.21
PULAU BELANG BELANG	1	20 S	127	24 E	2.42
PULAU BEPONDI	0	24 S	135	16 E	10.30
PULAU BIARO	2	06 N	125	23 E	1.33
PULAU BISA	1	14 S	127	36 E	2.42
PULAU BOANO	2	58 S	127	55 E	3.17
PULAU BOEANG	3	53 N	125	43 E	1.14
PULAU BOEI	5	07 S	132	00 E	4.8
PULAU BROMSI	1	13 S	136	36 E	10.19
PULAU BUANG	3	53 N	125	43 E	1.14
PULAU BUI	5	07 S	132	00 E	4.8
PULAU CERAM LAOET	3	53 S	130	26 E	3.60
PULAU CERAM REI	3	52 S	130	51 E	3.58
PULAU DAI	7	34 S	129	41 E	4.83
PULAU DAJANG	0	47 S	130	30 E	5.21
PULAU DAMAR	1	01 S	128	23 E	2.15
PULAU DAMAR	7	08 S	128	36 E	4.64
PULAU DARAM	2	09 S	130	55 E	2.97
PULAU DAWELOOR	7	46 S	130	04 E	4.83
PULAU DEER	1	09 S	129	50 E	2.90
PULAU DITI	1	57 N	127	43 E	2.3
PULAU DJOEEDIN	6	52 S	134	37 E	4.55
PULAU DOE ROWA	5	33 S	132	42 E	4.16
PULAU DOOM	0	53 S	131	14 E	5.38
PULAU DRAMAI	4	01 S	134	14 E	5.74
PULAU DUMAREHE	4	14 N	125	42 E	1.12
PULAU DUROA	5	33 S	132	42 E	4.16
PULAU EGA	2	59 S	132	07 E	5.63
PULAU EKA	2	59 S	132	07 E	5.63
PULAU ENU	7	05 S	134	29 E	4.56
PULAU FADOL	5	40 S	131	56 E	4.10
PULAU FAM	0	39 S	130	17 E	5.23
PULAU FARNUSAN	7	05 S	131	39 E	4.88
PULAU FORDATE	7	02 S	131	58 E	4.90
PULAU FRINUN	7	03 S	131	34 E	4.88
PULAU GAG	0	30 S	129	52 E	2.88
PULAU GAM	0	30 S	130	35 E	5.20
PULAU GEBE	0	05 S	129	28 E	2.86
PULAU GEMIEN	0	19 S	130	30 E	5.8
PULAU GILALANG	0	18 S	127	33 E	2.29
PULAU GODON	5	34 S	132	35 E	4.19
PULAU GOFA	3	50 S	130	43 E	3.57
PULAU GOMUMU	1	50 S	127	36 E	2.40
PULAU GORONG	4	01 S	131	24 E	3.63
PULAU GROOT BANDA	4	33 S	129	55 E	3.67
PULAU GUMORGA	0	02 N	127	13 E	2.24
PULAU GUNANGE	0	02 N	127	13 E	2.24
PULAU GUNUNGAPI	4	31 S	129	52 E	3.67
PULAU GUNUNGAPI	6	39 S	126	40 E	4.63
PULAU HABEEKE	8	15 S	139	28 E	5.89
PULAU HAROEKOE	3	34 S	128	30 E	3.44
PULAU HIRI	0	54 N	127	19 E	2.18
PULAU HORUKU	3	34 S	128	30 E	3.44
PULAU INDI	1	31 S	135	50 E	10.32
PULAU INGAR	4	21 S	131	33 E	4.5
PULAU JAAN	2	08 S	130	07 E	2.98
PULAU JAMDENA	7	30 S	131	30 E	4.86
PULAU JANOESI	1	43 S	135	41 E	10.36
PULAU JANUSI	1	43 S	135	41 E	10.36
PULAU JANUSI	1	48 S	135	56 E	10.35
PULAU JAPEN	1	45 S	136	10 E	10.31
PULAU JEBEN	0	29 S	130	21 E	5.9
PULAU JEDAN	5	23 S	134	41 E	4.36
PULAU JEF	1	18 S	131	01 E	5.47
PULAU JERIEF	0	42 S	130	42 E	5.24
