

DATA ON DOMESTIC SHIPPING

Sources:

- * Statistical Yearbook of Indonesia, 1982
(Statistik Indonesia, 1982)
- * Annual Report, 1981
(Laporan Taunan th. 1981)
Directorate General of Sea Communication

INTERISLAND CARGO FLOW BY COMMODITY GROUP 1977 - 1981

UNIT: TON

COMMODITY GROUP	1977	1978	1979	1980	1981	GROWTH RATIO 5 YEAR	AVERAGE GROWTH RATIO
TOTAL	19580130	19964386	24210847	25440074	26013803	32.9	7.4
FOOD	1337267	1338366	1590024	1889216	1881261	40.7	8.9
SUB TOTAL							
FISH	62126	53269	67130	59787	49202		
RICE	385393	418324	616771	785207	972343		
WHEAT FLOUR	272994	271003	278546	349944	297314		
SUGAR	506230	474656	505583	563091	406614		
MAIZE	65893	74681	75282	66276	103644		
OTHERS	44631	46433	46712	64911	52144		
COPRA	319168	280898	308908	333730	297335	-6.8	-1.8
PALM OIL, COOKING OIL	221009	304160	379760	506079	793614	259.1	37.7
FERTILIZER	608638	1275124	1303359	1626220	1903748	212.8	33.0
WOOD CORK	1494593	1327644	1610713	2314525	2219260	48.5	10.4
SALT	143772	142052	85376	80664	81893	-43.0	-13.1
CEMENT ASPHALT	659243	833469	1113406	1505532	1738642	163.7	27.4
PETROLEUM	12156764	11837621	14799258	13790075	13032469	7.2	1.8
CRUDE OIL	3072341	2656358	3771525	1989254	1222684		
BENZINE	1842582	2113923	1697687	1977765	2094880		
KEROSENE	2817946	2333445	3238341	3014596	2970725		
OTHER	4423895	4733895	6091705	6808460	6744180		
OTHER	2639676	2625049	3020043	3394033	4065581	54.0	11.4

CARGO LOADING AND UNLOADING OF INTERISLAND SEA
BORNE BY PROVINCE 1981 (TON)

PROVINCE	LOADING		UNLOADING		TOTAL	
	TON	RATIO	TON	RATIO	TON	RATIO
TOTAL	20821877	100	28334363	100	49156240	100
RIAU	4252677		2134795		6387472	
SUMATERASECMAN	1034485		721380		1755865	
SUMATERA IMARA	948895		2727326		3676221	
D. I ACEH	370089		637158		1007247	
OTHER						
SUMATERA	7446197	35.8	6696351	23.6	14142548	28.8
D.K.I JAKARTA	1995372		6727860		8683232	
JAWA TENGAH	1969281		3978548		5947829	
JAWA TIMUR	2512911		2706501		5219412	
OTHER						
JAWA Y MADURA	6824352	32.7	13795425	48.7	20599777	41.9
BALI	87498		503888		591386	
N.T. BARAT	44340		87932		132272	
N.T. TIMUR	83820		350847		434667	
BALI AND NUSA TENGGARA	215658	1.0	942667	3.3	1158325	2.4
KAL. BARAT	320164		826824		1146984	
KAL. TENGAH	303945		405442		709387	
KAL. SELATAN	603841		1208067		1631908	
KAL. TENGGARA	357266		307631		664897	
KALIMANTAN	4247122	20.4	3493977	12.3	7741099	15.7
SUL. UTARA	320164		826824		1146988	
SUL. TENGAH	303945		405442		709387	
SUL. SELATAN	603841		1028067		1631908	
SUL. TENGGARA	357266		307631		664897	
SULAWESI	1585216	7.6	2567964	9.1	4153180	8.4
MALUKU	297690		459569		757259	
IRIAN JAYA	225462		378410		604052	
MULUKU AND IRIAN JAYA	523332	2.5	837979	3.0	1361311	2.8

AMOUNT OF NATIONAL SHIPS BY TYPE OF SERVICE

TYPE OF SERVICE	1978		1979		1980		1981		1982	
	NO	DWT	NO	DWT	NO	DWT	NO	DWT	NO	DWT
TOTAL	5935	1581979	6165	1812395	6250	1660095	7074	1953984	7564	2791916
REGULAR LINER SERVICE	343	348162	373	386954	342	392912	361	425556	397	503371
LOCAL LINER SERVICE	1448	155680*	1389	163200*	1081	154867*	1090	161467*	1144	172039*
TRADITIONAL SERVICE	2182	96019*	2288	102731*	2563	121561*	3346	179032*	3486	180447*
PIONEER SERVICE	21	11171	25	14276	33	22072	35	23179	36	20805
SPECIAL SERVICE	1941	1222646	2090	1411165	2231	1245111	2242	1505249	2501	2267740
		265032*		194827*		424399*		320051*		578875*
		281338**		265256**		172785**		217357**		379226**

* BRT

** HORSE POWER

CARGO FLOW BY TYPE OF SERVICE

UNIT: 10³ TON

TYPE OF SERVICE	1978		1979		1980		1981		1982	
	TON	GROWTH RATIO	TON	GROWTH RATIO	TON	GROWTH RATIO	TON	GROWTH RATIO	TON	GROWTH RATIO
TOTAL	46206	-	44682	-3.5	63941	43.1	70281	9.9	67337	-11.7
REGULAR LINER SERVICE	5277	-	6002	13.7	6595	9.9	6794	3.0	7458	9.8
%	11.4		13.4						11.1	
LOCAL LINER SERVICE	1899	-	1970	4.2	2201	11.7	2271	3.2	2445	7.7
%	4.1		4.4						3.6	
TRADITIONAL SERVICE	926	-	1246	23.1	1461	17.3	1959	34.1	2155	10.0
%	2.2		2.8						3.2	
PIONEER SERVICE	53	-	68	28.3	96	41.2	97	1.0	54	-44.3
%	0.7		0.2						0.1	
SPECIAL SERVICE	38051	-	35396	-7.0	53588	51.4	59160	10.4	55225	-15.6
	82.2		79.2						82.2	

PERFORMANCE OF LOCAL LINER SERVICE BY KANWIL 1981

KANWIL	CARGO (TON)			PASSENGER (PERSON)				LIVE STOCK				
	BKT	MUAT	TOTAL	RATIO	TRN	NAIK	TOTAL	RATIO	T	N	TOTAL	RATIO
TOTAL	2040975	2270996	4311971	100	535068	567427	1102495	100	5413	13999	19412	100
I	190340	279285	469625	10.9	252282	278320	530502	48.1	-	-	-	-
II	661639	759258	1420897	33.0	200153	215171	415324	37.7	1209	636	1845	9.5
III	649027	788440	1437467	33.3	-	-	-	-	-	-	-	-
IV	111321	149034	260355	6.0	1039	960	1999	0.2	503	380	883	4.5
V	309950	162539	472489	11.0	59377	46978	106355	9.6	3701	16	3717	19.1
VI	35326	66725	102051	2.4	19200	22447	41647	3.8	-	12914	12914	66.6
VII	30174	27884	58058	1.3	1611	2051	3662	0.3	-	53	53	0.3
VIII	-	-	-	-	-	-	-	-	-	-	-	-
IX	53198	37831	91029	2.1	1406	1500	2906	0.3	-	-	-	-

NUMBER OF ROUTE BY KANWIL 1981

KANWIL	ROUTE CODE	ROUTE	UNIT	BRT
TOTAL	-	148	720	81717
I	L.I.01 - L.I.15	15	84	10000
II	L.II.01 - L.II.29	29	193	20247
III	L.III.01 - L.III.26	26	175	23488
IV	L.IV.01 - L.IV.19	19	69	9668
V	L.V.01 - L.V.15	15	65	7226
VI	L.VI.01 - L.VI.16	16	68	6664
VII	L.VII.01 - L.VII.8	8	40	2894
VIII	L.VIII.01 - L.VIII.06	6	7	408
IX	L.IX.01 - L.IX.14	14	19	1122

ACTIVITY OF TRADITIONAL LINER SERVICE 1978 - 1982

ITEM	1978	1979	1980	1981	1982	GROWTH RATIO (5 YEAR)	AVERAGE GROWTH RATIO
OWNER (NO.)	318	293	304	332	351	10.4	2.5
UNIT (NO.)	2182	2288	2563	3346	3486	59.8	12.4
SHIPS							
TOTAL BRT	96016	102931	121561	179032	180447	87.9	17.1
AVERAGE BRT	44.0	45.0	47.4	53.5	51.8	17.7	4.2
TRANSPOR- TATION							
CARGO (TON)	925779	1246089	1460887	1959480	2155316	132.8	23.5
PASSENGER (PERSON)	150534	248497	246433	400044	348284	131.4	23.3
LIVE STOCK (EKOR)	9984	13067	4770	7962	2400	-76.0	-30.0
PRODUCTION (TON/BRT/YEAR)	9.64	12.11	12.01	10.94	11.94	23.9	5.5

ACTIVITY OF TRADITIONAL SERVICE BY KANWIL 1982

KANWIL	CALL		CARGO		PASSENGER		LIVE STOCK		POTENSI		PRODUCTION TON/BRT/YEAR
	NUMBER	RATIO	TON	RATIO	PERSON	RATIO	EKOR LIVE	BRT	RATIO		
TOTAL	40998	100	2155316	100	348284	100	2400	180447	100	12.22	
I	1961	4.8	47517	2.2	8694	2.5	-	3776	2.1		
II	8409	20.5	82650	3.8	73518	21.1	-	11132	6.2		
III	14394	35.1	959522	44.5	-	-	-	62615	34.7		
IV	5738	14.0	657082	30.5	194387	55.8	1341	69145	38.3		
V	6814	16.6	251966	11.7	2973	0.9	1059	16751	9.3		
VI	2508	6.1	88957	4.1	68103	19.5	-	9312	5.2		
VII	243	0.6	24963	1.2	-	-	-	11110	6.1		
VIII	504	1.2	25370	1.2	-	-	-	5310	2.9		
IX	427	1.1	17289	0.8	618	0.2	-	1296	0.7		

Source: Annual Report 1982, DGSC

NUMBER OF ROUTE BY AREA 1981

WILAYAH	NO. OF ROUTE	NO. OF PORT	SHIP	
			UNIT	DWT
TOTAL	35	214	36	20805
PANTAI BARAT SUMATERA	5	31	5	3207
RIAU	3	15	3	1981
JAWA TIMUR	1	8	1	350
NIT/TIMTIM DSK	4	23	3	1750
JAWA TENGAHKALSEL	1	8	1	200
KALIMANTAN TIMUR	1	5	1	200
SUL. SEL/SULTENGI NTB/NTT	2	18	2	1500
SULUT/SULTENG	2	14	2	1000
MALUKU	6	38	6	4664
IRIAN JAYA	10	54	12	5953

DATA ON OCEAN-GOING SHIPPING

Sources:

* Statistical Yearbook of Indonesia, 1982
(Statistik Indonesia, 1982)

* Annual Report, 1981
(Laporan Tahunan th. 1981)

Directorate General of Sea Communication

EXPORTED CARGO BY PROVINCE 1978 - 1982

UNIT: 103 TON
106 US\$

PROVINCE	1978	1979	1980	1981	1982	G. RATIO 5 YEAR	AVERAGE G. RATIO
TOTAL	VOLUME 101267.2	98268.0	92511.5	86182.1	84031.6	-17.0	-4.6
	VALUE 11643.2	15590.1	21908.9	22260.3	19885.0	70.8	14.3
SUMATERA	VOLUME 47111.2	49188.9	54061.9	53262.9	51988.2	10.4	2.5
	VALUE 5935.8	8137.6	12757.6	13347.9	10996.2	85.3	16.7
JAWA MADURA	VOLUME 11484.8	10670.8	3824.5	3652.4	8596.8	-25.1	-7.0
	VALUE 1557.0	1907.1	1340.0	1320.3	2699.8	73.4	14.8
BALI	VOLUME 68.8	50.7	34.4	26.3	21.4	-68.9	-25.3
NUSA TENGGARA	VALUE 13.4	28.5	26.6	15.0	16.8	25.4	5.8
KALIMANTAN	VOLUME 33989.8	32124.8	28543.4	24091.7	19542.0	-42.5	-12.9
	VALUE 3215.7	4541.1	6433.5	6288.1	5134.6	59.7	12.4
SULAWESI	VOLUME 1299.8	1138.3	1145.9	801.6	644.4	-50.4	-16.1
	VALUE 135.6	243.4	347.8	279.7	237.4	75.1	15.0
MALUKU	VOLUME 7382.9	5094.5	4901.4	4347.2	3238.8	-56.1	-18.6
IRIAN JAYA	VALUE 785.7	732.4	1003.4	1009.3	800.2	1.8	0.1

DESTINATION OF EXPORTED CARGO BY PRINCIPAL AREA 1978 - 1982

UNIT: 103 TON
106 US\$

AREA OF DESTINATION	1978	1979	1980	1981	1982	G. RATIO 5 YEAR	AVERAGE G. RATIO
TOTAL							
VOLUME	101267.2	98268.0	92511.5	86182.1	84031.6	-17.0	-4.6
VALUE	11643.2	15590.1	21908.9	22260.3	19885.0	70.8	14.3
ASEAN							
VOLUME	10529.4	11236.7	12562.1	13103.7	22268.0	111.5	20.6
VALUE	1477.9	2232.9	2759.3	2682.8	2882.0	95.0	18.2
JAPAN							
VOLUME	46239.2	52816.2	49727.5	41902.2	38998.8	-15.7	-4.2
VALUE	4565.5	7191.9	10792.4	10545.9	10109.2	121.4	22.0
OTHER ASIA							
VOLUME	8647.8	7450.2	5897.6	4390.0	4144.6	-52.1	-16.8
VALUE	674.0	905.8	953.5	940.1	1029.2	52.7	11.1
USA/CANADA							
VOLUME	32109.2	22082.9	19795.1	21257.3	13311.6	-58.5	-19.8
OTHER AMERICA							
VALUE	3758.5	3629.2	5287.2	6066.3	3957.6	5.3	1.3
AUSTRALIA							
VOLUME	778.7	1318.4	1668.7	2250.1	2801.8	359.8	37.7
OTHER OCEANIA							
VALUE	113.5	241.0	447.6	658.5	813.8	617.0	63.6
EEC							
VOLUME	2611.7	3084.3	2569.1	2349.4	2159.4	-17.3	-4.6
VALUE	873.9	1173.0	1387.7	969.7	925.8	5.9	1.5
OTHERS							
VOLUME	351.2	279.3	291.4	929.4	347.4	-1.1	-0.3
VALUE	179.9	216.7	281.2	397.0	167.4	-6.9	-1.8

EXPORTED CARGO BY COMMODITY GROUP 1981

COMMODITY GROUP	VOLUME		VALUE	
	10 ³ TON	SHARE	10 ⁶ \$	SHARE
TOTAL	86182.1	100	22260.3	100
FOOD STUFF, LIVE ANIMAL	2169.3	2.5	929.5	4.2
BEVERAGE, TOBACCO	25.7	-	53.7	0.2
RAW MATERIALS	14835.9	17.2	2208.1	9.9
MINERAL FUELS RELATED MATERIALS	67464.5	78.3	17764.4	79.8
ANIMALS VEGETABLE OIL	252.0	0.3	129.1	0.6
CHEMICALS	63.4	0.1	64.1	0.3
MANUFACTURED GOODS	1331.6	1.6	776.5	3.5
MACHINERY	7.0	-	153.5	0.7
MISCELLANEOUS M. GOOD	16.6	-	121.2	0.5
OTHERS	16.1	-	60.2	0.3

IMPORTED CARGO BY PROVINCE 1978 - 1982

UNIT: 103 TON
106 US\$

PROVINCE	1978	1979	1980	1981	1982	G. RATIO 5 YEAR	AVERAGE G. RATIO
TOTAL							
	VOLUME	14508.6	19008.2	18631.7	22822.8	71.0	14.3
	VALUE	6690.4	10834.4	13272.1	16678.4	149.3	25.7
SUMATERA							
	VOLUME	2178.3	2761.6	2557.8	4887.0	124.3	22.4
	VALUE	989.7	1563.2	2104.0	3202.8	223.6	34.1
JAWA MADURA							
	VOLUME	9719.2	11300.2	13863.8	15426.2	58.7	12.2
	VALUE	5198.6	5466.0	9817.7	11939.6	129.7	23.1
BALI							
	VOLUME	48.2	42.4	73.2	140.8	192.1	30.7
	VALUE	8.8	13.0	28.0	71.6	713.6	68.9
KALIMANTAN							
	VOLUME	503.2	817.4	678.2	1374.2	173.1	28.6
	VALUE	224.6	347.1	644.0	1015.6	352.2	45.8
SULAWESI							
	VOLUME	774.2	442.8	1100.3	805.0	4.0	0.1
	VALUE	217.4	188.5	414.4	321.2	47.7	10.3
MALUKU							
	VOLUME	125.5	85.8	98.2	189.6	51.1	10.9
	VALUE	51.3	64.5	73.5	127.6	148.7	25.6

ORIGIN OF IMPORTED CARGO BY PRINCIPAL AREA 1978 - 1982

UNIT: 103 TON
106 US\$

AREA OF ORIGIN	1978	1979	1980	1981	1982	G.RATIO 5 YEAR	AVERAGE G.RATIO
	VOLUME VALUE	VOLUME VALUE	VOLUME VALUE	VOLUME VALUE	VOLUME VALUE		
TOTAL	13348.6 6690.4	14508.6 7202.3	19008.2 10834.4	18631.7 13272.1	22822.8 16678.4	71.0 149.3	14.3 25.7
ASEAN	3009.8 652.0	3393.5 838.9	3897.1 1350.4	4211.3 1702.1	6979.8 3316.0	131.9 408.9	23.4 50.2
JAPAN	2183.7 2016.4	2125.2 2103.4	2936.7 3413.0	2983.3 3989.0	3044.6 4055.2	39.4 101.1	8.7 19.1
OTHER ASIA	4302.6 1136.9	5096.6 1350.4	7140.1 2131.7	4882.5 2053.9	6909.6 2593.4	60.6 128.1	12.6 22.9
USA/CANADA OTHER AMERICA	1767.6 991.2	1715.4 1156.3	2389.5 1617.0	2907.9 2162.0	2351.8 2291.0	33.1 131.1	7.4 23.3
AUSTRALIA OTHER OCEANIA	966.9 255.8	937.0 265.1	1252.8 453.1	1281.7 460.1	1381.8 427.8	42.9 67.2	9.3 13.7
EEC	666.5 1267.4	658.3 1073.5	706.9 1444.7	1097.9 2200.0	1018.4 2891.8	52.8 128.2	11.1 22.9
OTHERS	451.5 370.7	582.6 414.7	685.1 424.5	1267.1 705	1136.8 1103.2	151.8 197.6	26.0 31.3