PULAU JIEW	0	44 N	129	07 E	2.71
PULAU JOE	0	03 S	129	37 E	2.87

	Position				Sec. Para
	°	'	°	'	
PULAU JORONGA	1	06 S	128	23 E	2.16
PULAU JU	0	03 S	129	37 E	2.87
PULAU JUEDIN	6	52 S	134	37 E	4.55
PULAU JURSIAN	5	54 S	134	46 E	4.49
PULAU KABUAI	2	33 S	134	53 E	10.51
PULAU KABURUANG	3	47 N	126	47 E	1.8
PULAU KAI BESAR	5	40 S	133	00 E	4.26
PULAU KAI DULAH	5	37 S	132	46 E	4.23
PULAU KAI KECIL	5	47 S	132	44 E	4.14
PULAU KAICEBO	2	14 S	139	34 E	10.10
PULAU KAIMEER	5	10 S	132	01 E	4.8
PULAU KAJUMERAH	4	01 S	132	23 E	5.74
PULAU KALAMA	3	15 N	125	27 E	1.25
PULAU KALBUR	6	39 S	131	35 E	4.87
PULAU KARAIRA-BESAR	5	58 S	134	50 E	4.46
PULAU KARAKITANG	3	10 N	125	31 E	1.26
PULAU KARANG	7	01 S	134	39 E	4.56
PULAU KARAS	3	28 S	132	40 E	5.66
PULAU KARAWAIRA-BESAR	5	58 S	134	50 E	4.51
PULAU KARI	6	42 S	129	31 E	4.68
PULAU KASA	3	18 S	128	09 E	3.49
PULAU KASIM	1	18 S	131	01 E	5.47
PULAU KASIRUTA	0	24 S	127	12 E	2.38
PULAU KASTEEL	5	15 S	137	39 E	5.81
PULAU KAWALOESOE	4	14 N	125	20 E	1.12
PULAU KAWALUSU	4	14 N	125	20 E	1.12
PULAU KAWE	0	04 S	130	08 E	5.4
PULAU KELANG	3	12 S	127	44 E	3.15
PULAU KESWU	7	32 S	131	09 E	4.97
PULAU KILWARU	3	53 S	130	54 E	3.59
PULAU KISAR	8	04 S	127	11 E	4.70
PULAU KOFIAU	1	11 S	129	50 E	2.89
PULAU KOLA	5	28 S	134	33 E	4.38
PULAU KONAN	5	34 S	134	46 E	4.46
PULAU KRI	0	34 S	130	41 E	5.24
PULAU KUR	5	21 S	131	59 E	4.9
PULAU KURUDU	1	51 S	137	00 E	10.16
PULAU LAAG	5	23 S	137	43 E	5.82
PULAU LAIBOBAR	7	13 S	131	23 E	4.98
PULAU LAIGOMA	0	08 N	127	13 E	2.25
PULAU LAKAHIA	4	04 S	134	36 E	5.76
PULAU LAKOR	8	15 S	128	10 E	4.75
PULAU LARAT	7	09 S	131	51 E	4.88
PULAU LAUT	7	32 S	127	33 E	4.62
PULAU LAWAK	0	01 S	130	57 E	5.13
PULAU LEER	6	12 S	134	51 E	4.52
PULAU LEN KAFAL	2	00 S	130	35 E	2.97
PULAU LETI	8	12 S	127	42 E	4.73
PULAU LIFUMATOLA	1	49 S	126	27 E	2.50
PULAU LIPANG	3	55 N	125	23 E	1.14
PULAU LOLEODJAHA	1	01 S	128	09 E	2.17
PULAU MAAR	5	57 S	134	47 E	4.51
PULAU MADORANG	3	39 S	131	04 E	3.33
PULAU MAIKOOR	6	13 S	134	15 E	4.43
PULAU MAJU	1	19 N	126	21 E	2.1
PULAU MAKALEHI	2	44 N	125	10 E	1.30
PULAU MAKIAN	0	20 N	127	24 E	2.22
PULAU MAMBUAT	0	36 S	127	23 E	2.35
PULAU MANAWOKA	4	07 S	131	20 E	3.62
PULAU MANDIOLI	0	43 S	127	15 E	2.36