IMPORTED CARGO BY COMMODITY GROUP 1981

COMMODITY GROUP	VOLUME		VALUE	
	10 ³ TON	SHARE	10 ⁶ \$	SHARE
TOTAL	18631.7	100	13272.1	100
FOOD AND LIVE ANIMALS	3146.9	16.9	1356.1	10.2
BEVERAGE & TOBACCO	37.6	0.2	44.8	0.3
CRUDE MATERIALS	2077.7	11.2	564.8	4.3
MINERAL FUELS & RELATED MATERIALS	5804.0	31.2	1727.2	13.0
ANIMALS AND VEGETABLE OIL	46.2	0.2	28.8	0.2
CHEMICALS	2785.1	14.9	1754.4	13.2
MANUFACTURED GOODS	3766.7	20.2	2518.3	19.0
MACHINERY	896.3	4.8	4618.7	34.8
MISCELLANEOUS M. GOOD	67.9	0.4	325.2	2.5
OTHERS	3.3	-	333.8	2.5

SHARE OF CARGO FLOW BY NATIONAL FLAG 1982

UNIT: TON

TYPE OF SERVICE	EXPORT			IMPORT			TOTAL			
	TOTAL	NATIONAL	SHARE	TOTAL	NATIONAL	SHARE	TOTAL	NATIONAL	SHARE	
GENERAL	SUB TOTAL	5007424	1750283	35.0	13457272	3919767	29.1	18464696	5670050	30.7
	LINER	2198546	1050942	47.8	6331120	2435539	38.5	8529666	3486481	40.9
	TRAMPER	2808878	699341	24.9	7126152	1484228	20.8	9935030	2183569	22.0
SPECIAL	SUB TOTAL	103830690	2696181	2.6	991673	91272	9.2	104822363	2787453	2.7
	DRY CARGO	6362945	2696181	42.4	991673	91272	9.2	7354618	2787453	37.9
	LIQUID CARGO	97467745	-	0	-	-	-	97467745	-	0
GRAND TOTAL	108838114	4446464	4.1	14448945	4011039	27.8	123287059	8457503	6.9	

INTERNATIONAL CARGO FLOW 1978 - 1982

UNIT: TON

TYPE OF SERVICE	1978	1979	1980	1981	1982	RATIO IN 1982	GROWTH RATIO 5 YEAR	AVERAGE GROWTH RATIO
TOTAL	108876549	123913527	101744498	111218527	123287059	100	13.2	3.2
GENERAL								
SUB TOTAL	12121164	14095945	17254565	17637460	18464696	15.0	52.3	11.1
LINER	5635044	5819950	7353049	8299004	8529666	6.9	51.4	10.9
TRAMPER	6486120	8275995	9901516	9338456	9935030	8.1	53.2	11.2
SPECIAL								
SUB TOTAL	96755385	109817582	84489933	93581067	104822363	85.0	8.3	2.0
LOG	19485581	22450018	12684063	5913902	3142382	2.5	-83.9	-36.6
OTHER DRY CARGO	3821823	3630927	1555877	5095999	4212236	3.4	10.2	2.5
LIQUID CARGO	73446981	83736637	70249993	82571166	97467745	79.1	32.7	7.3

CARGO FLOW BY LINER BY ROUTE OF SERVICE 1982

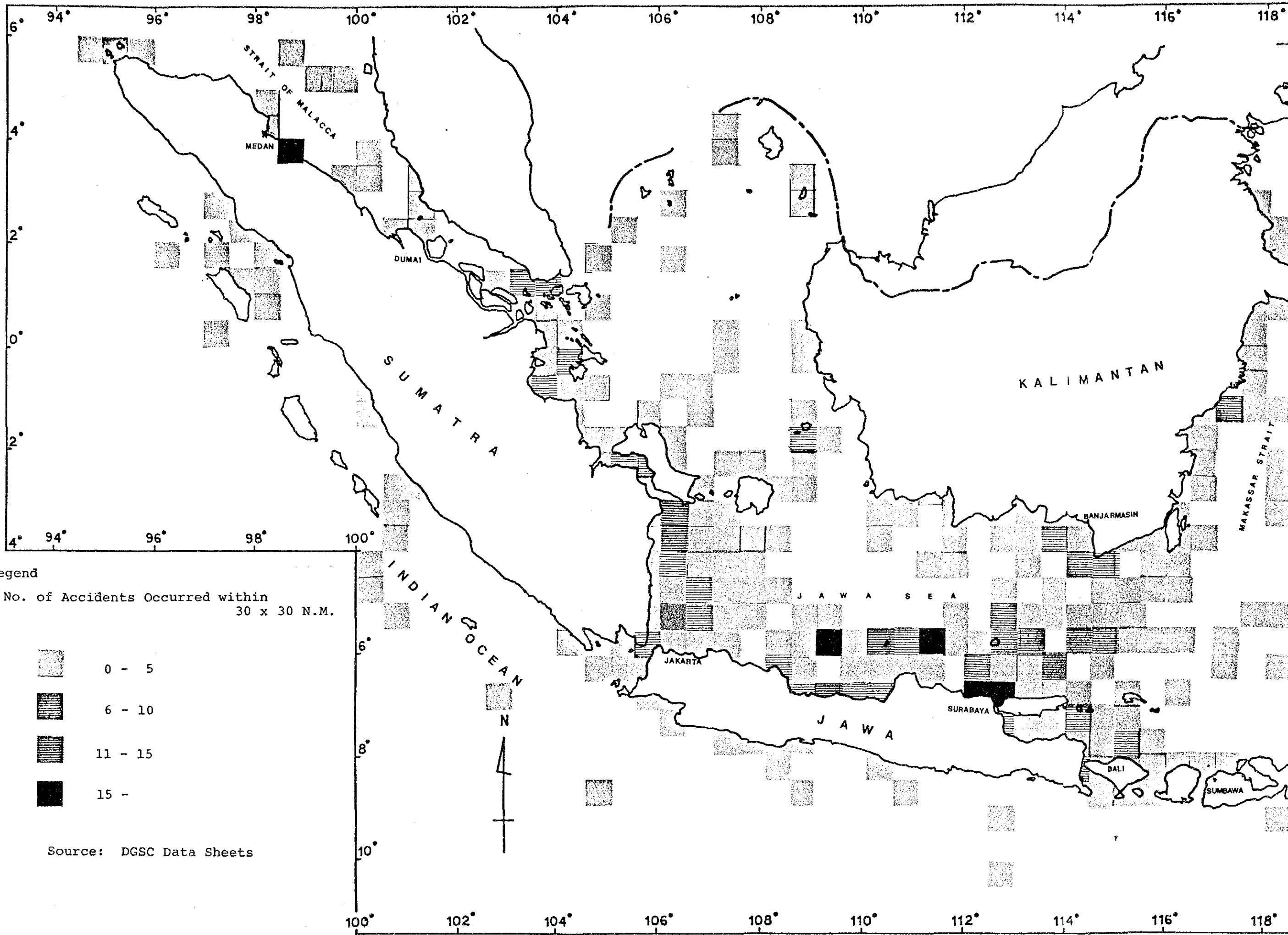
ROUTE OF SERVICE	SHIP		CARGO FLOW (TON)						RATIO	
	TOTAL UNIT	DWT	SAIL	IMPORT		EXPORT		TOTAL		
				TON	SHARE	TON	SHARE	TON		SHARE
INDONESIA - EUROPE	179	2704674	254	1044688	100	811994	100	1856682	100	21.8
NATIONAL FLAG	21	288263	40	315665	30.2	216980	26.7	532645	28.7	
FOREIGN FLAG	48	860139	50	305887	29.3	250062	30.8	555949	29.9	
NON CONFERENCE	110	1556272	164	423136	40.5	344952	42.5	768088	41.4	
INDONESIA - MIDDLE EAST (NATIONAL FLAG)	15	197544	35	158050	100	379097	100	537147	100	6.3
INDONESIA - JAPAN	288	2261647	640	3924964	100	448612	100	4373576	100	51.3
NATIONAL FLAG	119	842260	307	1736573	44.2	197324	44.0	1933897	44.2	
FOREIGN FLAG	169	1419387	333	2188391	55.8	251288	56.0	2439679	55.8	
INDONESIA - SOUTH KOREA	35	249103	102	217503	100	4835	100	222338	100	2.6
NATIONAL FLAG	9	67928	23	43373	20.0	51	1.0	43424	19.5	
FOREIGN FLAG	26	181175	79	174130	80.0	4784	99.0	178914	80.5	
INDONESIA - USA	177	3321585	193	985915	100	554008	100	1539923	100	18.0
NATIONAL FLAG	23	314078	36	181878	18.4	257490	46.5	439368	28.5	
FOREIGN FLAG	154	3007507	157	804037	81.6	296518	53.5	1100555	71.5	
GRAND TOTAL	694	8434553	1224	6331120	100	2198546	100	8529666	100	100
NATIONAL FLAG	187	1710073	441	2435539	38.5	1050942	47.8	3486481	40.9	
FOREIGN FLAG	507	7024480	783	3895581	61.5	1147604	52.2	5043185	59.1	

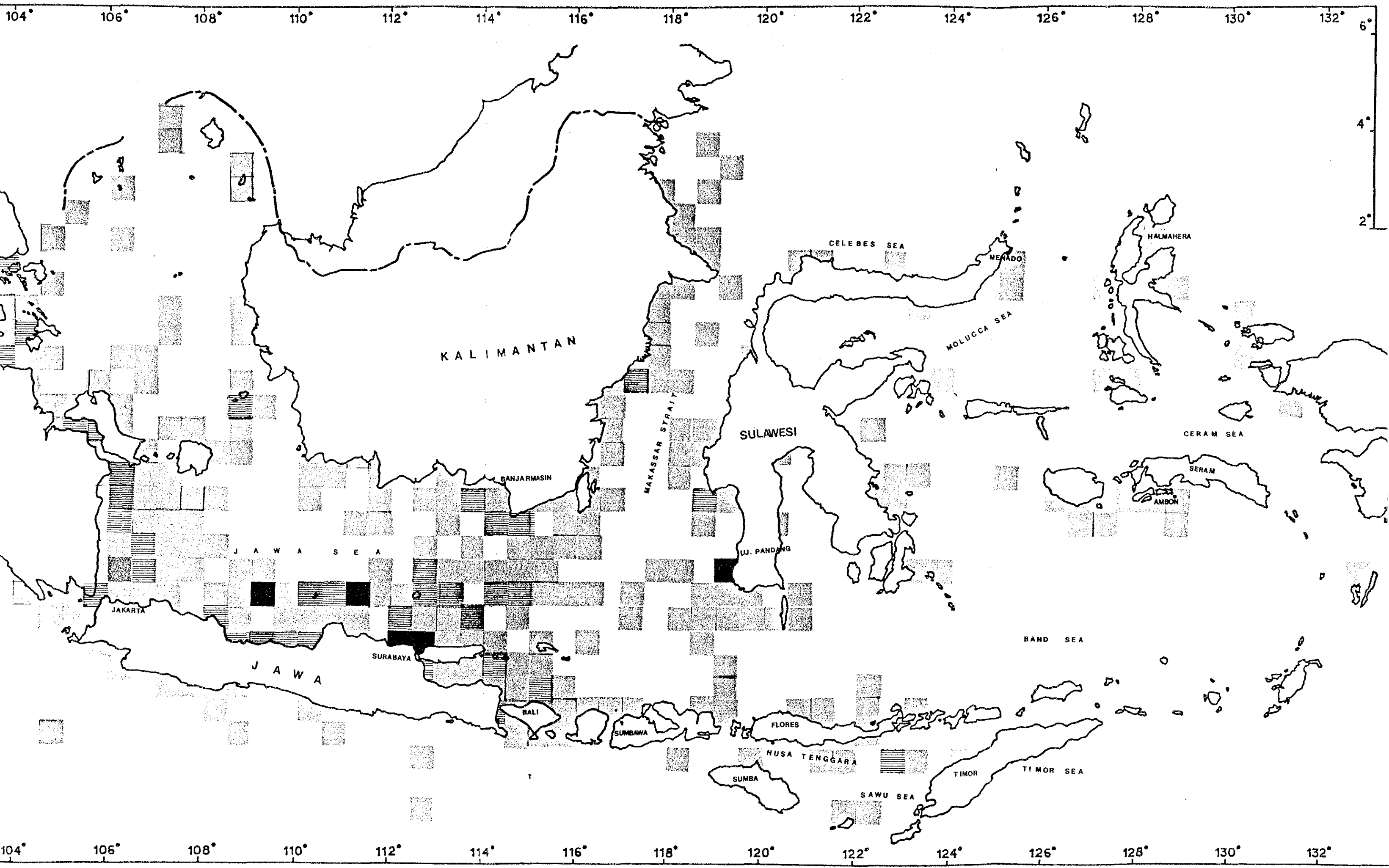
CARGO FLOW BY TRAMPER BY SERVICE ROUTE 1981

SERVICE ROUTE	TOTAL UNIT	SHIP		CARGO FLOW (TON)			RATIO
		DWT	SAIL	IMPORT	EXPORT	TOTAL	
MIDDLE EAST	25	305067	26	127500	81346	208846	2.2
AFRICA	16	187874	20	58506	7124	65630	0.7
AUSTRALIA/ NEW ZEALAND	87	6675576	239	1006427	66677	1073104	11.5
USA/CANADA	148	891394	248	1594296	115022	1709318	18.3
THAILAND	60	320825	89	333874	48113	381987	4.1
PHILIPPINE	51	299555	99	398239	21311	419550	4.5
MALAYSIA	13	57325	92	22140	89646	111786	1.2
JAPAN	82	560282	105	269501	155124	424625	4.6
KOREA	106	800230	145	708528	111420	819948	8.8
HONG KONG	63	410242	161	379863	110067	489930	5.2
TAIWAN	103	697649	281	534416	104468	638884	6.8
INDIA PAKISTAN, BANGLADESH	71	748276	87	122130	328290	450420	4.8
EUROPE	157	3165327	196	559284	1889199	2448483	26.2
OTHERS	37	158533	43	80347	15598	195945	1.1
GRAND TOTAL	1019	15278155	1831	6195051	3143405	9338456	100
NATIONAL FLAG	171	1817136	313	1734835	334420	2069255	22.2
FOREIGN FLAG	848	13481019	1518	4460216	2808985	7269201	77.8

NUMBER OF MARINE ACCIDENTS
OCCURRED FROM 1979 to 1983

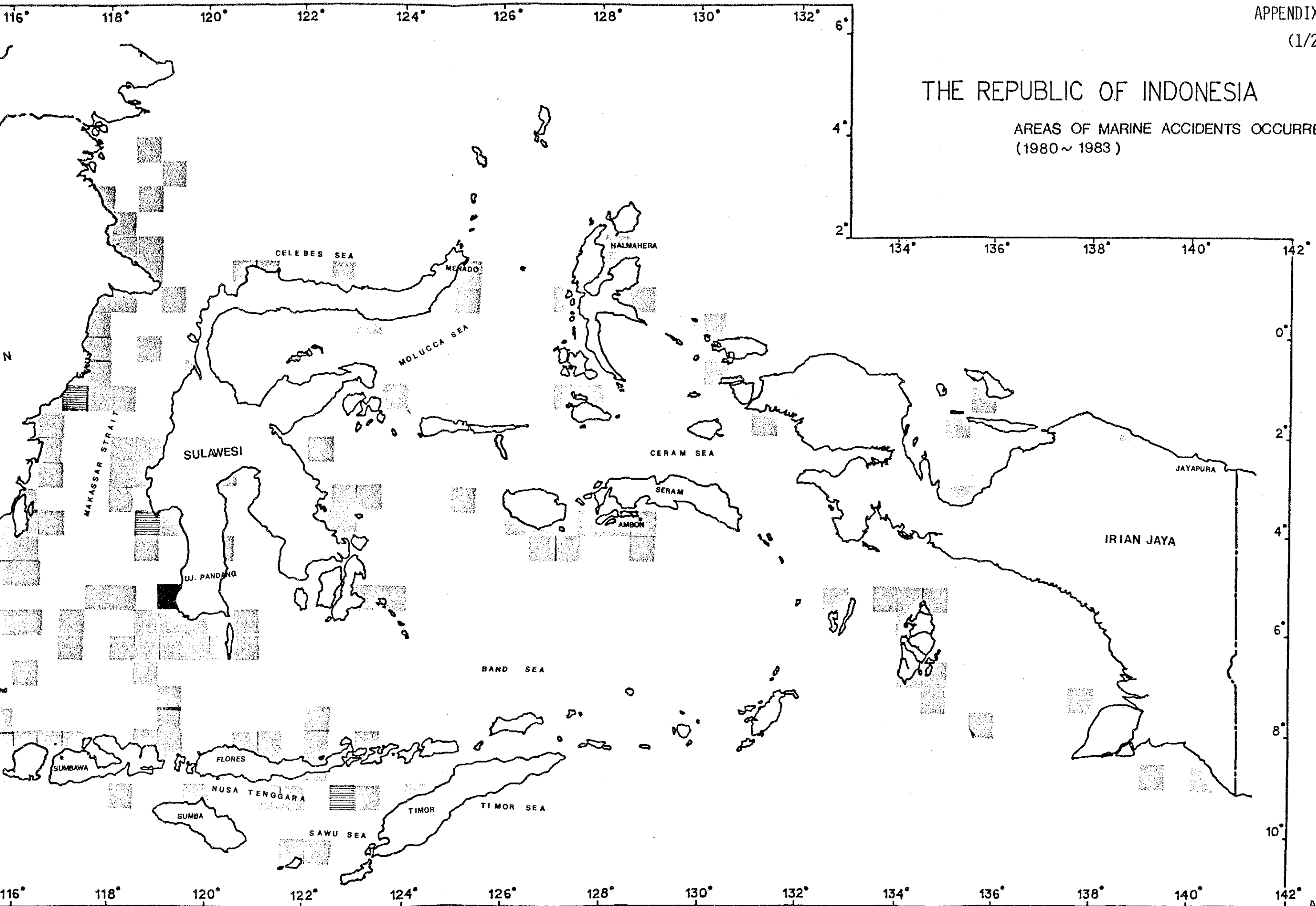
Source: Compiled from Records of Marine
Accidents DGSC, 1984