PULAU MANGGOER	5	35 S	132	00 E	4.10
PULAU MANGGUR	5	35 S	132	00 E	4.10
PULAU MANGOLE	1	50 S	125	50 E	2.47
PULAU MANGOLI	1	50 S	125	50 E	2.47
PULAU MANIL	0	18 S	130	54 E	5.17
PULAU MANIPA	3	19 S	127	34 E	3.14
PULAU MANOEK	5	33 S	130	18 E	4.4
PULAU MANOEPAMPI	1	48 S	135	48 E	10.36
PULAU MANSINAM	0	54 S	134	06 E	10.65
PULAU MANSUAR	0	36 S	130	34 E	5.24
PULAU MANUK	5	33 S	130	18 E	4.4
PULAU MANUPAMPI	1	48 S	135	48 E	10.36
PULAU MANURAN	0	02 N	130	53 E	5.13
PULAU MAOPORA	7	35 S	127	36 E	4.63
PULAU MAR	6	54 S	134	31 E	4.56
PULAU MARE	0	35 N	127	24 E	2.22
PULAU MARORE	4	44 N	125	29 E	1.10
PULAU MARSEGOE	3	00 S	128	03 E	3.19
PULAU MARSEGU	3	00 S	128	03 E	3.19
PULAU MASELA	8	09 S	129	52 E	4.84
PULAU MASI-MASI	2	00 S	139	08 E	10.12
PULAU MATAN	0	58 S	131	09 E	5.39
PULAU MATOETOENG	4	27 N	125	42 E	1.11
PULAU MATUTUANG	4	27 N	125	42 E	1.11
PULAU MAYU	1	19 N	126	21 E	2.1
PULAU ME	0	07 S	130	15 E	5.10
PULAU MEIRANG	5	50 S	134	17 E	4.41
PULAU MEMANOEK	4	36 N	125	38 E	1.11
PULAU MEMANUK	4	36 N	125	38 E	1.11
PULAU MENGGE	2	12 S	139	32 E	10.10
PULAU MES	7	50 S	131	26 E	4.91
PULAU MIANGAS	5	34 N	126	35 E	1.2
PULAU MITAK	7	11 S	131	28 E	4.99
PULAU MITAN	7	38 S	127	26 E	4.62
PULAU MITI	1	34 N	128	03 E	2.64
PULAU MOA	8	12 S	128	00 E	4.74
PULAU MOLANA	3	38 S	128	36 E	3.45
PULAU MOLU	6	45 S	131	32 E	4.87
PULAU MOTI	0	27 N	127	24 E	2.22
PULAU NAIRA	4	31 S	129	54 E	3.68
PULAU NAMATOTE	3	47 S	133	52 E	5.72
PULAU NAMWAAN	7	07 S	131	27 E	4.99
PULAU NAUFI	2	14 S	136	15 E	10.43
PULAU NAURIO	4	56 S	136	50 E	5.81
PULAU NELAJAN	0	55 S	130	22 E	5.27
PULAU NGAF	5	38 S	132	35 E	4.19
PULAU NGELENGELE-KECIL	2	10 N	128	13 E	2.58
PULAU NILA	6	44 S	129	30 E	4.68
PULAU NJATA	7	31 S	127	18 E	4.62
PULAU NOESREEN	5	42 S	132	16 E	4.13
PULAU NUHU TAA	5	55 S	132	28 E	4.20
PULAU NUKAHA	7	05 S	131	59 E	4.90
PULAU NUM	1	30 S	135	11 E	10.38
PULAU NUMFOOR	1	00 S	134	53 E	10.40
PULAU NUSI	3	09 S	135	40 E	10.46
PULAU NUSREEN	5	42 S	132	16 E	4.13
PULAU NYATA	7	31 S	127	18 E	4.62
PULAU OBILATU	1	24 S	127	20 E	2.41
PULAU OEDJIR	5	36 S	134	17 E	4.39
PULAU OER	5	51 S	132	32 E	4.20
PULAU OERAN	4	46 S	131	52 E	4.6
PULAU OET	5	35 S	132	40 E	4.17
PULAU OGAR	2	39 S	132	28 E	5.55
PULAU OKI	3	49 S	126	51 E	3.8