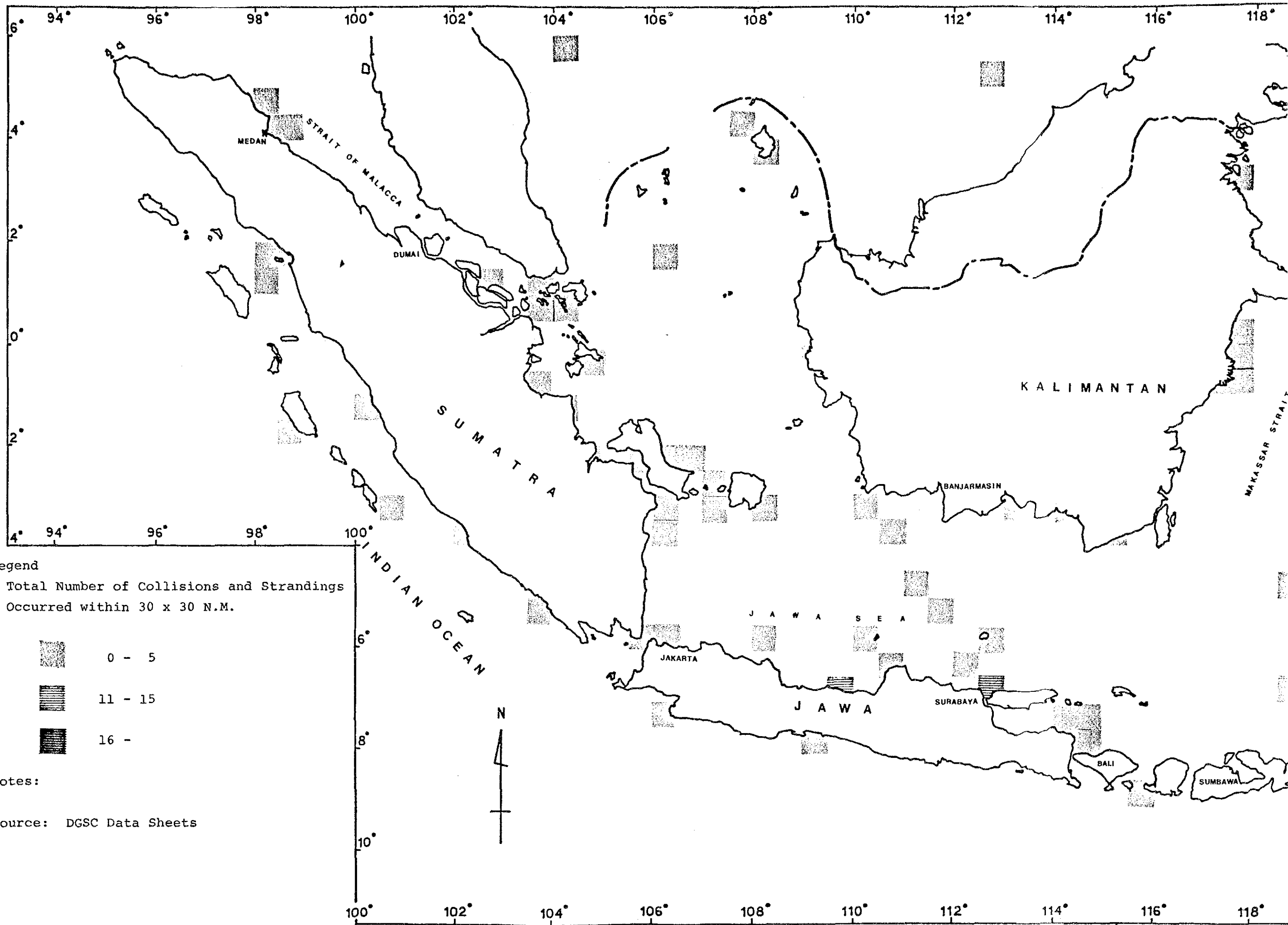




THE REPUBLIC OF INDONESIA




AREAS OF MARINE ACCIDENTS OCCURRED
(1980 ~ 1983)





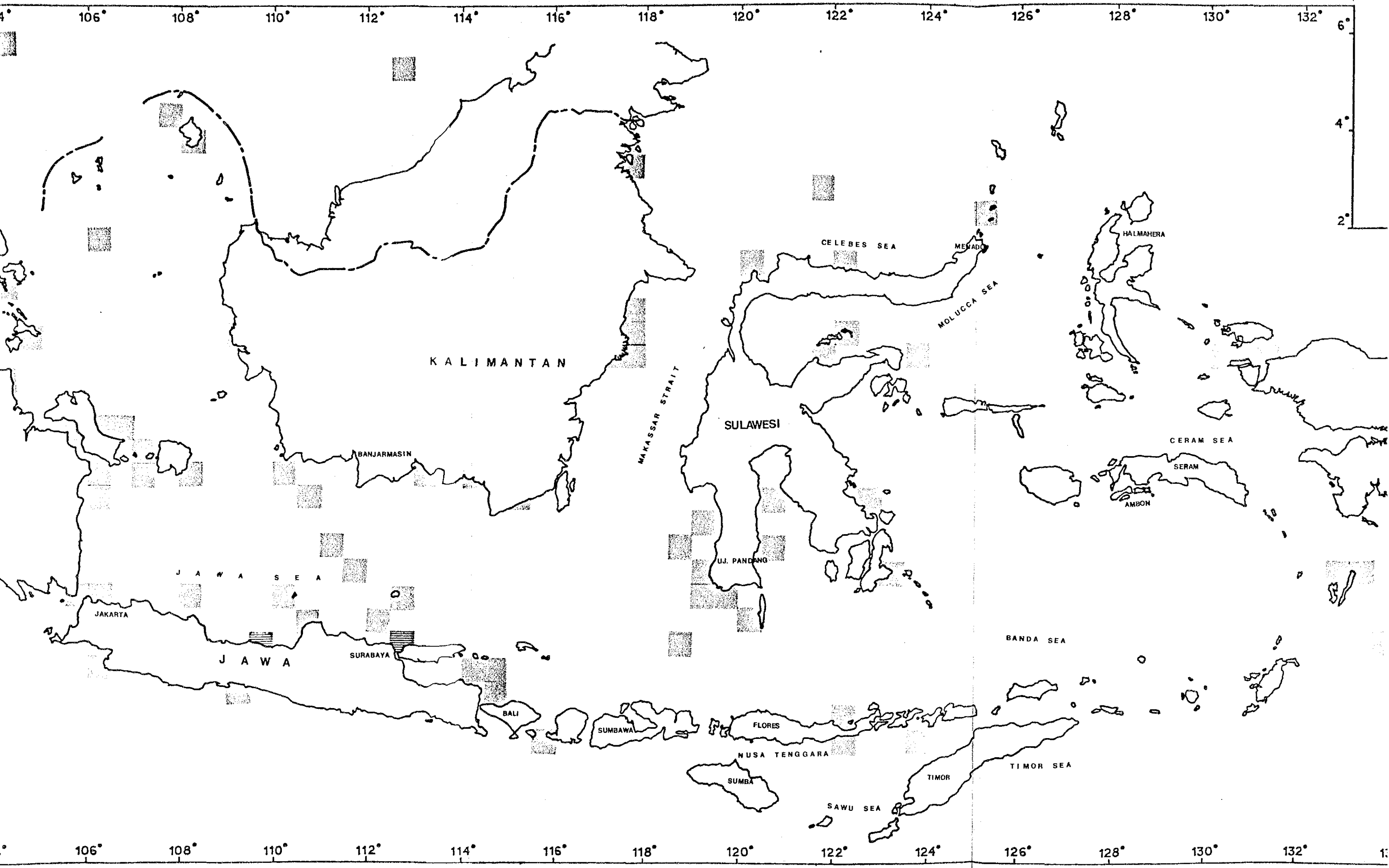
Legend

Total Number of Collisions and Strandings
Occurred within 30 x 30 N.M.

-  0 - 5
-  11 - 15
-  16 -

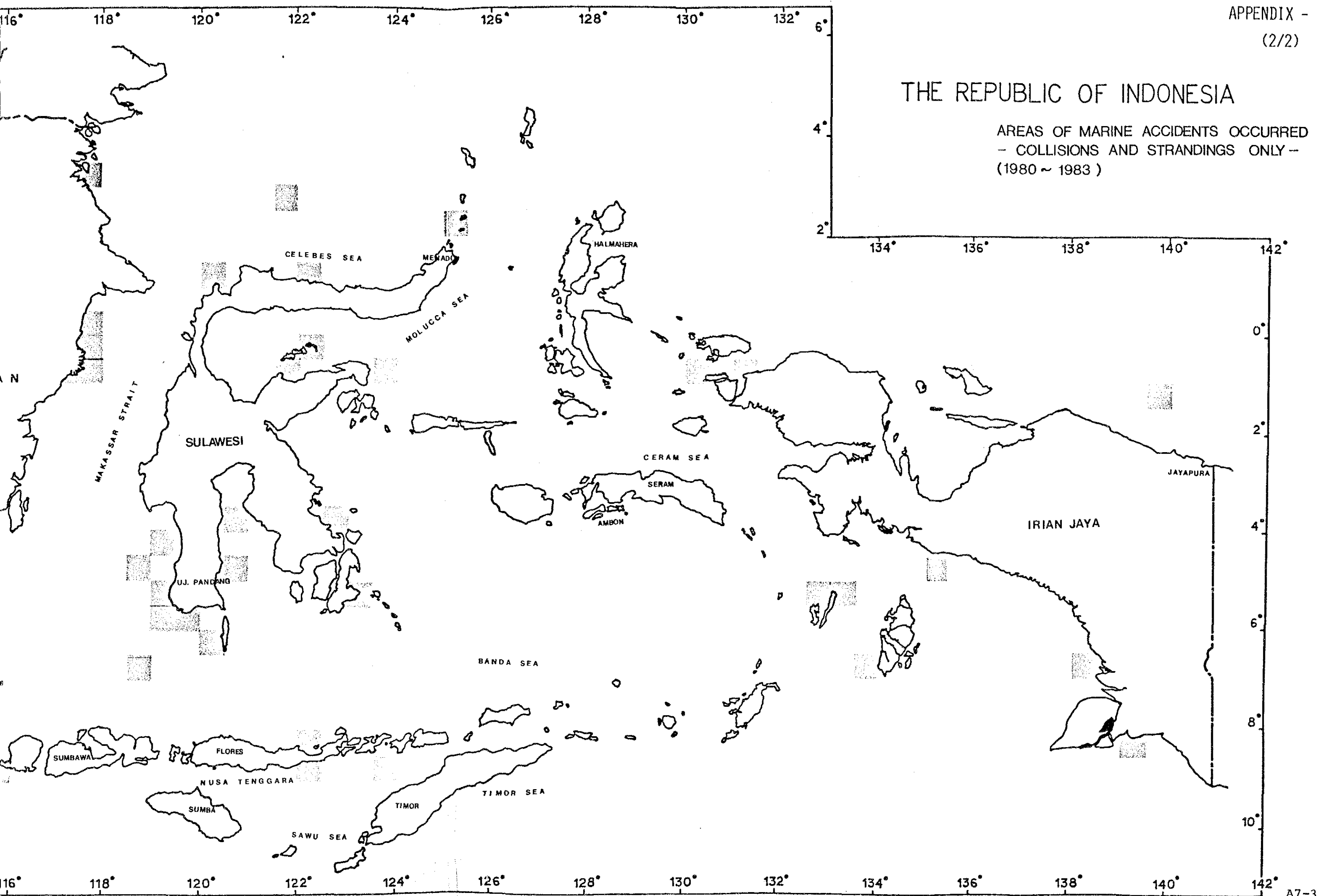
Notes:

Source: DGSC Data Sheets



THE REPUBLIC OF INDONESIA

AREAS OF MARINE ACCIDENTS OCCURRED
- COLLISIONS AND STRANDINGS ONLY -
(1980 ~ 1983)



1979 - 1983 Number of Marine Accidents Occurred in the Republic of Indonesia

Year No. Month	1979		1980		1981		1982		1983		Total Occurred
	No. Occurred	No. Plotted	No. Occurred	No. Plotted	No. Occurred	No. Plotted	No. Occurred	No. Plotted	No. Occurred	No. Plotted	
Jan.	21	17	35	25	85	57	85	79	27	18	
Feb.	20	11	34	21	32	24	30	28	27	8	
Mar.	7	7	24	16	35	27	44	41	25	12	
Apr.	19	12	17	9	25	18	32	30	21	6	
May	23	19	28	19	39	25	30	28	28	12	
June	31	18	28	24	30	13	46	41	65	10	
July	27	19	63	37	37	29	52	43	10	4	
Aug.	21	14	35	23	44	21	42	38	15	9	
Sept.	39	20	34	23	36	29	26	23	24	15	
Oct.	46	31	34	11	27	20	42	34	19	4	
Nov.	26	20	29	20	44	41	20	12	NA	NA	
Dec.	30	12	24	10	56	55	18	10	NA	NA	
Total	310	200	385	238	490	359	467	407	261	98	1,913

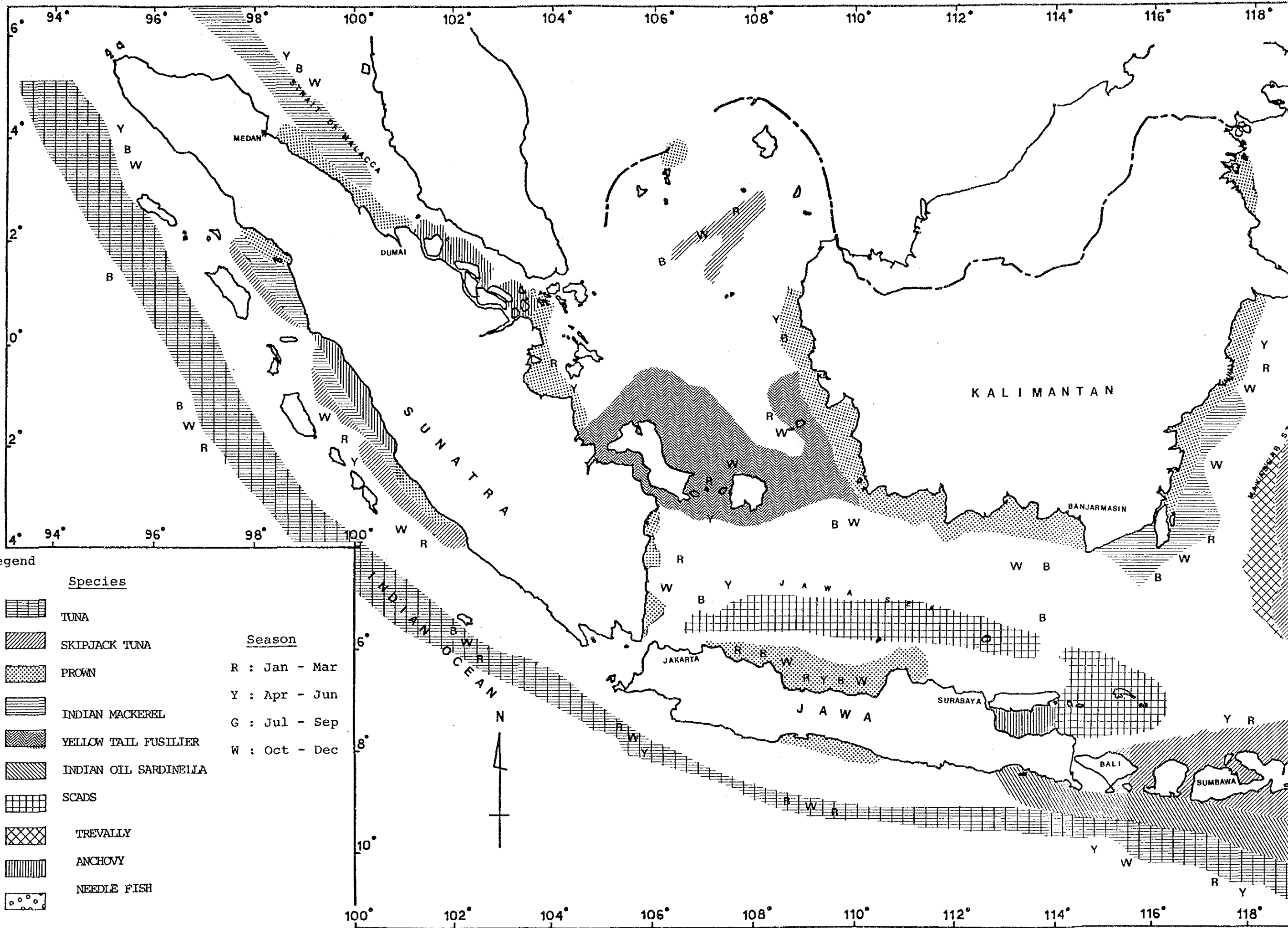
Notes: NA: Data not available

**Number of Marine Accidents Occurred
(Collisions & Stranding Only)**

Year Month	1979		1980		1981		1982		1983	
	No. Occurred	No. Plotted	No. Occurred	No. Plotted	No. Occurred	No. Plotted	No. Occurred	No. Plotted	No. Occurred	No. Plotted
Jan.	6	6	4	2	11	10	9	8	1	1
Feb.	8	5	5	4	5	5	4	2	5	2
Mar.	0	0	1	0	3	2	4	4	2	2
Apr.	1	0	2	0	4	3	7	7	1	0
May	6	5	2	1	4	4	2	2	1	0
June	3	3	4	2	3	3	8	7	3	1
July	2	1	4	2	5	4	6	4	5	1
Aug.	1	1	1	1	6	5	6	6	1	0
Sept.	1	0	3	1	2	0	7	6	1	0
Oct.	4	2	2	1	7	5	7	6	2	2
Nov.	4	4	5	3	8	6	1	0	NA	NA
Dec.	4	3	4	3	8	8	2	1	NA	NA
Total	40	30	45	20	66	55	63	53	22	9

Notes: NA: No Data Available

FISHING GROUNDS BY SPECIES AND SEASONS,
AND EXTRACT FROM
FISHERIES STATISTICS OF INDONESIA, 1981

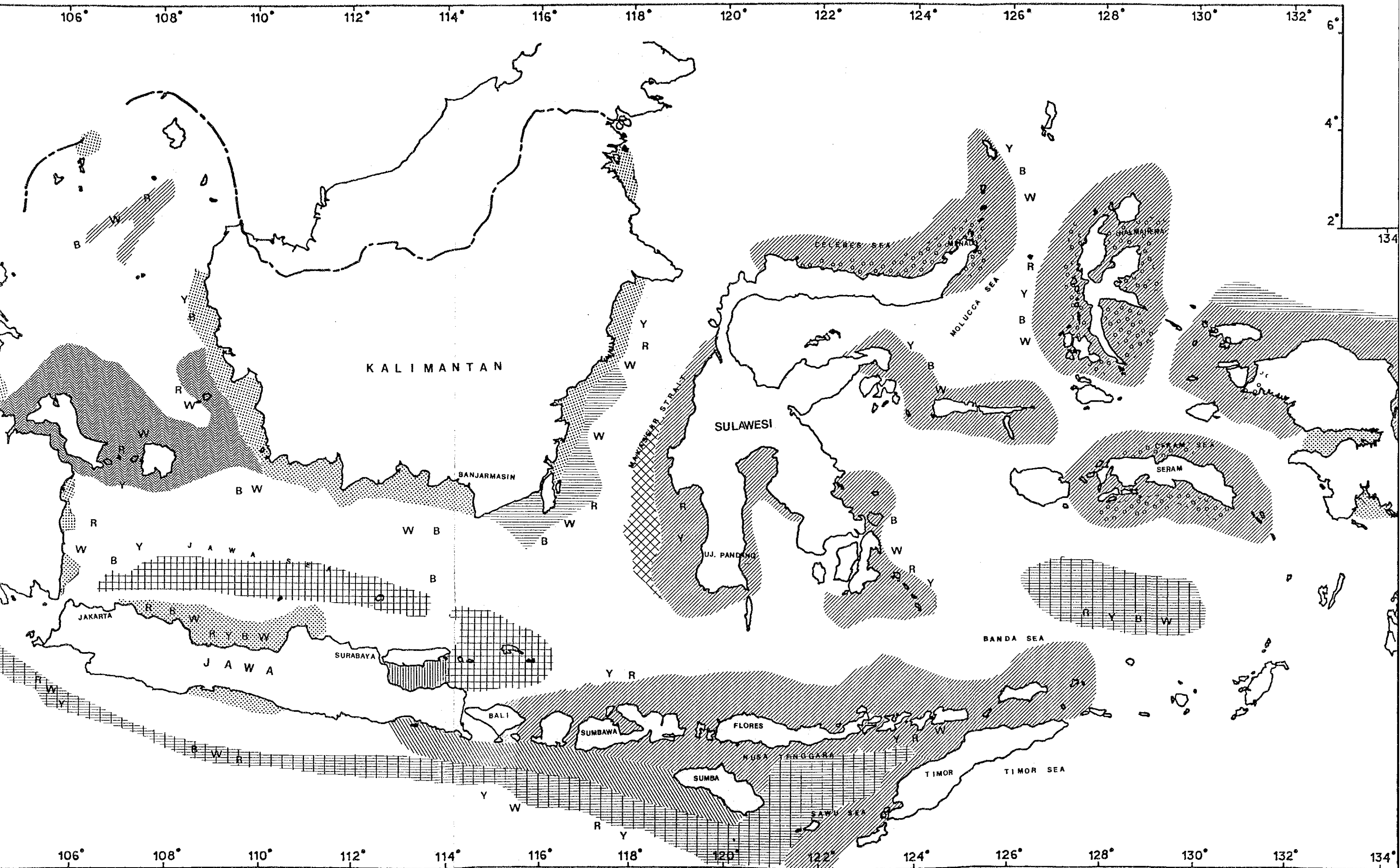


Legend

- | Species | |
|---------|-----------------------|
| | TUNA |
| | SKIPJACK TUNA |
| | PROWN |
| | INDIAN MACKEREL |
| | YELLOW TAIL FUSILIER |
| | INDIAN OIL SARDINELLA |
| | SCADS |
| | TREVALLY |
| | ANCHOVY |
| | NEEDLE FISH |

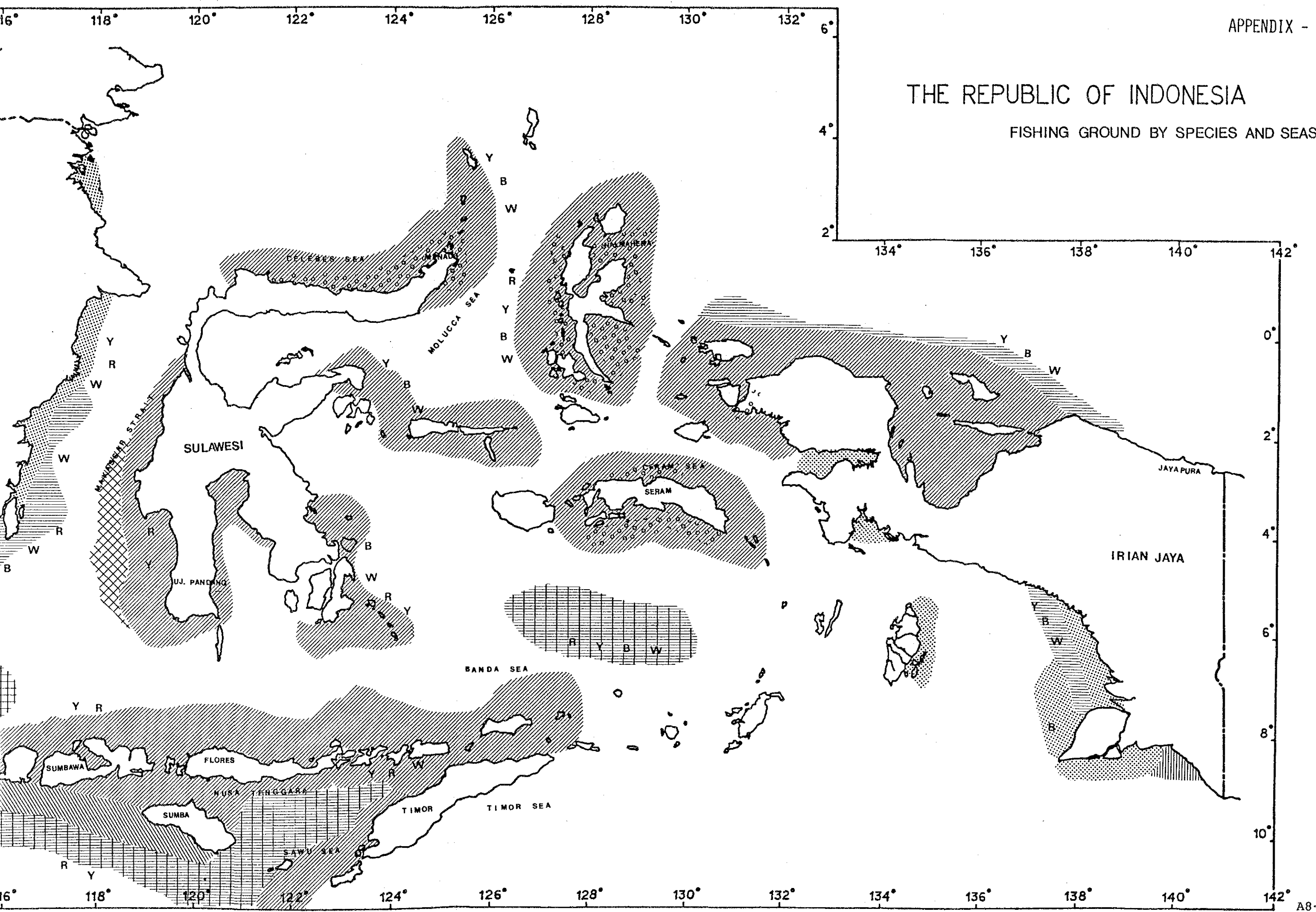
- | Season | |
|--------|-------------|
| R | : Jan - Mar |
| Y | : Apr - Jun |
| G | : Jul - Sep |
| W | : Oct - Dec |





THE REPUBLIC OF INDONESIA

FISHING GROUND BY SPECIES AND SEASONS



FISHERIES PRODUCTION BY SUB SECTOR OF FISHERY

UNIT: TON

SUB SECTOR	1977		1978		1979		1980		1981	
	TON	GROWTH RATIO	TON	GROWTH RATIO	TON	GROWTH RATIO	TON	GROWTH RATIO	TON	GROWTH RATIO
TOTAL	1571852	-	1647664	4.8	1748397	6.1	1849662	5.8	1914506	3.5
MARINE FISHERY	1157691	-	1227386	6.0	1317744	7.4	1394810	5.8	1408272	1.0
SUB TOTAL	414164	-	420278	1.5	430653	2.5	454852	5.6	506233	11.3
INLAND OPEN WATER	254243	-	249146	-2.0	248161	-0.4	254498	2.6	264983	4.1
SUB TOTAL	159918	-	171132	7.0	182492	6.6	200354	9.8	241250	20.4
INLAND FISHERY	87604	-	87995	0.4	93644	6.4	97898	4.5	112916	15.3
CULTURE	54341	-	57680	6.1	59359	2.9	66379	11.8	78224	17.8
FRESH WATER POND	272	-	390	43.4	369	-5.4	582	57.7	581	-0.2
CAGE	17701	-	25067	41.6	29120	16.2	35496	21.9	49529	39.5
PADDY FIELD										

VALUE OF FISHERIES PRODUCTION BY SUB SECTOR OF FISHERY

UNIT: 106 RP

SUB SECTOR	1977		1978		1979		1980		1981	
	VALUE	GROWTH RATIO	VALUE	GROWTH RATIO	VALUE	GROWTH RATIO	VALUE	GROWTH RATIO	VALUE	GROWTH RATIO
TOTAL	316349	-	378851	19.8	553236	46.0	697334	26.0	882379	26.5
MARINE FISHERY	185511	-	225941	21.8	335968	48.7	424080	26.2	504214	18.9
SUB TOTAL	130838	-	152910	16.9	217268	42.1	273254	25.8	378165	38.4
INLAND OPEN WATER	57421	-	65945	14.8	89053	35.0	121110	36.0	159495	31.7
SUB TOTAL	73417	-	86965	18.5	128215	47.4	152144	18.7	218670	43.7
BRACKISH WATER POND	39466	-	45809	16.1	76292	66.5	72071	-5.5	102502	42.2
CULTURE	23450	-	26192	11.7	34063	30.1	47514	39.5	67614	42.3
FRESH WATER POND	220	-	316	43.6	395	25.0	612	54.9	613	0.2
CAGE	10281	-	14648	42.5	17465	19.2	31948	82.9	47938	50.1
PADDY FIELD										

QUANTITY VALUE OF FISHERY PRODUCTION BY SUB SECTOR OF FISHERY AND PROVINCE 1981

UNITS VOLUME TON
VALUE 106 RP

PROVINCE	VOLUME						VALUE					
	TOTAL		MARINE FISHERY		INLAND FISHERY		TOTAL		MARINE FISHERY		INLAND FISHERY	
	TON	RATIO	TON	RATIO	TON	RATIO	RP	RATIO	RP	RATIO	RP	RATIO
TOTAL	1914506	100	1408272	100	506233	100	882379	100	504214	100	378165	100
SUMATERA	534923	27.9	438850	31.2	96073	19.0	219991	24.9	139887	27.7	80104	21.2
JAWA	550057	28.7	355109	25.2	194948	38.5	279747	31.7	125782	25.0	153965	40.7
BALI NUSATENGARA TIMOR	81235	4.3	76484	5.4	4751	0.9	26414	3.0	23803	4.7	2611	0.7
KALIMANTAN	299815	15.7	158405	11.2	141410	27.9	159149	18.0	69452	13.8	89697	23.7
SULAWESI	350195	18.3	283910	20.2	66285	13.1	154128	17.5	103078	20.4	51050	13.5
MALUKU IRIANIAYA	98280	5.1	95514	6.8	2766	0.6	42949	4.9	42212	8.4	737	0.2

Notes (1) Fishery production in value:-

Fishery production in value represents the producers value equivalent of the landing.

(2) Fishery production in quantity:-

Fishery production in quantity represents the live weight equivalent of the landing, i.e. "the round, fresh", "round, whole" or "ex-water" weight equivalent of the quantities recorded at the time of landing.

MARINE FISHERY PRODUCTION BY SPECIES 1981

SPECIES	VOLUME					VALUE				
	TON	RATIO	G. RATIO 5 YEARS	AVERAGE G. RATIO	106 RP	RATIO	G. RATIO 5 YEARS	AVERAGE G. RATIO		
TOTAL	1408272	100	21.6	5.0	504214	100	171.8	28.4		
SUB TOTAL	1206638	85.7	23.5	5.4	367769	72.9	175.6	28.9		
FISHES										
SARDINELLA	108714	(9.0)	67.1	13.7	21991	(6.0)	201.4	31.8		
ANCHOVIES	99681	(8.2)	23.8	5.5	23478	(6.4)	109.7	30.6		
EASTERN LITTLE TUNAS	87731	(7.3)	40.6	8.9	40302	(11.0)	207.2	32.4		
INDIAN MACKERELS	85747	(7.1)	20.5	4.8	33925	(9.2)	177.3	29.0		
SCADS	65637	(5.4)	-2.9	-0.7	22479	(6.1)	119.0	21.7		
SKIPJACKS TUNAS	57430	(4.8)	88.9	17.2	24229	(6.6)	249.2	36.7		
SUB TOTAL	140042	9.9	8.5	2.1	126826	25.2	160.5	27.3		
CRUSTA- CEANS										
SHRIMP	79052	(56.4)	-14.5	-3.9	37242	(29.4)	171.7	28.4		
BANANA PRAWN	22196	(15.8)	-8.8	-2.3	52830	(41.7)	120.5	21.9		
MOLLUSCS	50947	3.7	11.1	2.7	8657	1.7	170.5	28.2		
OTHER AQUATIC ANIMALS	3049	0.2	48.8	10.4	590	0.1	56.9	11.9		
AQUATIC PLANTS	7251	0.5	76.9	15.3	362	0.1	78.3	15.6		

MARINE FISHING BOAT 1981

SIZE OF BOAT			1981			AVERAGE G. RATIO	
			NUMBER	RATIO	G. RATIO (5 YEAR)		
TOTAL			277005	100	11.5	2.7	
NON POWERED BOAT	SUB TOTAL		225949	81.6	-1.0	-0.3	
	DUG-OUT BOAT		106759	(47.2)	16.5	3.9	
	PLANK	SMALL	71389	(31.6)	-7.7	-2.0	
	BUILD	MEDIUM	41580	(18.4)	-14.7	-3.9	
	BOAT	LARGE	6211	(2.8)	-40.9	-12.3	
POWERED BOAT	SUB TOTAL		51066	18.4	151.4	25.9	
	OUT-BOARD MOTOR		31105	(60.9)	224.0	34.2	
	INBOARD MOTOR	SUB TOTAL		19951	(39.1)	86.2	16.8
		5 GT		13140	(65.9)	142.6	24.8
		5 - 10 GT		4001	(20.1)	39.6	8.7
		10 - 30 GT		2501	(12.5)	22.6	5.2
		30 - 50 GT		148	(0.7)	-20.9	-15.7
		50 - 100 GT		28	(0.1)	-67.4	-24.5
		100 - 200 GT		77	(0.4)	35.1	7.8
		200 GT		56	(0.3)	-9.7	-2.5

NUMBER OF MARINE FISHING BOATS BY SIZE OF BOATS

SIZE OF BOAT	1977		1978		1979		1980		1981		
	NUMBER	GROWTH RATIO	NUMBER	GROWTH RATIO	NUMBER	GROWTH RATIO	NUMBER	GROWTH RATIO	NUMBER	GROWTH RATIO	
TOTAL	248544	-	248113	-0.2	257905	3.9	271856	5.4	277005	1.9	
SUB TOTAL	228228	-	222121	-2.7	225804	1.7	226866	0.5	225949	-0.4	
DUG-OUT BOAT	91621	-	95392	4.1	99135	3.9	102359	3.3	106759	4.3	
NON POWERED BOAT	SMALL	77373	-	67406	-12.9	73936	9.7	76066	2.9	71389	-6.1
	PLANK BUILD BOAT	48731	-	47786	-1.9	43352	-9.3	40375	-6.9	41580	3.0
	MEDIUM BOAT	10503	-	11234	7.0	8972	-20.1	7607	-15.2	6211	-18.4
LARGE											
SUB TOTAL	20316	-	25992	27.9	32101	23.5	44990	40.2	51066	13.5	
OUT-BOARD MOTOR	9601	-	13226	37.8	17343	31.1	26523	52.9	31105	17.3	
SUB TOTAL	10715	-	12766	19.1	14758	15.6	18467	25.1	19951	8.0	
POWERED BOAT	5 GT	5417	-	7305	34.9	8936	22.3	11324	26.7	13140	16.0
	5-10 GT	2866	-	2387	-16.7	2639	10.6	3417	29.5	4001	17.1
	10-30 GT	2040	-	2586	26.8	2868	10.9	3258	13.6	2501	-23.2
	IN-BOARD MOTOR	187	-	232	24.1	144	-37.9	307	113.2	148	-51.8
	30-50 GT	86	-	128	48.8	43	-66.4	28	-34.9	28	0
	50-100 GT	57	-	78	36.8	77	-1.3	80	3.9	77	-3.7
100-200 GT	62	-	50	-19.4	51	2.0	53	3.9	56	5.7	
200 GT											

NUMBER OF FISHERMAN BY CATEGORY

CATEGORY	1977		1978		1979		1980		1981	
	PERSON	GROWTH RATIO	PERSON	GROWTH RATIO	PERSON	GROWTH RATIO	PERSON	GROWTH RATIO	PERSON	GROWTH RATIO
TOTAL	1217967	-	1162725	-4.5	1199481	3.2	1382394	15.2	1550425	12.2
SUB TOTAL	815947	-	831965	2.0	883997	6.3	770731	9.8	1104649	13.8
MARINE FISHERY	435416	-	442914	1.7	468676	5.8	516853	10.3	579336	12.1
PART TIME (MAJOR)	292720	-	297922	1.8	319551	7.3	350224	9.6	411792	17.6
PART TIME (MINOR)	87811	-	91129	3.8	95810	5.1	103654	8.2	113521	9.5
SUB TOTAL	402020	-	330760	-17.7	315484	-4.6	411663	30.5	445776	8.3
INLAND OPEN WATER FISHERY	144117	-	119172	-17.3	112832	-5.3	150097	33.0	160636	7.0
PART TIME (MAJOR)	198492	-	163647	-17.5	156778	-4.2	192320	22.7	206732	7.5
PART TIME (MINOR)	59411	-	47941	-19.3	45874	-4.3	69246	50.9	78408	13.2

Notes: Based on their working time, the statistics on fishermen/fish farmers are classified as follows:

- i. Full timer: Fishermen who spent all of their working time fishing.
- ii. Part timer major: Fishermen who spent a major part of their working time fishing.
- iii. Part timer minor: Fishermen who spent a minor part of their working time fishing.