PULAU OWI	1	14 S	136	13 E	10.21
PULAU PAI	1	13 S	136	26 E	10.20
PULAU PANDJANG	4	01 S	131	14 E	3.62
PULAU PANJANG	2	59 S	131	14 E	5.63
PULAU PANJANG	4	01 S	131	14 E	3.62
PULAU PARA	3	05 N	125	30 E	1.27
PULAU PARANG	3	19 S	130	47 E	3.32
PULAU PASIGE	2	21 N	125	19 E	1.32
PULAU PEF	0	26 S	130	26 E	5.7
PULAU PENAMBULAI	6	17 S	134	52 E	4.35
PULAU PENEMU	0	35 S	130	16 E	5.22
PULAU PENJURING	6	44 S	134	29 E	4.56
PULAU PILONGAN	0	44 N	127	37 E	2.9
PULAU PILONGGA	0	44 N	127	37 E	2.9
PULAU PISANG	1	23 S	128	55 E	2.45
PULAU POKAL	0	26 S	127	43 E	2.13
PULAU RAM	0	50 S	131	13 E	5.36
PULAU RAO	2	21 N	128	09 E	2.59
PULAU RAU	2	21 N	128	09 E	2.59
PULAU ROEMBERPON	1	50 S	134	10 E	10.59
PULAU ROEN	4	33 S	129	41 E	3.65
PULAU ROENG	2	18 N	125	22 E	1.32
PULAU ROMANG	7	35 S	127	25 E	4.60
PULAU ROMBOMBO	0	57 S	131	06 E	5.39
PULAU ROON	2	25 S	134	35 E	10.56
PULAU ROZENGAIN	4	35 S	130	02 E	3.70
PULAU RUANG	2	18 N	125	22 E	1.32
PULAU RUMBERPON	1	50 S	134	10 E	10.59
PULAU RUN	4	33 S	129	41 E	3.65
PULAU SAGEWIN	0	57 S	130	39 E	5.30
PULAU SALEBABU	3	56 N	126	40 E	1.7
PULAU SALOMAKIE	1	01 S	128	23 E	2.15
PULAU SAMBIKI	1	56 S	125	47 E	2.48
PULAU SANANA	2	03 S	125	59 E	2.51
PULAU SANGIHE	3	33 N	125	33 E	1.16
PULAU SANGIHE PULAU LENGGIS	3	23 N	125	38 E	1.21
PULAU SANGIR	3	33 N	125	33 E	1.16
PULAU SAPARUA	3	33 S	128	40 E	3.46
PULAU SAYANG	0	18 N	129	53 E	2.85
PULAU SEIRA	7	41 S	131	03 E	4.95

	Position				Sec. Para
	°	'	°	'	
TANJUNG RAINBAWA	1	47 S	136	54 E	10.33
TANJUNG RAINBAWI	1	47 S	136	54 E	10.17
TANJUNG ROENAKI	1	41 S	134	06 E	10.62
TANJUNG RONGI MHE	1	38 N	127	32 E	2.5
TANJUNG RUNAKI	1	41 S	134	06 E	10.62
TANJUNG SAALA	3	22 S	128	01 E	3.48
TANJUNG SABRA	2	17 S	132	18 E	5.50
TANJUNG SAFI	0	16 N	127	43 E	2.11
TANJUNG SALAKITI	2	40 S	132	07 E	5.51
TANJUNG SAMBERSBARI	1	11 S	135	54 E	10.24
TANJUNG SAMERSBARI	1	11 S	135	54 E	10.23
TANJUNG SANIANI	3	14 S	127	38 E	3.15
TANJUNG SAOBASAR	0	05 S	131	10 E	5.11
TANJUNG SAOEKRIS	0	27 S	132	58 E	10.69
TANJUNG SARMANA	3	25 S	126	02 E	3.4
TANJUNG SASELATA	0	21 N	127	39 E	2.10
TANJUNG SAUKRIS	0	27 S	132	58 E	10.69
TANJUNG SAWEBA	0	43 S	133	57 E	10.60
TANJUNG SEITU	3	26 S	129	34 E	3.54
TANJUNG SELE	1	26 S	130	56 E	5.47
TANJUNG SERBAT	5	31 S	132	48 E	4.24
TANJUNG SIDANGOLI	0	53 N	127	30 E	2.8
TANJUNG SIMORA	3	40 S	133	41 E	5.68
TANJUNG SISAL	3	04 S	130	27 E	3.30
TANJUNG SISI	3	10 S	128	10 E	3.49
TANJUNG SOEADJA	2	32 S	140	45 E	10.3
TANJUNG SOOS	1	10 S	129	58 E	5.21
TANJUNG SOPI	2	38 N	128	34 E	2.53
TANJUNG SORONG	0	49 S	131	13 E	5.36
TANJUNG SRABAPAN	0	31 S	133	05 E	10.69
TANJUNG STEENBOOM	4	56 S	136	50 E	5.79
TANJUNG SUAJA	2	32 S	140	45 E	10.3
TANJUNG TANAH MERAH	2	26 S	133	07 E	5.56
TANJUNG TANAHMERAH	2	24 S	140	21 E	10.6
TANJUNG TANDURU BESAR	2	52 S	128	10 E	3.19
TANJUNG TARONMETA	3	34 S	133	34 E	5.70
TANJUNG TAWA	0	43 S	128	04 E	2.13
TANJUNG TERUA	3	08 S	128	11 E	3.49
TANJUNG TOARDEFETE	5	55 S	134	17 E	4.41
TANJUNG TOKAKA	0	13 S	127	40 E	2.12
TANJUNG TONGERAI	3	38 S	132	43 E	5.66
TANJUNG TUTNEI	8	15 S	127	58 E	4.74
TANJUNG TUTPATEH	8	13 S	127	36 E	4.73
TANJUNG UAFA FENJURING	6	19 S	134	53 E	4.53
TANJUNG ULI	0	28 N	127	58 E	2.80
TANJUNG ULI	2	50 S	128	40 E	3.22
TANJUNG UNDUR	3	47 S	130	36 E	3.55
TANJUNG UWAMA	0	06 N	127	41 E	2.12
TANJUNG VALS	8	21 S	137	35 E	5.87
TANJUNG VERKAMI	1	48 S	138	41 E	10.14
TANJUNG WAARLANGIER	6	59 S	132	00 E	4.90
TANJUNG WABA	2	11 S	136	31 E	10.41
TANJUNG WADATUTU	8	08 S	130	56 E	4.94
TANJUNG WAFANI	2	03 S	130	15 E	2.98
TANJUNG WAFKALETTE	1	15 S	131	03 E	5.41
TANJUNG WAIROLE	3	41 S	127	55 E	3.40
TANJUNG WAJAMLI	1	04 N	128	42 E	2.69
TANJUNG WAJTETA	1	47 S	125	22 E	2.47
TANJUNG WALIMEN	3	29 S	126	05 E	3.4
TANJUNG WALWAWAT	3	37 S	126	12 E	3.4
TANJUNG WAMONKET	1	32 S	131	12 E	5.48
TANJUNG WAPOTI	3	04 S	126	41 E	3.3
TANJUNG WARARI	1	05 S	136	23 E	10.25
TANJUNG WATLOREN	5	35 S	132	20 E	4.12
TANJUNG WATULAIJURING	5	20 S	134	34 E	4.36
TANJUNG WAYABULA	2	17 N	128	12 E	2.53
TANJUNG WAYAMLI	1	04 N	128	42 E	2.69
TANJUNG WEDUAR	6	01 S	132	50 E	4.34
TANJUNG WETIN	2	42 S	132	05 E	5.53
TANJUNG WIRUWAI	2	17 S	139	39 E	10.10
TANJUNG WOIBI	2	54 S	134	41 E	10.54
TANJUNG WOKA	1	26 S	127	53 E	2.43
TANJUNG WOMOSISORE	3	06 S	134	50 E	10.52
TANJUNG YAMTU	1	40 S	130	20 E	2.96
TANJUNG YAMTUP	1	31 S	131	26 E	5.49
TANJUNG YAMURSBA	0	21 S	132	25 E	5.32
TANJUNG YOGUR	2	33 S	140	43 E	10.4
TAPALO	2	01 S	130	19 E	2.98
TARIWERWI ISLAND	11	09 S	151	15 E	8.2
TAROA	5	48 S	132	37 E	4.19