FISHERMEN IN 1981

CATEGORY		NUMBER	RATIO	G. RATIO (5 YEARS)	AVERAGE G. RATIO
TOTAL		1550425	100	27.3	6.2
MARINE FISHERY	SUB TOTAL	1104649	71.2	35.4	7.9
	FULL TIME	579336	(52.4)	33.1	7.4
	PART TIME (MAJOR)	411792	(37.3)	40.7	8.9
	PART TIME (MINOR)	113521	(10.3)	29.3	6.6
INLAND FISHERY	SUB TOTAL	445776	28.8	10.9	2.6
	FULL TIME	160636	(36.0)	11.5	2.8
	PART TIME (MAJOR)	206732	(46.4)	4.2	1.0
	PART TIME (MINOR)	78408	(17.6)	32.0	7.2

DISPOSITION OF MARINE FISHERY PRODUCTION BY TYPE OF DISPOSITION 1981

UNIT: TON

TYPE OF DISPOSITION		TON	RATIO
TOTAL		1408272	100
FRESH FISH		690683	49.0
PROCESSED	SUB TOTAL	653617	46.4
	DRIED/SALTED	464944	(71.1)
	BOILED	81836	(12.5)
	BLACHAN	52160	(8.0)
	FISH PEDA	8375	(1.3)
	FISH SAUCE	538	(0.1)
	SMOKED	34901	(5.3)
	OTHER	10863	(1.7)
FREEZING		48555	3.4
CANNING		10561	0.8
FISH MEALS		4856	0.4

NUMBER OF MARINE FISHING BOAT BY SIZE OF BOAT, COASTAL AREA 1981

COASTAL AREA	SIZE OF BOAT															
	NON POWERED BOAT						POWER BOAT									
	TOTAL	SUB TOTAL	DUG OUT BOAT	PLANK BUILD BOAT			SUB TOTAL	OUT BOARD MOTOR	INBOARD MOTOR					SUB TOTAL		
				SMALL	MEDI-UM	LARGE			5	5-10	10-30	30-50	50-100		150-200	200
							GT	GT	GT	GT	GT	GT	GT	GT		
TOTAL	277005	225949	106759	71389	41580	6221	51056	31105	19951	13140	4001	2501	148	28	77	56
SUMATERA	61668	44904	11094	20205	12384	1221	16764	3646	13118	9537	2493	1067	21	-	-	-
%	22.3	19.9	10.4	28.3	29.8	19.6	32.8	11.7	65.8	72.6	62.3	42.7	14.2			
JAWA	59396	47134	6686	22823	15436	2189	12262	10283	1979	298	572	1075	24	3	5	2
%	21.4	20.9	6.3	32.0	37.1	35.2	24.0	33.1	9.9	2.3	14.3	43.0	16.2	10.7	6.5	3.6
BALI NUSATENG-GARA TIMOR	29543	25664	21498	3231	772	163	3879	3790	89	24	21	23	1	-	17	3
%	10.7	11.3	20.1	4.5	1.9	2.6	7.6	12.2	0.4	0.2	0.5	0.9	0.7		22.1	5.3
KALIMANTAN	17901	10637	935	5302	4100	400	7264	3157	4107	3117	816	144	21	8	1	-
%	6.5	4.7	0.9	7.4	9.8	6.4	14.2	10.1	20.6	23.7	20.4	5.7	14.2	28.6	1.3	
SULAWESI	74129	64909	40117	15680	7328	1684	9220	8844	376	162	84	92	37	-	-	1
%	26.7	28.7	37.6	22.0	17.7	27.1	18.1	28.4	1.9	1.2	2.1	3.7	25.0			1.8
MALUKU IRIAN	34368	32701	26429	4148	1560	564	1667	1385	282	2	15	100	44	17	54	50
%	12.4	14.5	24.7	5.8	3.7	9.1	3.3	4.5	1.4	-	0.4	4.0	29.7	60.7	70.1	89.3

REPUBLIC OF INDONESIA
FORECAST OF FISHERY PRODUCTION

Source: Letter dated 15 December, 1983
issued by Ministry of Fisheries
(Direktrat Jenderal Perikanan)

PROJECT FISHERY PRODUCTION BY SUB SECTOR OF FISHERY

UNIT: 10³ TON

SUB SECTOR	1984	1985	1986	1987	1988	AVERAGE GROWTH RATE	2000 TON	G. RATE FROM 1988
TOTAL	2247.1	2370.5	2503.0	2648.2	2811.3	5.8	4180.7	48.7
MARINE FISHERY	1657.0	1749.1	1845.3	1947.8	2058.6	5.6	2943.1	43.0
FISHERY	1654.1	1742.3	1832.6	1925.1	2018.3	5.1	2814.0	39.4
CULTURE	2.9	6.8	12.7	22.7	40.3	93.1	129.1	220.3
SUB TOTAL	590.1	621.4	657.7	700.4	752.7	6.3	1237.6	64.4
FISHERY	278.2	283.8	289.4	295.5	302.0	2.1	374.7	24.1
SUB TOTAL	311.9	337.6	368.3	404.9	450.7	9.6	862.9	91.5
INLAND FISHERY	143.4	156.3	171.2	187.8	207.0	9.6	293.4	41.7
BRACKISH POND	93.1	98.4	104.1	110.0	117.1	5.9	224.8	92.0
FRESHWATER POND	0.9	1.0	1.1	1.2	1.3	9.6	1.9	46.2
CAGE	60.5	63.9	67.9	72.9	79.3	7.0	218.0	174.9
PADDY FIELD	14.0	18.0	24.0	33.0	46.0	34.6	124.8	171.3

FORECAST NUMBER OF MARINE FISHING BOAT

YEAR	1984	1985	1986	1987	1988	2000
MARINE FISHING BOAT	325480	342655	360383	378666	396948	553346

LIST OF EXISTING AND PLANNED VISUAL AIDS TO
NAVIGATION ALONG MAJOR SEA LANES

(Ref: 2-3-1 and 4-3-1, (1), 1))

(Notes)

MS	-	Lighthouse on Land
MLL	-	Lighthouse offshore
RS	-	Light Beacon on Land
RLB	-	Resilient Light Beacon

LIST OF EXISTING AND PLANNED VISUAL AIDS TO NAVIGATION ALONG MAJOR SEA LANES

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS #NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
BELAWAN (IYU KL)	MS (315) NIPA LARANGAN	3 54.2 N 98 40.6	Cape	Fl. W (3) 20 sec 17	RLB BELAWAN	4 01 N 98 50	Entrance of Approach Channel	10	RLB 1
Ty. PRIOK	(500) PU. PANDANG	3 25.5 N 99 45.5	On Island	Fl. W 5 sec 15	MS Ty. DYABUNG	1 01 S 104 21	SE Point of Berhala St. (Entrance)	20	MS 5
	RS (540) BANGAN	3 01.0 N 99 51.4	Entrance of Asahan River	Occ. W 2.5 sec 12	MS BATAKARANG	2 01 S 104 51	NW of Banka Strait (Entrance)	20	MS 6
	MS (560) JEMUR	2 53.0 N 100 34.0	Summit of Island	Fl. W 5 sec 18	MS LUCIPARAT	3 13 S 106 04	SE of Banka Strait (Entrance)	20	MS 7
	RLB (571) ONE FATHOM BANK (N)	2 49.3 N 100 56.3	Malacca Strait	Fl. R 3 sec 8.5	RS Pu. SALAHNAMA	3 21 N 99 43	Middle Point of Island	15	RS 5
	RLB (572) ONE FATHOM BANK (S)	2 06.2 N 101 53.4	Malacca Strait	Fl. G 3 sec 9.5	RS Ty. SIAPAPI	2 55 N 99 59	Cape	15	RS 6
	MS BERHALA	3 56 N 99 26	Berhala Bank						

* No. is in reference to that shown on Site Arrangement Plan, Fig. 4-3-1-(1)/1

** Lighthouses Under Construction By Credit Export And French Aid.

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
	RS (610) PALEIGH BANK	2 06.2 N 101 53.4	Malacca Strait	Fl. W (2) 5 sec 11.5					
	RS (620) ROB ROY BANK	1 54.7 N 102 03.1	Malacca Strait	Fl. W (2) 7 sec 11.5					
	MS (630) Tg. MEDANG	2 07.4 101 39.0	N point of Rupat Island	Fl. W 10 sec 19.8					
	MS** Tg. PALIT	1 32 N 102 27	NE point of Island		RS GOSONG BUNGA	3 45 N 99 05	On Shoal	10	RS 4
	MS (800) IYU KECIL	1 11.5 N 103 21.0	On Island	Fl. W (3) 15 sec 1	RS Tg. PASIR	4 08 S 105 49	Entrance of Masudgi	15	RS 15
	RS (910) RUKAN UTARA	0 37.5 N 103 46.5	Durian Strait Summit of Island	Fl. W (2) 3 sec 10	MLL GOSONG ETNA	5 18 S 106 54	On Shoal	15	MLL 1
	MS (920) RUKAN SELATAN	0 32.5 N 103 46.5	Durian Strait S summit	Fl. W 5 sec 21	MS Pu. SEGAMA	5 10 S 106 06	On Island	20	MS 9
	RS (921) Tg. Datuk	0 0.5 N 103 48.3	Entrance of Durian Strait	Fl. W 5 sec 12					

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION					PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE		
	RS (928)	0 20.0 S	Entrance of Durian Strait	Fl. W (2) 10 sec						
	Tg. BAKAU	103 47.5		11						
	(930)	0 32.5		Fl. W 5 sec						
	MUD	104 02.0 S	E side of hill	21						
	RS (940)	0 37.0		Fl. W 8 sec						
	SPEKE ROCK	104 06.5 S	On Reef	12						
	(960)	0 52.5		Fl. W 15 sec						
	BERHALA	104 24.5 S	On Rock	12						
	(1540)	1 57.5		Fl. W 3 sec						
	Tg. ULAR	105 07.5 S	W point of Banka Island	13						
	(1550)	2 05.0		Fl. W 5 sec						
	Tg. KELIAN	105 08.0 S	W of Muntok	20						
	RS (1560)	2 04.5		F. R						
	MUNTOK	105 08.0 S	W of Sei Muntok Entrance	12						
	MS (1600)	2 23.0		Fl. W (3) 30 sec						
	WEST NANGKA	105 45.0 S	On Island	21						

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
	RS (1620)	2 49.0 S		Fl. R 10 sec					
	Tg. LELARI	105 57.0	N of Tg.	10					
	MS (1640)	2 53.0 S	Middle of Island	Fl. W 30 sec					
	Pt. BESAR	106 08.5		19					
	(1660)	3 08.0 S	Middle of Island	Fl. W 10 sec					
	DAPUR	106 31.0		16					
	(1690)	5 12.0 S		Fl. W (2) 11 sec					
	JAGA UTARA	106 28.0	Noord Wachter	18					
	(1700)	5 12.5 S	Arnemuide Droogte	Fl. W 15 sec					
	BETING RAJA	106 44.5		11					
	RS (1710)	5 17.5 S		Fl. W 5 sec					
	BETING EKA	106 54.5	W side of Reef	11					
	(1711)	5 41.7 S		Fl. W 5 sec					
	PENIKI	106 42.7		14					
	(1720)	5 57.5		Fl. W (4) 20 sec					
	DAMAR BESAR	106 50.5	W Point of Island	19					

SEA LANE (RUS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
	(1750) KARANG TIMBUL	6 04.1 S 106 52.4	On Reef	Fl. G (3) 9 sec 11					
BELAWAN (E of BERHALA)	(4326) PU. SELATAN	6 56.2 S 116 15.4	E side Kangean Island	Fl. W (3) 20 sec 17	RS DOKAN	1 00 S 105 39	N-30M of Banka Island	15	RS 11
U. PANDANG	(4350) SELATAN	4 10.5 S 114 39.0	Cape	Fl. W 6 sec 17.2	RS HAWKINS	1 09 S 106 39	NE-45M of Banka Island	10	RS 12
	(4440) SAMBARGALANG	4 24.5 S 116 10.0	Summit Of South Island	Fl. W 5 sec 18	MLL CORY FORT REEF	2 42 S 109 40	On Reef	15	MLL 2
	(4450) KUNYIT	4 05.5 S 116 02.5		Fl. W 5 sec 12	RS Pu. KERAMIAN	5 06 S 114 36	On Island	15	RS 34
	MS** PUTING	3 32 S 111 48	Cape						
	MS** MASALEMBO	5 35 S 114 27	Island						

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
	MS KALUKALUKUANG	5 12 S 117 40	W of U. Pandang						
Ty. PRIOK	(2990) Pu. RAKIT	5 56.5 S 108 23.0	South Coast of Island	Fl. W 15 sec 20	RS KARIUM JAWA	5 50 S 110 28	On Island	15	RS 29
CIREBON	(3020) CIREBON	6 43.0 S 108 34.5	East Mole Root	Fl. W (3) 30 sec	RLB Ty. PERAK	6 37 S 112 44	Entrance of Channel	10	RLB 5
SEMARANG	(3010) CIREBON	6 42.0 S 108 33.0	On top of RO Station	F. R 10	MS Ty. BENDOH	6 37 S 111 29	Cape	20	MS 18
Ty. PERAK	(3120) KARANGJERUR	6 48.6 S 109 11.8	NW End Reef	Fl. W 5 sec 12	MS Ty. AMER ²	6 46 S 111 57	Cape	20	MS 19
	(3130) TEGAL	6 51.0 S 109 8.3		Iso W 10 sec 15	RLB CIREBON	6 32 S 108 51	Entrance of Port	10	RLB 3
	(3150) PEKALONGAN	6 51.5 S 109 41.5	Left Bank Near Entrance	Fl. W 5 sec 10	MS Ty. LOSARI	6 45 S 108 49	Coast	20	MS 17

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
	(3200) SEMARANG	6 57.5 S 110 25.0	W side harbour Channel	Fl. W (4) 20 sec 16	RLB SEMARANG	6 54 S 110 24	Entrance of port	10	RLB 4
	(3290) MANDALIKA	6 30 S 110 55.5	Summit	Fl. W 5 sec 23	RS Pu. PANJANG	6 35 S 110 37	On Island	15	RS 30
	(3300) Pu. NYAMUK	5 48.8 S 110 11.3		Fl. W (3) 15 sec 16	RS JEPARA	6 35 S 110 39		15	RS 31
	(3400) KARANG JAMUJANG	6 55.6 S 112 43.7		Fl. W 4 sec 18	RS Tg. KUNIRAN	6 34 S 110 39	Cape	15	RS 32
	(3510) SEMBILANGAN	7 03.5 S 112 40.5	West channel	Fl. W (2) 10 sec 19	RS NASSAU REEF	5 49 S 106 50	On Reef	10	RS 27
	(3620) SURABAYA PERAK TOWER	7 12.0 S 112 43.5	Perak Tower	F. R 10	RS GENTING	5 51 S 110 36	On Island	15	RS 28
	(3840) KARANG KOKO	7 28.3 113 07.0	Middle of Reef	Fl. W (3) 15 sec 12	MS DOANG DOANGAN	5 25 S 117 56	On Island	20	MS 45

SEA LANE (R/S, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
Tg. PrioK	(4900) DEWAKANG BESAR	5 24.0 S 118 26.0	N point	Fl. W (3+2) 20.5 sec 12	RS TAKA BAKANG	4 58 S 118 33	On Shoal	10	RS 62
U. PANDANG	(4910) DE. BRIL	6 05.0 S 118 54.5	SW edge of Reef	Fl. W (3) 6.5 sec 15	MS LONG KOITONG	6 41 S 118 16	On Island	20	MS 46
	(4950) MARISO	5 09.5 119 24.5	Near Shore	Fl. W 5 sec 12	MS Pu. SAHARU	5 05 S 117 03	On Island	20	MS 44
	MS MASALEMBO				RS Tg. MANTIGI	5 43 S 112 41	N point of Island	15	RS 33
	MS KALUKALUKUANG								

SEA LANE (RIS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
BELAWAN LHOK SEUMAWE	MS (315)	3 54.2 N		Fl. W (3) 20 sec	RS	4 26 N			RS 3
	NIPA LARANGAN	98 40.6		17	Uj. TAMANG	98 17	Cape	15	
KRUENG RAYA	RS (180)	4 33.5 N		Q. W 1 sec	MS	4 53 N			MS 4
	KUALA LANGSA	98 4.4		10	TG. PEUREULA	97 54	Cape	20	
SIBOLGA	(140)	4 31.6 N		Fl. W (3) 10 sec	MS	5 13 N			MS 3
	KUALA LANGSA	98 01.2		12	Ty. RAJA	96 28	Cape	20	
	RS (131)	4 52.7 N		Fl. W (2) 10 sec	RS	5 23 N			RS 2
	KUALA BEUKA	97 56.4	S of Ty. Peureula	13	SIGLI	95 57	Coast	15	
	(120)	5 15.0 N		Fl. W 5 sec	RS	5 36 N			RS 1
	Ty. JAMBO AYE	97 29.3		18	Uj. EUMPEE	95 11	E Point of Nasi Besar	15	
	RS (115)	5 14.4 N		Fl. W (2) 10 sec	MS	5 30 N			MS 2
	ARUN	97 02.7		12	Uj. PIDIE	95 53	Cape	20	
	(104)	5 12.9 N		Fl. W 6 sec	MS	5 33 N			MS 1
	ARUN	97 06.0	Leading Light	12	Pu. BUNTA	95 09	W point of Pu. Bunta	20	
	(103)	5 13.3 N		Fl. G 2 sec	RS	4 39 N			RS 26
	(105) ARUN	97 06.0	Inner Breakwater	10	Uj. BARO	95 32	Cape	15	

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
	(81) KRUENG RAYA	5 36.7 N 95 31.6	Tg. Batu Kapal	Fl. W 8 sec 12	MS Uj. RAJA	3 44 N 96 32	Cape	20	MS 15
	RS (80) BURO	5 41.3 N 95 23.0	On Reef	Fl. W 8 sec 10	MS Pu. BENGKARU	2 02 N 97 07	On Island	20	MS 14
	MS (2710) Uj. KARANG	1 43.1 N 98 31.1	Sibolga	Fl. W (3) 17 sec 17	RS MANSALAR	1 40 N 98 33	NE of Pu. Mansalar	15	RS 23
	(2720) SIBOLGA	1 45.5 N 98 43.1		OCC. R 2.5 sec 10	RS SUSOH	3 43 N 96 47	Coast	15	RS 25
	RS (2740) SOUTH PYLADES	1 40.7 N 98 0.6		Fl. W 8 sec 13	RS Pu. BAGU	2 17 N 97 24	On Island	15	RS 24
	(2750) SINGKEL	02 13.0 N 97 45.8	P. Sorak	Fl. W 8 sec 12	RS Pu. BINTANAH	1 28 N 98 10	On Island	15	RS 22
					MS SERANGBAUNG	1 44 S 97 26	On Island	20	MS 13

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
Tg. PRIOK	(1711) PENIKI	5 41.7 S 106 42.7		Fl. W 5 sec 14					
PANJANG	(1720) DAMAR BESAR	5 57.5 S 106 50.5	W Point of Island	Fl. W (4) 20 sec 19	MS Tg. LESUNG	6 28 S 105 40	Cape	20	MS 16
BENGKULU	RS (1760) SUNDA KELAPA	6 07.2 S 106 48.5		Fl. W (3) 15 sec 11					
PADANG	MS (2230) Tg. LAYAR	6 45.0 S 105 12.5	Jawa's 1st Point	Fl. W (3) 15 sec 18	RS CUKU BLANTUNG	5 41 S 105 31		15	RS 16
	(2260) Tg. CIKONENG	6 00.4 S 105 53.0	Jawa's Forth Point	Fl. W (2) 29 sec 19	MS SANDING	3 28 S 100 39	SE point of Pu. Paga	20	MS 10
	(2280) TEMPURUNG	5 54.0 S 105 56.0	Summit of Island	Fl. W 3 sec 13	RS MANA	4 29 S 102 53	Cape	15	RS 17
	(2290) BELIMBING	5 55.5 S 104 33.5	S point of Sumatera	Fl. W (2) 10 sec 21	RS SIKOWAI	1 09 S 100 19	On Island	15	RS 19
	RS (2360) GUNUNG KUNYIT	5 26.9 S 105 16.8	W point of Jawa	Fl. W 3 sec 20	MS Ug. TANJUNG	2 09 S 100 50	Cape	20	MS 11

SEA LANE (RIS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
	RS (2375)	5 49.3 S		Fl. W (2) 6 sec	RS	2 34 S			
	Pu. TIGA	105 32.7		13	MUKO MUKO	101 06	Coast	15	RS 18
	(2381)	5 54.4 S		Fl. W (3) 10 sec					
	Tg. TUA	105 43.0		10					
	MS**	5 49 S							
	PU. SERDANG	105 23	On Island						
	MS**	5 29 S							
	ENGANO	102 23	On Island						
	(2450)	5 12.7 S		Fl. W 5 sec					
	Tg. WALOR	103 54.3		17					
	RS (2460)	5 7.5 S		Fl. W 15 sec					
	PISANG	103 51.0		12					
	RS (2470)	4 48.5 S		Fl. W (3) 15 sec					
	BINTUHAN	103 20.5		12					
	MS (2490)	3 50.5 S		Iso. 10 sec					
	TIKUS	102 11.0		16					

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
	RS (2540) KATANG ²	1 53.5 S 100 34.0		Fl. W (3) 22 sec 13					
	MS (2570) Ug. SUNGAI BRAMEI	1 2.5 S 100 22.5	SE point of Teluk Bayur	Fl. W (3) 20 sec 21					
TY. PRIOK	(1860) Pu. SIMEDANG	3 19.0 S 107 13.0		Fl. W (4) 25 sec 20	RS Pu. LEMAN	1 17 S 108 53	Entrance of Karimata Strait	15	RS 50
SINTETE	RS (1861) KASENGA	3 02.7 S 107 20.8		Fl. W 5 sec 10	MS AVAR MASIN	3 14 S 108 23	On Island	20	MS 8
PONTIANAK	(1870) MENDANAU	2 53.0 S 107 20.5		Fl. W (3) 20 sec 21.5	RS Ty. MURUNG	3 02 S 106 53	Entrance of Macclesfuld Str.	15	RS 13
	(1880) LANGKUAS	2 32.0 S 107 37.5		Fl. W 7.5 sec 20	RLB PONTIANAK	0 17 N 110 50	Entrance of Port	10	RLB 8
	MS** PSEMUT	2 29 S 108 50							

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
Tg. PERAK	MS (4150)	8 05.5 S	N coast Bali, River Entrance	Fl. W 3 sec	RS	2 52 S	E of Macclesfuld Str.	15	RS 14
	BULELENG	115 05.5		13	Pu. CELAKA	107 0			
LEMBAR	RS (4167)	8 32.0 S	Padang Bay	Fl. W 5 sec	RS	7 00 S		15	RS 36
	Tg. SARI	115 30.8		10	KANGEAN	115 17			
	MS (4180)	8 34.0 S	W coast Lombok	Fl. W (3) 45 sec	RS	7 06 S	On Island	15	RS 35
	AMPENAN	116 4.5		15	Pu. KAMUDI	114 47			
	RS (4181)	8 43.9 S		Fl. W 5 sec	MS	8 11 S	NE coast of Bali	20	MS 24
	LEMBER	116 3.6		11	Tg. TEKURENAN	115 29			
	MS**	8 24 S			RS	8 44 S	Entrance of Lombok Strait	15	RS 40
	GILI SELANG	115 43			Tg. PANDANAN	115 51			
	MS**	8 49 S			MS	8 21 S	Entrance of Lombok Strait	20	MS 25
	BUKIT BADUNG	115 11			Pu. TREWANGAN	116 02			
	MS**	8 46 S			MS	8 42 S	W of Lembar	20	MS 26
	SEDIHING	115 32			P. PO	115 58			
	RS (3950)	7 14.9 S	On Island	Fl. W 3 sec.	MS	8 49 S	Entrance of Lombok Strait	20	MS 27
	GILI DUA	114 40.0		13	Tg. BATU GENDANG	115 50			

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
	(3960) GILI GENTENG	7 11.5 S 113 33.0	On Reef	Fl. W (3) 15 sec 12	RS Gs. SEKUMOI	7 51 S 117 12		10	RS 41
	(3970) TANJUNG	7 8.0 S 113 53.5	SE Coast of Madura	Fl. W 3 sec 11	RS Ty. SERANGAN	8 43 115 15	On Shoal	10	RS 39
	(3990) (3991) KALIANGET	7 03.0 S 113 56.5	Leading Lights, On Beach	F. R, F. G					
	RS (4001) KAMUDI	7 06.0 S 114 47.3		Fl. W 3 sec 11					
	RS Ty. BUNYUTAN								
	MS SELAY								

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
Tg. PERAK	MS** PANJANG	8 26 S 116 52							
KUPANG	(4250) (Front) KELAPA	8 40.0 S 119 14.0		Iso. W 2 sec 30	RS SANGEANG	8 14 S 119 01	SW point of Sangeang	15	RS 42
	(4260) (Rear) KELAPA	8 40.0 S 119 14.0	Near Summit	Occ. W 3 sec 30	MS Tg. NAROE	8 19 S 119 0	NE point of Sumbawa	20	MS 29
	MS (5730) SBA	10 29.0 S 121 50.5	W coast of Sawu Island	Fl. W 5 sec. 13	RS LANG ROI	8 44 S 119 22	Entrance of Sape Strait	15	RS 43
	RS (5740) MENIA	10 26.0 S 121 52.0	N coast of Sawu Island	F. R 10	MS Tg. SASAR	9 16 S 119 56	N point of Sumba	20	MS 32
	(5750) BA'A	10 43.5 S 123 3.0	W coast of Roti Island	Fl. W (2) 10 sec 12	MS Tg. UNDU	10 05 S 120 50	E of Sumba	20	MS 33
	(5770) KUPANG	10 10.0 S 123 34.5	W coast of Timor	Fl. W 5 sec 13					
	MS (5800) Tg. KURONG	10 7.5 S 123 26.5	N side Pu. Semau	Occ. W (2) 30 sec 27					

SEA LANE (RLS, PIONEER, LOCAL)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
Tg. PERAK	RS Kr. SAKUNDI								
	MS** MASALEMBO	5 35 S 114 27			MS Ty. KAROSSO	9 30 S 118 58	W point of Sumba	20	MS 31
BALIKPAPAN	MS (4450) KUNYIT	4 0.5.5 S 116 02.5	Summit Island	Fl. W 5 sec 12	MS Pu. DAO B.	10 48 S 122 38	On Island	20	MS 34
SAMARINDA	MS (4580) BALINGKAR	3 15.5 S 116 14.0	On Hill	Fl. W 5 sec 15	RS KERA	10 05 S 123 33	On Island	15	RS 46
TARAKAN	MS (4610) SAMBERGELAP	3 39.5 S 116 36.0	Butona Island	Fl. W (3) 17 sec 13	MS Ty. AMAT	8 58 S 116 43	Cape	20	MS 28
	RS (4621) ADDINGTON REEF	2 43.8 S 116 45.6	On Reef	Fl. W 8 sec 12	RS KALAMBAU	4 55 S 115 39	On Island	15	RS 53
	(4650) AMBO	2 32.3 S 117 57.0	N of Island	Fl. W (3) 15 sec 12	RS MATASIRI	4 49 S 115 48	NE of Kalambau	15	RS 54

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
					MS	1 22 S	E of Balikpapan Port	20	MS 40
					Tg. JUMALAI	116 44			
					MS	1 11 S	NE coast of Balikpapan Port	20	MS 41
					Tg. MANGGAR	116 59			
					MS	0 45 S	Entrance of Samarinda	20	MS 42
					Tg. MABAYOR	117 35			
					RS	0 41 N	On Island	15	RS 55
					Pu. BIRAH BIRAHAN	118 27			
					RS	2 30 N	On Reef	10	RS 58
					Kr. BALIK TABA	118 00			
	(4630)	2 22.5 S		Fl. W 5 sec	RLB	3 14			
	Kr. SULING	116 43.5	On Reef	9	TARAKAN	117 53	Entrance of Tarakan Port	10	RLB 6
	(4730)	1 16.5 S		Fl. W 20 sec	MS	2 33 N			
	BALIKPAPAN	116 48.5	On Takong Hill	25	Tg. BALI TUWATAN	118 33	N point of Island	20	MS 43
	MS (4890)	0 59.5 N		Fl. W 5 sec	RS	2 23 N			
	MANGKALIHAT	118 59.0		18	PANDYANG	118 12	On Island	15	RS 57

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
	MS (5310) Tg. ARANG RS SAMBIT RS MELABUNG	3 27.1 N 117 52.1	Pu. Bunyu	Fl. W 3 sec 18	RS KI. BILANG BILANGAN	1 34 N 118 57	On Reef	10	RS 56
Tg. PERAK SAMPIT	Tg. SAMPIT				RS Tg. SIAMOK	3 23 S 112 33	Cape	15	RS 51
	MS (4350) SELATAN	4 10.5 S 114 39	Cape	Fl. W 6 sec 17.2	RS Tg. BURUNG	3 33 S 114 31	Coast	15	RS 52
U. PANDANG	(4950) MARISO	5 09.5 S 119 24.5	Near Shore Makasar	Fl. W 5 sec 12	MS PASOSO/ MAMLABAYA	0 06 N 119 37	Pu. Pasoso	20	MS 50
PARE-PARE	(5020) KAPOPOSANG	4 42.0 S 118 57.0	W point of Island	Fl. W 5 sec 16	MS Tg. LALBRAH	1 59 S 119 12	Coast	20	MS 49
PANTALOAN	MS (5080) CAPE MANDAR	3 34.0 S 118 56.0	N of Karang Rangas	Fl. W 5 sec 21	MS SEMATAN	1 05 N 120 24	N point of Island	20	MS 51

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
TOLI TOLI	MS (5090)	2 37.5 S	1400 m from Cape	Fl. W 6 sec	RS	1 08 N			
	Ty. RANGAS	118 49.0		23	Kr. BULIUGUT	122 25	On Shoal	10	RS 65
BITUNG	MS (5110)	0 38.5 S	NW Point of Bay	Fl. W (4) 25 sec	MS	1 45 N	N Point of Island	20	MS 53
	(Ty. KARANG) TELUK PALU	119 44.0		23	MANTAR AWE	124 44			
	MS (5120)	0 35.0 N	Summit Island	Fl. W 5 sec	MS	1 18 N	Cape	20	MS 52
	TUGUAN	119 48.0		23	Ty. KANDI	121 27			
	(5130)	1 03.5 N		Fl. W 3 sec	RS	1 32 N	N Point of Lenbeh Island	15	RS 66
	TOLI-TOLI	120 48.4		10	BATU KAPAL	125 17			
	MS (5140)	1 20.5 N	On Rock	Fl. W 5 sec	RS	3 19 S	Coast	15	RS 64
	SALANDO	120 48.5		19	Ty. CINRANA	118 50			
	MS (5340)	0 58.5 N		Fl. W 3 sec	RS	5 34 S	Coast	15	RS 59
	HULAWA	122 54.0		12	Ty. JEMBATAN	119 15			
	MS (5360)	1 29.6 N		Fl. W 8 sec	RS	4 16 S	On Reef	10	RS 63
	MENADO	124 50.3	On Hill	15	Kr. PANKAMANDRA	119 17			
	MS (5390)	1 53.5 N	NE Point of Island	Fl. W 5 sec	RS	5 15 S	On Reef	10	RS 61
	TALISEI	125 6.0		24	KARANG MALABIRI	120 26			

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
	MS** PASANG KAYU	1 10 N 119 20							
	RS (5451) LEMBEH ISLAND	1 23.5 N 125 09.5	On Bank	Fl. W 10 sec 12					
	RS KARANG PASIR								
	MS Tg. KAPAS								
BITUNG	5490 GORONTALO	0 29.6 N 123 3.5	Left Bank of River	Fl. W 5 sec 12					
GRONTALO	MS Pu. Pandang				MS Ty. TALABU	0 46 S 123 27	Cape	20	MS 57
GORONTALO	MS** MAYU	1 19 N 126 29							

SEA LANE (RIS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
TERANTE					MS HIRI (HALUMAHERA)	0 55 N 127 19	N of Ternate	20	MS 61
U. PANDANG	MS (5910) SUANGGI	3 18.0 S 127 28.0	Manipa Strait	Fl. W (2) 10 sec 23	MS PU. TENGAH	3 14 S 125 59	On Island	20	MS 64
SORONG	MS (6341) PU. BUAYA	0 50.4 S 131 12.4		Fl. W (4) 25 sec 22	RS Ty. KARBAU	3 16 S 127 07	Entrance of Nanulea	15	RS 76
	RS (6390) BATANTA	0 54.5 S 130 36.0	Sagewin Strait	Fl. W (2) 10 sec 12	RS Ty. WAKA	2 28 S 126 02	S point of Pu. Sanana	15	RS 75
					MS Ty. WOUI	1 43 S 128 01	SE of Pu. Obi Mayor	20	MS 63
					RS NAMEPALE	1 47 S 129 37	On Island	15	RS 80
					RS Ty. TASEK	1 17 S 129 43	On Island	15	RS 81

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS #NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
SORONG	(6150) NUMFOOR	0 56.5 S 134 49.5		Fl. W 3 sec 12					
BIAK	(6190) AMSTERDAM	0 20.5 S 132 10.5		Fl. W 3 sec 12	RS (VALSCHE CAPE) Tg. WIELIOS	0 22 S 132 43	Coast	15	RS 83
	(6211) Tg. WOKA	01 36.0 S 135 24.6		Fl. W 3 sec. 12	MS Tg. MANDUNDI	0 39 S 135 17	W point of Biak Island	20	MS 67
	(6403) Tg. MEMORI	0 51.5 S 134 08.0		Fl. W (3) 11 sec 12	RS KUMAMBA	1 36 S 138 44	N-20M of Sarmi	15	RS 84
	(6405) Tg. PEGUN	0 48.5 N 134 17.7		Fl. W 5 sec 15					
BIAK	(6451) Tg. RAINBAWI	01 48.0 S 136 54.0		Fl. W 3 sec 12	MS MATTERER	2 19 S 140 09	W-40M of Jayapura	20	MS 68
JAYAPURA	MS KUMAMBA				RLB SORONG	0 52 S 131 12	Entrance of Sorong	15	RLB 7

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
	RS SORINAWA				RS SAGEWIN	0 57 S 130 39	On Island	15	RS 82
	MS** SARMI	1 51 S 138 45							
SORONG	(6000) MERAUKE	8 30.0 S 140 22.5		FL. W (4) 20 sec 18					
MERAUKE	(6002) MERAUKE	8 27.5 S 140 21.5	On N Bank ACROSS Ty. Haram	FL. W 3 sec 12	RS P. EKKA	2 58 S 132 07	On Island	15	RS 85
	(6070) PU. PISANG	2 37.5 S 131 39.0	NE point of Sabuda	FL. W (2) 18 sec 12	MS TY. PAPISOI	4 05 S 133 00	Cape	20	MS 69
	(6120) JEF. JUS	1 45.5 131 08.0	NE point of Island	FL. W (3) 15 sec 14	RS TY. BORONG	5 17 S 133 08	Cape	15	RS 79
	RS KASA								