TAUARA SHOAL	11	07 S	152	54 E	8.24
TAURAMA HILL	9	32 S	147	14 E	6.34
TAUSCH ISLAND	5	06 S	145	48 E	9.83
TAWA TAWA MAL REEF	11	04 S	153	00 E	8.30
TAWAL REEF	11	04 S	152	21 E	8.11
TAWALI KECIL	0	14 S	127	18 E	2.28
TE POINT	11	18 S	154	13 E	8.57
TEGAL REEF	5	29 S	132	49 E	4.15
TEHORU ROADS	3	22 S	129	32 E	3.55
TELEGRAAF REEF	2	48 S	128	56 E	3.23
TELIATA POINT	5	56 S	147	20 E	9.73
TELUK ABORU	3	36 S	128	31 E	3.44
TELUK ALJOEI	0	10 S	130	18 E	5.10
TELUK ALYU	0	10 S	130	18 E	5.10
TELUK AMAHAI	3	20 S	128	55 E	3.53
TELUK AMBON	3	43 S	128	07 E	3.35
TELUK ARAGO	0	03 S	130	33 E	5.12
TELUK ARGUNI	3	23 S	133	39 E	5.71
TELUK ARGUNI	3	27 S	133	36 E	5.68
TELUK BABANG	0	37 S	127	36 E	2.31
TELUK BAGUALA	3	39 S	128	17 E	3.39
TELUK BARA	3	10 S	126	13 E	3.3
TELUK BELANG BELANG	0	37 S	127	25 E	2.35
TELUK BERAU	2	30 S	132	20 E	5.51
TELUK BINTUNI	2	20 S	133	25 E	5.57
TELUK BOBANE	0	53 N	127	40 E	2.66
TELUK BOELA	3	06 S	130	30 E	3.30
TELUK BONI	0	03 S	131	03 E	5.14
TELUK BULA	3	06 S	130	30 E	3.30
TELUK BULI	0	48 N	128	28 E	2.69
TELUK DAGO	3	26 N	125	33 E	1.22
TELUK DEMTA	2	21 S	140	09 E	10.8
TELUK DJAILOLO	1	02 N	127	28 E	2.7
TELUK DODINGA	0	49 N	127	33 E	2.9
TELUK ELAT	5	38 S	132	59 E	4.32
TELUK ELPAPUTIH	3	17 S	128	51 E	3.52
TELUK ESANG	4	28 N	126	43 E	1.4
TELUK ETNA	3	55 S	134	45 E	5.77
TELUK FLAMINGO	5	31 S	138	02 E	5.82
TELUK FOFAK	0	02 S	130	44 E	5.12
TELUK GAGAK	3	45 S	133	54 E	5.73
TELUK GALELA	1	53 N	127	55 E	2.60
TELUK GELANIT	5	38 S	132	41 E	4.23
TELUK HARIA	3	35 S	128	37 E	3.46
TELUK HATILING	2	48 S	129	31 E	3.27
TELUK HOH	5	17 S	133	09 E	4.30
TELUK INGELAS	3	03 S	130	27 E	3.30
TELUK IRIS	2	24 S	140	13 E	10.7
TELUK JAILOLO	1	02 N	127	28 E	2.7
TELUK JAIMARIA	1	41 S	135	36 E	10.37
TELUK JAYAPURA	2	32 S	140	43 E	10.4
TELUK JOPPINGAR	2	29 S	134	36 E	10.56
TELUK KABAREI	0	03 S	130	58 E	5.13
TELUK KABUI	0	22 S	130	38 E	5.19
TELUK KAIMANA	3	40 S	133	44 E	5.71
TELUK KAU	1	03 N	128	53 E	2.65
TELUK KAYELI	3	19 S	127	07 E	3.11
TELUK KOEMA	3	34 N	125	36 E	1.18
TELUK KOTANIA	3	03 S	128	02 E	3.20
TELUK KUMA	3	34 N	125	36 E	1.18
TELUK KWATISORE	3	15 S	134	57 E	10.52
TELUK LABUHA	0	38 S	127	23 E	2.34
TELUK LAPAN	0	42 S	127	40 E	2.31
TELUK LEKSULA	3	47 S	126	31 E	3.6