SEA LANE (RUS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
U. PANDANG	MS** PAMALI (4900)	3 59 S 123 1			RS Ty. LAIKANG	5 36 S 119 27	Coast	15	RS 60
KENDARI	DEWAKAN BESAR (4910)	5 24.0 S 118 26.0	N Point	Fl. W 5 sec 12	Ty. BULO ²	5 42 S 119 43	Coast	20	MS 47
	DE BRIL (4920)	6 05.0 S 118 54.5	On Reef	Fl. W (3) 6.5 sec 15	TELAGA BESAR	5 30 S 122 03	S. of Island	20	MS 58
	DAYANG DAYANGAN (4930)	5 24.0 S 119 11.5	SE side of Island	Fl. W 5 sec 16	Ty. MASSIGA	5 41 S 122 28	On Island	20	MS 59
	KUDINGARENG LOMPO (4950)	5 09.1 S 119 15.6		Fl. W (4) 27.5 sec 16.5	Pu. KADATUA	5 31 S 122 30	On Island	15	RS 71
	MARISO (5580)	5 09.5 S 119 24.5		Fl. W 5 sec 12	P. BATU SURI	5 21 S 122 39	On Island	15	RS 72
	WANGI-WANGI MS (5630)	5 15.5 S 123 32.0	NS side of Island	Fl. W (2) 12 sec 30	Ty. BUTON	4 23 S 123 04	N point of Island	20	MS 60
	PASITANETE	5 44.5 S 120 29.5	Salayar Strait	Fl. W 5 sec 17					

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
	MS Tg. SEMALI RS SELAT WONOMI								
U. PANDANG	MS (5920) Tg. NUSANTIVE	3 47.5 S 128 05.5	S point of Amboina	Fl. W 5 sec 18	RS Pu. MORO-MORO	6 07 S 124 37	On Island	15	RS 73
AMBON					MS AMBELAU	3 53 S 127 13	S point of Ambelau	20	MS 65
					RS Tg. WATINA	3 47 S 126 43	Cape	15	RS 77
PALEMBANG	MS BERHALA				RS Tg. LABU	0 46 S 103 28	Entranc of Tungkai	15	RS 9
JAMBI	MS PENYUSU				RS Tg. SOLOK	1 0 S 103 48	Entrance of Jambi	15	RS 10

SEA LANE (RUS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
TG. PERAK	RS KI. BANGKA BARAT				RUB PALEMBANG	2 09 S 104 58	Entrance of Palembang	10	RUB 2
TG. PERAK	(3400) KARANG JAMURANG	6 55.6 S 112 43.7		Fl. W 4 sec 18	MS TG. PATJINAN (PACINANAN)	7 37 S 114 02	Cape	20	MS 21
KALIANGET MENENG	(3510) SEMBILANGAN	7 03.5 S 112 40.5		Fl. W (2) 10 sec 19	MS TG. BANTENAN	8 46 S 114 31	E point of Jawa	20	MS 23
	(3840) KARANG KOKO	7 28.3 S 113 07.0		Fl. W (3) 15 sec 12	RS TG. MEBULU	8 40 S 115 05	Cape	15	RS 38
CILACAP	(3880) PROBOLINGGO	7 43.0 S 113 13.0		Fl. W 5 sec 11	RS TG. NGAMBER	8 14 S 111 05	Entrance of Patjitan	15	RS 37

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
	(3950) GILI DUA	7 14.9 S 114 40.0		Fl. W 3 sec 13	MS MADURA	6 52 S 113 56	Coast	20	MS 20
	(3960) GILI GENTENG	7 11.5 S 113 53.0		Fl. W (3) 15 sec 12	MS Pu. MENDIANGA	8 08 S 114 31	NW Point of Bali	20	MS 22
	(3970) TANJUNG	7 8.0 S 113 53.5		Fl. W 3 sec 12					
	(3990) KALIANGET	7 03.0 S 113 56.5		F. R 11					
	MS (4000) SAFUDI	7 05.1 S 114 19.5		Fl. W 5 sec 19					
	(4001) KAMUDI	7 6.2 S 114 47.3		Fl. W 3 sec 11					
	MS (4100) CILACAP	7 47.0 S 109 02.5		Fl. W 5.5 sec 30					
	(4110) CILACAP	7 44.0 S 109 01.0		Fl. W 5 sec 12					

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
	MS LEMBYAN								
	MS BANSERING								
	MS U. PIRING								
	RS KARANG MAS								
	RS BANYUWANG								
MENENG	MS** BUKIT BADUNG								
	MS** TJ. SEDIHING								

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
S.W. COAST IN SUMATERA					RS LABU LABU	1 35 N 98 35	Entrance of Sibolga port, On Island	15	RS 21
					MS TUNGKUS NASI	1 35 N 98 41		20	MS 12
					RS PU. ILIR	1 16 N 98 43	On Island	15	RS 20
					RS BATU BELAYAR	0 24 N 104 15	On Island	10	RS 8
SOUTHWARD WATER OF BINTAN					MS PU. LEMUKUTAN	0 48 N 108 42	N point of Island	20	MS 38
					RS PU. SITINJAN	0 21 N 108 44	On Island	15	RS 49

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO	
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE		
SUMATERA					MS	0 15 N				
					PU. PENGIKI	108 02	On Island	20		MS 39
					MS	0 07 N				
					PEDYANTANG	107 13	South China Sea	20		MS 37
					MS	1 00 N				
					PU. TAMBELAN	107 36	On Island	20		MS 36
					RS	0 56 N				
					PU. MARAPAS	104 55	On Island	15		RS 7
					RS	3 39 N				
					Tg. PIAN PADANG	108 18	S. Point of Natuna Besar Island	15		RS 48
FLORES					RS	3 14 N				
					Tg. PEDAS	106 12		15		RS 47
					RS	8 36 S				
					PU. LANOTOBI	122 50	On Island	15		RS 45

SEA LANE (RUS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
TIMOR					MS	7 23 S	On Island	20	MS 48
					BONE RATE	121 05			
					MS	8 14 S	Entrance of Reo port	20	MS 30
					Ty. TORO BESI	120 26			
					RS	8 09 S	Entrance of Flores str.	10	RS 44
					Kr. SERBETE	123 01			
					MS	8 19 S	E point of Island	20	MS 35
					Ty. LAISUMBU	125 07			
					MS	8 20 S	Cape	20	MS 66
					TG. ARO USU	130 45			
				RS	7 48 S	On Shoal	10	RS 78	
				BARA SADI	130 48				
				RS.	4 04 S	On Island	15	RS 70	
				PU. LAMBASINA	121 19				

SEA LANE (RUS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
SULAWESI					RS UNA UNA	0 10 S 121 36	WSW 100M of Gorontalo	15	RS 67
					RS TEPAU	1 51 S 124 01	Greyhound Strait	15	RS 69
					RS PU. BAKAKANG	1 35 S 123 27		15	RS 68
					MS ULU SIAU	2 44 N 125 24		20	MS 54
					MS PU. BENGLAUT	3 29 N 125 43	On Island	20	MS 55
					MS KABURUANG	3 58 N 126 49	S point of Island	20	MS 56
					MS Tg. NGOTOPORO	0 13 N 128 53	E. Point of Halmahera	20	MS 62
	HALMAHERA								

SEA LANE (RLS, LOCAL, PIONEER)	EXISTING AIDS TO NAVIGATION				PLANNED AIDS TO NAVIGATION				REMARKS *NO
	TYPE & NAME INDONESIAN LIGHTS NUMBERS	LOCATION	PLACE	LIGHT CHARACTER RANGE IN MILE	TYPE & NAME	LOCATION	PLACE	RANGE IN MILE	
					RS PU. TABALENGI	2 22 N 128 40	On Island	15	RS 74
IRIAN JAYA									

Remarks:

	Long Term	Short Term
MIL	11	2
RLB	18	8
MS	190	69
RS	335	131
Total	554	210

LIST OF LIGHTS, INDONESIA 1982

- Extract -

NOTES:

The lights over 10 N.M range are extracted from the List of Lights Indonesia, Edition 1982 - New lights are also added based on the information obtained by JICA Study Team in March, 1984.

No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range
SUMATERA NORTH COAST				
10	Ie Meule NE-point of Pu. We	5 54.0 95 N 20.0	Fl. W 5 sec E 10.0	16
40	Klah NW point of Pu. We	5 52.6 95 N 18.3	Fl. W 30 sec E 0.93	15
50	Breueh Summit N. point island	5 45.0 95 N 03.0	GpFl. (2) W 10 sec E 1,250.00	30
60	Breueh	Below the main light.	F. R E 1.14	13
80	Buro on reef	5 41.3 95 N 23.0	Fl. W 8 sec Pr	10
81	Krueng Raya Tg. Batu Kapal	5 36.7 95 N 31.6	Fl. W 8 sec Pr	12
103	Arun Inner break water	5 13.3 97 N 06.0	Fl. G 2 sec E	10
104	Arun FRONT	5 12.9 97 N 06.0	Fl. W 6 sec E	12
SUMATERA EAST COAST				
105	Arun REAR	5 12.8 97 N 05.9	Fl. W 6 sec E	12
115	Arun Ka. Geukueh	5 14.4 97 N 02.7	GpFl. (2) W 10 sec E	12
120	Tg. Janbo Aye Diamant punt	5 15.0 97 N 29.3	Fl. W 5 sec E 900.00	18
131	Kuala Beukah S. of Tg. Peureula	4 52.7 97 N 56.4	GpFl. (2) W 10 sec E	13
132	Kuala Beukah S. of Tg. Peureula	Below the main light	Fl. RWG E 0.55	10
140	Kuala Langsa	4 31.6 98 N 01.2	GpFl. W (3) 10 sec E	12
180	Kuala langsa	4 33.5 98 N 4.4	QKFl. W 1 sec E	10
315	Nipah Larangan	3 54.2 98 N 40.6	GpFl. (3) W 20 sec E	17

No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range
500	Pu. Pandang Summit of Island	3 25.5 99 N 45.5	Fl. W 5 sec E	15
540	Bagan Asahan Asahan river	3 01.0 99 N 51.4	Occ. W 2.5 sec E	12
560	Jemur (Pu. Aruah) Summit of Island	2 53.0 100 N 34.0	Fl. W 5 sec E 10.5	18
610	Gosong Pyramid (Raleigh Bank)	2 06.2 101 N 53.4	GpFl. (2) W 5 sec E 0.80	11.5
620	Rob Roy Bank Malacca Strait	1 54.7 102 N 03.1	GpFl. (2) W 7 sec E 0.80	11.5
630	Tg. Medang N. point of Rupert Island	2 07.4 101 N 39.0	Fl. W 10 sec E 80.00	19.8
631	Morong	1 55.1 101 N 46.4	GpFl. (2) W 14 sec A	13
650	Bengkalis strait	1 39.5 101 N 50.5	GpFl. (3) W 15 sec A 0.83	12
674	Selat Rupert "B" REAR	1 31.1 101 N 55.2	Iso. W 4 sec E	12
675	Selat Rupert "C" REAR	1 32.2 101 N 54.1	Iso. W 4 sec E	12
677	Selat Rupert "E" FRONT	1 40.9 101 N 48.6	QkFl. W 1 sec E	10.8
678	Selat Rupert "F" REAR	1 41.5 101 N 48.1	Iso. W 2 sec E	11.2
679	Selat Rupert "G" FRONT	1 41.5 101 N 47.1	QkFl. W 1 sec E	10.8
RIAU ARCHIPELAGO				
800	Iyu Kecil On middle Island	1 11.5 103 N 21.0	GpFl. (3) W 15 sec E 820.00	18
830	Takong On reef S. of Takong Kecil Philip Strait	1 06.0 103 N 43.2	Iso. R 2 sec E 0.10	10
833	Takong Kecil On summit of Island Philip Strait	1 06.3 103 N 43.2	GpFl. (2) WR 10 sec E 4.50	18
835	Helen Mars Philip Strait	1 07.4 103 N 46.5	QkFl. W 1 sec E	10

No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range	No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range
860	Jangkat Middle of Island	0 58.0 103 42.6	Fl. W 5 sec E 4.50	17	1030	Terkulai NW. side of Island	0 57.0 104 20.5	Iso. W 2 sec A 1.24	12
910	Rukan Utara Summit of Island	0 37.5 103 45.5	GpFl. (2) W 30 sec Pr 0.45	10	1080	Mantang On hill near Tg. Punggung	0 44.5 104 30.5	Fl. W 3 sec E 1.50	20
920	Rukan Selatan Southern Summit	0 32.5 103 46.5	Fl. W 5 sec E	21	1086		0 47.6 104 35.1	Fl. W 5 sec E	10
921	Tg. Datuk	0 00.5 103 48.3	Fl. W 5 sec A	12	1087	Pu. Mantang REAR	0 47.3 104 34.9	GpFl. (2) R 10 sec E	10
928	Tg. Bakau	0 20.0 103 47.5	GpFl. W (2) 10 sec A 10.00	11	1090	Karas kecil Eastern hill, middle of Isl.	0 44.5 104 22.0	Fl. W 5 sec E 1,410.00	17
930	Muci E. side hill	0 32.5 104 02.0	Fl. W 5 sec E 10.00	21	1110	Berakit Nothermost summit near NE. point of isl. Bintan	1 13.1 104 34.5	GpFl. (2) 10 sec E	20
940	Speke rock On reef	0 37.0 104 06.5	Fl. W 8 sec Pr	12	1120	Pu. Kentar Hill SE. point Island	0 02.0 104 47.0	GpFl. (2) W 10 sec E 0.90	26
960	Berhala On rock S. of Island	0 52.5 104 24.5	Fl. W 15 sec E 0.90	12	1150	Tanjung Jang SE. point Lingga Island	0 18.0 105 00.0	Fl. W 19 sec E 1,040.00	20
970	Karang Galang E. end of reef Pan reef	1 09.5 104 11.5	Fl. W 12 sec Pr 0.42	10					

No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range	No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range
1230	Jambi river Kampang Laut Front	1 01.9 103 49.0 S	Fl. W 6 sec E	11.5	1640	Besar Middle of Island	2 53.0 106 08.5 S	GpFl. (2) W 30 sec 500.00 E	19
1240	Jambi river Tg. Bedada Rear	1 03.4 103 49.4 S	Fl. W 6 sec E	14.5	1660	Dapur Middle of Island	3 08.0 106 31.0 S	Fl. W 10 sec 1,410.00 E	16
1271	Tg. Kampeh	2 11.5 104 54.1 S	Fl. W 5 sec	10	JAVA - NORTH COAST				
1530	Penyusu N. entrance Klabat bay SW. side of Isl.	1 31.5 105 41.0 S	Fl. W 0.87 Pr	12	1690	Jaga Utara (Noord wachter) On island	5 12.0 106 28.0 S	GpFl. (2) W 11 sec 825.00 E	18
1540	Tg. Ular W. point Bangka	1 57.5 105 07.5 S	Fl. W 30 sec E	13	1700	Beting Raja (Arnemuiden droogte)	5 12.5 106 44.5 S	GpFl. (3) W 15 sec A	11
1550	Tg. Kelian Tg. W. of Muntok	2 05.0 105 08.0 S	Fl. W 5 sec 540.00	20	1710	Beting Eka (Etna droogte) West side of reef	5 17.5 106 54.5 S	Fl. W 5 sec 0.85 A	11
1560	Muntok W. of Sei Muntok Entrance	2 04.5 105 09.5 S	F. R 0.27 E	12	1711	Peniki	5 41.7 106 42.7 S	Fl. W 5 sec A	14
1600	West Nangka Hill western Island	2 23.0 105 45.0 S	GpFl. (3) W 30 sec 1,300.00 E	21	1720	Damar-Besar W. point of Island	5 57.5 106 50.5 S	GpFl. (4) W 20 sec 368.00 E	19
1620	Tg. Lelari N. of Tanjung	2 49.0 105 57.0 S	Fl. R 10 sec 0.75 A	10	1750	Karang Timbul (Van Dorthrif) On reef	6 04.1 106 52.4 S	GpFl. (3) G 9 sec 0.15 A	11

No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range
1760	Sunda Kelapa	6 07.2 106 S 48.5	GpFl. (3) W 15 sec A	11
1810	Tg. Priok	6 05.8 106 S 52.8	Fl. W 10 sec E	18
1830	Tg. Berikat E. point Bangka	2 34.0 106 S 51.0	GpFl. (3) W 15 sec A 0.83	12
1860	Pu. Simedang (Ondiepwater) Middle of the island	3 19.0 107 S 13.0	GpFl. (4) W 125 sec E 37.50	20
1861	Kasenga	3 02.7 107 S 20.8	Fl. W 5 sec A	10
1870	Mendanau near Tg. Ayer Lancur	2 53.0 107 S 20.5	GpFl. (3) W 20 sec E	21.5
1880	Langkuas Near E. end of Island	2 32.0 107 S 37.5	Fl. W 7.5 sec E 653.00	20
BANGKA - EASTCOAST				
1921	Tg. Tuing	1 36.0 106 S 02.8	Fl. W 6 sec A	18
KARIMATA STRAIT				
1922	Tg. Raja	1 54.1 106 S 11.3	GpFl. W (2) 12 sec A	14
1940	General Eliot SW. side of reef	2 04.0 106 S 19.0	Fl. W 18 sec Pr 0.90	11
1960	Discovery Eastbank Gosong Namapango On bank	3 35.0 109 S 10.0	Fl. W 5 sec A 0.87	10
1970	Fox Bank	3 30.7 110 S 11.0	GpFl. (4) W 25 sec A	10
2010	Kanis NE. side of Billiton, on islands	2 37.5 108 S 12.5	Fl. W 5 sec A 0.83	11
2020	Serutu Near west point of Island	1 43.0 108 S 42.0	GpFl. (3) W 10 sec E 3,300.00	36
KALIMANTAN - WESTCOAST				
2040	Ma. Kapuas Kecil Front	0 04.4 109 N 10.1	Iso. W 4 sec E	10
2050	Ma. Kapuas Kecil Rear	0 04.1 109 N 11.1	LoFl. W 12 sec E	10