TELUK LELINTAH	2	02 S	130	18 E	2.98
TELUK LOLODA	1	41 N	127	33 E	2.4
TELUK MAFFIN	1	58 S	138	52 E	10.13
TELUK MANALU	3	32 N	125	38 E	1.19
TELUK MANGANITU	3	34 N	125	30 E	1.23
TELUK MARCHESA	0	49 S	130	53 E	5.29
TELUK MATTERER	2	19 S	140	08 E	10.9
TELUK MAWI	1	39 S	134	07 E	10.59
TELUK MAYALIBIT	0	21 S	130	56 E	5.17
TELUK MIOELOE	3	35 N	125	34 E	1.18
TELUK MURIS	2	22 S	140	10 E	10.7
TELUK NALAHIA	3	38 S	128	47 E	3.47
TELUK NAMROLE	3	51 S	126	43 E	3.8
TELUK PAPUMA	1	36 S	135	53 E	10.35
TELUK PARUMI	1	46 S	135	51 E	10.36
TELUK PATIPI	2	42 S	132	07 E	5.53
TELUK PAYAHI	0	18 N	127	42 E	2.11
TELUK PETAAR	3	39 N	125	34 E	1.17
TELUK PIRU	3	20 S	128	10 E	3.48
TELUK RAREWARAI	3	02 S	135	48 E	10.45

	Position				Sec. Para
	°	'	°	'	
WEDA ROADS	0	20 N	127	53 E	2.80
WEDOEAR ROADS	5	50 S	132	56 E	4.29
WEDUAR ROADS	5	50 S	132	56 E	4.29
WEIBU ISLET	7	33 S	147	24 E	9.56
WEITOA ISLAND	10	40 S	150	56 E	7.18
WELLE ISLAND	9	36 S	151	00 E	9.24
WEST BROOKER PASSAGE	11	03 S	152	24 E	8.12
WEST CHANNEL	10	40 S	150	35 E	7.12
WEST HARBOR	3	33 S	143	37 E	9.98
WEST PASSAGE	10	48 S	152	17 E	8.65
WEWAK HARBOR	3	34 S	43	38 E	9.97
WINDISSI ROADS	2	25 S	134	13 E	10.58
WOLA ISLAND	11	18 S	154	02 E	8.54
WOLF ROCK	0	12 N	126	54 E	2.25
WOLVERINE ENTRANCE	10	05 S	147	40 E	6.41
WONGAT ISLAND	5	08 S	145	51 E	9.83
WOODFORD REEFS	0	42 S	130	25 E	5.23
WOODLARK ISLAND	9	00 S	152	50 E	8.1
WOODLARK ISLAND	9	07 S	152	50 E	9.4
WOOI BAY	1	41 S	135	31 E	10.37
WORI WORI PATCHES	11	06 S	152	44 E	8.21
WOTAI ROAD	6	45 S	129	29 E	4.69
WRIGHT PATCH	9	11 S	150	54 E	9.26
WURI WURI PASSAGE	10	58 S	152	46 E	8.30

Y

	Position				Sec. Para
	°	'	°	'	
YARUMAN ISLAND	11	09 S	152	48 E	8.23
YEF	0	21 N	127	54 E	2.80
YEF DOIF	0	53 S	131	02 E	5.43
YEF DOIF ISLANDS	0	46 N	129	47 E	2.88
YEF MO	1	13 S	131	13 E	5.41
YEF PELEE	2	12 S	130	15 E	2.98
YEINA ISLAND	11	20 S	153	27 E	8.42
YELA ISLAND	11	22 S	154	10 E	8.52
YEMBRO	5	32 S	132	19 E	4.11
YONGA BAY	11	20 S	154	05 E	8.54
YULE ISLAND	8	50 S	146	32 E	6.23
YULE PATCHES	11	15 S	152	42 E	8.20
YUMA PASSAGE	11	21 S	153	23 E	8.44

Z

	Position				Sec. Para
	°	'	°	'	
ZADEL BERG	1	49 S	130	22 E	2.96
ZEEMEEUW REEFS	1	20 S	130	31 E	2.95
ZOUTBERG	0	46 S	127	43 E	2.32