No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range	No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range
2150	Saint Petrus Summit of Island	1 54.0 108 N 39.0	Fl. W 6 sec E	25	2360	Gunung Kunyiit	5 26.9 105 S 16.8	Fl. W 3 sec E	20
2160	Merunding Centre of island	2 04.5 109 N 06.0	GpFl. (3) W 15 sec 4.50 E	16	2375	Pu. Tiga	5 49.3 105 S 32.7	GpFl. W (2) 6 sec A	13
2170	Subi Kecil Summit of Island	3 03.0 108 N 51.0	Fl. W 5 sec E	24	2381	Tg. Tua	5 54.4 105 S 43.0	GpFl. (3) W 10 sec A	10
2210	Mangkai Centre of island	3 05.0 105 N 36.0	Fl. W 7.5 sec 1,000.00 E	32	2400	Pu. Tunda South point of Island	5 49.0 106 S 17.0	Fl. W 6 sec E	15
2230	Tg. Layar Java's first point W. point of mecuwen bay	6 45.0 105 S 12.5	GpFl. (3) W 15 sec 21.00 E	18	2410	Payung South side of Island	5 49.5 106 S 33.5	GpFl. (2) W 10 sec E	15
2260	Tg. Cikoneng Near Kg. Anyer Kidul. (Java's North point)	6 0.40 105 S 53.0	GpFl. (2) W 29 sec 21.00 E	19	2420	Pu. Jong	5 51.1 106 S 38.7	GpFl. (3) G 15 sec A	11
2280	Tempurung Summit of Isl. (Toppershoedje)	5 54.0 105 S 56.0	Fl. W 3 sec 1.14 E	13	2450	Tg. Walor	5 12.7 103 S 54.3	LoFl. W 5 sec E	17
2290	Belimbing Pamancasa S. Point of Sumatera	5 55.5 104 S 33.5	GpFl. (2) W 10 sec 900.00 E	21	2460	Pisang East hill of island	5 07.5 103 S 51.0	Fl. W 15 sec Pr 0.9	12
					2470	Bintuhan Near Tg. Bandar	4 48.5 103 S 20.5	GpFl. (3) W 15 sec A 0.75	12

No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range	No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range
2490	Tikus Middle of Island	3 50.5 102 S 11.0	Iso. W 10 sec 0.97 E	16	2660	Karsih Sw. point of Island	0 36.0 100 S 04.5	GpFl. (4) W 15 sec 0.86 E	16
2540	Katang-Katang S. side of Island	1 53.5 100 S 34.0	GpFl. (3) W 22 sec 1.13 A	13	2680	Pangkal SE. end of Isl.	0 08.5 99 N 17.5	Fl. W 5 sec 0.36 E	19
2570	Ug. Sungai Bramei SE. part Teluk Bayur	1 02.5 100 S 22.5	GpFl. (3) W 20 sec 168.0 E	21	2690	Temang Westerly hill of Island	0 22.0 99 N 05.5	LoFl. W 9 sec 1.13 A	20
2610	Pulau Pisang	0 59.0 100 S 20.0	0.5T - 4.5G (5 sec)	10	2710	Ujung Karang Sibolga	1 43.1 98 N 43.1	GpFl. W (3) 17 sec E	17
2630	Siberut	1 35.9 99 S 12.2	Fl. W 7 sec A	15	2720	Sibolga	1 45.5 98 N 46.0	Occ. R 2.5 sec E	12
2640	Sikakap Strait on Tonggo isl.	2 46.5 100 S 13.5	Fl. W 5 sec A	10	2740	South Pylades	1 40.7 98 N 00.6	Fl. W 8 sec A	13
2650	Bojo Hill near Sw. end of Island	0 38.5 98 S 30.5	GpFl. (2) W 20 sec 1.322 E	26	2750	Singkel P. Sorak	2 13.0 97 N 45.8	Fl. W 8 sec E	12
----	P. Ujung	0 25.0 99 S 53.0	0.5T - 4.5G (5 sec)	11	2790	Sigata Hill E. Side Island	0 07.5 98 S 12.0	GpFl. (4) W 20 sec E	26
----	P. Labu	0 51.0 98 N 56.0	0.5T - 4.5G (5 sec)	16	2810	Hinako NW. side hill of Island	0 52.0 97 N 20.0	Fl. W 5 sec 0.90 E	19

No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range	No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range
2830	Gunung Sitoli Hill near Tg. Mbaa	1 N 18.5 97 36.0	Fl. W 5 sec E 1.13	22	3010	Cirebon	6 S 42.0 108 33.0	F. R. E	10
2840	Sikabaluan	1 S 07.3 98 59.7	Fl. W 7 sec A	10	3020	Cirebon East mole, root	6 S 43.0 108 34.5	GpFl. (3) W 30 sec E	16
2850	Goso Baohi N. end Nias Island	1 N 26.1 97 10.2	Fl. W 5 sec E	15	3050	Cirebon Front	6 S 42.4 108 34.3	Fl. W 5 sec A	10
2870	Teluk Dalem Tg. Batu	0 N 33.5 97 49.6	Fl. W 5 sec A	12	3051	Cirebon Rear	6 S 42.4 108 34.1	GpFl. (9) W 15 sec A	13
2920	Tapa-Tuan Hill top near Ug. Kupiah	3 N 15.0 97 10.5	Fl. W 5 sec E 0.28	11	3120	Karangjeruk NW. end reef	6 S 48.6 109 11.8	Fl. W 5 sec A	12
2940	Meulaboh Ug. Karueng	4 N 07.0 96 07.5	Fl. W 8 sec E 0.86	11	3130	Tegal	6 S 51.0 109 08.3	Iso. W 10 sec E	15
JAVA - NORTH COAST									
2990	Pu. Rakit (Boompjes) South coast island	5 S 56.5 108 23.0	Fl. W 15 sec E 10.00	20	3150	Pekalongan Left bank near entrance	6 S 51.5 109 41.5	Fl. W 5 sec E	10
3000	Cirebon East to Tanah	6 S 31.7 108 43.5	FL-0.5 - Ecl. 4.5 A Fl. G. 5 sec	12	3200	Semarang W. side harbour channel	6 S 57.5 110 25.0	GpFl. (4) W 20 sec E	16
					3290	Mandalika Summit	6 S 23.0 110 55.5	Fl. W 5 sec E 770.00	23

No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range	No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range
3300	Pu. Nyamuk	5 S 110 48.8 113 11.3	GpFl. W (3) 15 sec E	16	3970	Tanjung South East coast Madura	7 S 113 08.0 113 53.5	Fl. W 3 sec E 0.08	12
3320	Sangkalapura Nearest of pier	5 S 112 51.0 112 39.5	Fl. W 5 sec E	11	3990	Kalianget 130 m from No. 3980 rear	7 S 113 03.0 113 56.5	F. R E	11
3400	Karang Jamuang	6 S 112 55.6 112 43.7	Fl. W 4 sec E 840.00	18	4000	Sapudi West point island near Tribung	7 S 114 05.1 114 16.5	Fl. W 5 sec E 1,210.00	19
3510	Sembilangan 3264m -2000 from Nr. 3500	7 S 112 03.5 112 40.5	GpFl. (2) W 10 sec E 7.00	19	4005	Kamudi	7 S 114 06.2 114 47.3	Fl. W 3 sec A	11
3620	Surabaya Perak tower	7 S 112 12.0 112 43.5	F. R E	10	4080	Tg. Pengambengan On cape	8 S 114 24.0 114 35.0	Fl. W 5 sec E 1,210.00	18
3840	Karang Koko (Zwaantjes droogte) Middle of reef	7 S 113 28.3 113 07.0	GpFl. (3) W 15 sec A 0.37	12	4090	Benoa	8 S 115 44.8 115 12.6	Fl. W 5 sec E	16
3880	Probolinggo West mole head	7 S 113 43.0 113 13.0	Fl. W 5 sec A 0.75	11	JAVA SOUTHCOAST				
3950	Gili Dua on island	7 S 114 14.9 114 40.0	Fl. W 3 sec A	13	4100	Cilacap Gunung Cimiring	7 S 109 47.0 109 02.5	LoFl. W 5.5 sec E 790.00	30
3960	Gili Genteng Coastal reef, west side island	7 S 113 11.5 113 53.0	GpFl. (3) W 15 sec A 0.13	12	4110	Cilacap (Teluk Penyu) west coast of Schildpadbaai	7 S 109 44.0 109 01.0	Fl. W 5 sec E	12

No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range	No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range
4150	Buleleng (Singaraja) (Beach East of river entrance, North coast Bali)	8 05.5 115 05.5 S	Fl. W 3 sec E	13	4326	Pu. Sekala On East side Kangean isl.	6 56.2 116 15.4 S	GpFl. (3) W 20 sec E	17
4167	Tg. Sari Padang Bay	8 32.0 115 30.8 S	Fl. W 5 sec A	10	4350	Selatan On cape.	4 10.5 114 39.0 S	Fl. W 6 sec E 0.83	17.2
4180	Ampenan Beach north-north east, from flag staff. west coast Lombok	8 34.0 116 04.5 S	GpFl. (3) W 45 sec 50.00 E	15	4361	Barito river	3 37.8 114 25.2 S	Fl. W 4 sec E	13
4181	Lembar (Bukit Puihan)	8 43.9 116 03.6 S	Fl. W 5 sec	11	4363	Barito river REAR	3 31.0 114 30.3 S	Fl. W 3 sec E	10
4200	Petagan	8 26.1 116 45.3 S	Fl. W 3 sec E	12	4440	Sambargalang (Gebroeders) Summit of South Island	4 24.5 116 10.0 S	Fl. W 5 sec	18
4250	Kelapa Front. 3520 - 242 m from rear light	8 40.0 119 14.0 S	Iso. W 2 sec E	30	4450	Kunyit Summit island	4 05.5 116 02.5 S	Fl. W 5 sec A	12
4260	Kelapa Near Summit Rear	8 40.0 119 14.0 S	Occ. W 3 sec E 0.83	30	4580	Balingkar On hill	3 15.5 116 14.0 S	Fl. W 5 sec ED	15
4280	Reo	8 16.8 120 27.4 S	Fl. W 3 sec E	10	4610	Sambergelap Westerly Buton Butona Isle.	3 39.5 116 36.0 S	GpFl. (3) W 17 sec E 0.83	13
					4621	Addington reef	2 43.8 116 45.6 S	Fl. W 8 sec Pr	12

No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range	No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range
4660	Ambo (Balabalagan) North part of Island	2 32.3 S 117 57.0	GpFl. (3) W 15 sec 0.83 A	12	4747	Kutei river REAR	240 m 3200 from No. 4746	Iso. W 2 sec E	10
4702	Balikpapan Rear	1500 m 3600 from front light	Iso. W 2 sec E	11.2	4750	Kutei river (Ma. Pegah)	0 48.9 S 117 17.9	Fl. G 3 sec E	10
4704	Balikpapan Rear	3000 m 2700 from front light	Iso. W 2 sec E	11.2	4761	Kutei river REAR	300 m 1.50 from No. 4760	Iso. W 2 sec E	10
4706	Balikpapan Rear	1000 m 1400 from front light	Iso. W 4 sec E	11.5	4763	Kutei river REAR	650 m 324.50 from No. 4762	Iso. W 2 sec E	12
4730	Balikpapan Signal station on top of Takong Hill	1 16.5 S 116 48.5	Fl. W 20 sec E	25	4790	Kutei river Across Tg. Sanga Sanga (on East Bank) REAR	300 m 3560 from front 0 36.0 S 117 17.5	F. R Pr	10
4742	Kutei river (Mahakam) REAR	1750 m 1700 from front	Iso. W 4 sec E	12	4890	Mangkaihat	0 59.5 N 118 59.0	Fl. W 5 sec E	18
4743	Kutei river (Mahakam) FRONT	0 57.6 S 117 18.4	QkFl. W 1 sec E	10	4891	Bontang FRONT I A	0 03.7 N 117 32.7	QkFl. W 1 sec E	12
4744	Kutei river (Mahakam) REAR	600 m 3160 from front 0 57.3 S 117 18.3	Iso. W 2 sec E	11	4892	Bontang REAR I B	0 03.9 N 117 32.5	Iso. W 2 sec E	12

No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range	No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range
4895	Bontang FRONT III A	0 06.0 N 117 30.6	Fl. W 2.5 sec E	12	5080	Cape Mandar N. of Karang Rangas	3 34.0 S 118 56.0	Fl. W 5 sec 800.00 E	21
4896	Bontang REAR III B	0 06.1 N 117 30.3	Fl. W 2.5 sec E	12	5090	Tg. Rangas (Cape Willem) 1950 - 1400 m from cape	2 37.5 S 118 49.0	Fl. W 6 sec 1000.00 E	23
4899	Bontang Pu. Barat Basah	0 03.8 N 117 33.6	GpFl. (3+2)W20.5sec E	22	5110	Teluk Palu (Tg. Karang) Hill, NW. Point bay	0 38.5 S 119 44.0	GpFl. (4) W 25 sec 1000.00 E	23
4900	Dewakang Besar North point	5 24.0 S 118 26.0	Fl. W 5 sec 0.75 A	12	5120	Tuguan (Noord Wachter) Summit island	0 35.0 N 119 48.0	Fl. W 5 sec E	23
4910	De Bril (Gosong Takarewataya) South west edge of reef	6 05.0 S 118 54.5	GpFl. (3) 6.5 sec 1.8 E	15	5130	Toli-Toli (Tg. Labuan) Dedeh	1 03.5 N 120 48.4	Fl. W 3 sec E	10
4920	Dayang-Dayangan South east side of island	5 24.0 S 119 11.5	Fl. W 5 sec 770.00 E	16	5140	Salando Rock E. of North side Salando reef	1 20.5 N 120 48.5	Fl. W 5 sec 10.5 E	19
4930	Kudingareng Lompo	5 09.1 S 119 15.6	GpFl. W(4) 27.5sec E	16.5	5310	Tg. Arang Pu. Bunyu	3 27.1 N 117 52.1	Fl. W 5 sec E	18
4950	Mariso Near shore south of Makassar	5 09.5 S 119 24.5	Fl. W 5 sec E	12	SULAWESI NORTH COAST				
5020	Kapoposang West point of island	4 42.0 S 118 57.0	Fl. W 5 sec 4.50 E	16	5340	Hulawa Near North easterly corner of island	0 58.5 N 122 54.0	Fl. W 3 sec 0.14 A	12

No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range	No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range
5360	Menado On hill G. Menang	1 29.6 N 124 50.3	Fl. W 8 sec E.	15	5573	Kolonedale Tg. Mposo	1 57.0 S 121 32.5	Fl. G 6 sec A	11
5363	PP. Tg. Kapas Lilang	1 19.0 N 125 04.0	T.1.0 - G.2.0	20	5579	Saponde	3 58.7 S 122 45.8	Fl. W 4 sec A	12
5390	Talisei North - East point island	1 53.5 N 125 06.0	Fl. W 5 sec	24	5580	Wangi-wangi NW. side of the island	5 15.5 S 123 32.0	GpFl. (2) W 12 sec E	30
5444	Miangas On Island	5 33.8 N 126 35.6	GpFl. (3) W 20 sec E	23	5630	Pasitanete North Coast Island Salayar Strait	5 44.5 S 120 29.5	Fl. W 5 sec 1,250.00 E	17
5451	Lembeh Island On bank South of Lembeh Isl.	1 23.5 N 125 09.5	GpFl. (2) W 10 sec 0.83 A	12	5650	Tg. Jene Near Cape	3 14.1 S 120 25.5	Fl. W 5 sec 0.22 A	11
5490	Gorontalo Left bank of river	0 29.5 N 123 03.5	Fl. W 5 sec A	12	5651	Pulau Bulu	2 48.8 S 120 57.3	Fl. W 3 sec E	10
5510	PP. Parigi	0 48.5 S 120 10.5	T.1.0 - G.6.0	15	5652	Lelewu	3 00.3 S 120 56.0	Fl. W 5 sec E	10
5520	Poso Pier head	1 22.0 S 120 45.0	Fl. W 3 sec E	10	5653	Pakowe	3 08.2 S 120 53.3	Fl. W 2 sec E	10
5560	Buang buang Banggai archipelago	2 04.3 S 123 55.0	GpFl. W (3) 40 sec E	15	5674	Lambasing-Besar	4 04.2 S 121 22.0	Fl. W 5 sec E	11

No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range
NUSA TENGGARA ISLAND				
5730	Sba North of white pyramide, W. coast of Sawu	10 29.0 S 121 50.5	F1. W 5 sec E 1.7	13
5740	Menia Just E. of river entrance North coast Sawu	10 26.0 S 121 52.0	F. R P	10
5750	Ba'a Near flagstaff W. Coast of Roti	10 43.5 S 123 03.0	GpFl. (2) W 10 sec A 0.9	12
5770	Kupang Ford Concordia West Coast Timor	10 10.0 S 123 34.5	F1. W 5 sec A 1.15	13
5800	Tg. Kurong Hilly country SW. from cape, N. side Pulau Semau	10 07.5 S 123 26.5	GpOcc. (2) W 30 sec E 10.00	27
5810	Liran South point of Island	8 03.0 S 125 44.0	GpFl. (2) W 20 sec E	21
5817	Dilly Ponta da Lague boda	8 32.9 S 125 33.8	GpFl. (2) W 6.5 sec E	12
5830	Meaty Miarang West coast Isl	8 20.0 S 128 29.0	GpFl. (3) W 29 sec E	15
MALUKU ISLAND				
5870	Tg. Ular NW. point island Wamar (Aru islands)	5 45.0 S 134 10.5	F1. W 5 sec E 0.13	12
5871	Wokam	5 19.6 S 134 34.1	F1. W 4 sec A	10
5910	Suanggi Manipa Strait Suanggi Islet	3 18.0 S 127 28.0	GpFl. (2) W 10 sec E	23
5920	Tg. Nusanive 2800 800 m of S. point of Amboina	3 47.5 S 128 05.5	F1. W 5 sec E	18
6000	Merauke South of river Entrance	8 30.0 S 140 22.5	GpFl. (4) W 20 sec E	18
6002	Merauke On North bank across Tg. Haran	8 27.5 S 140 21.5	F1. W 3 sec A	12
6070	Pulau Pisang NE. point of Sabuda	2 37.5 S 131 39.0	GpFl. (2) W 18 sec A 0.86	12
6090	Tg. Tanah Merah On hill	2 26.5 S 133 07.0	GpFl. (3) W 15 sec A 0.83	12

No.	NAME-position	Lat. M/S Long. E	Characteristics Intensity Source	Range	No.	NAME-position	Lat. N/S Long. E	Characteristics Intensity Source	Range
6120	Jef. Jus NE. point Island	1 45.5 S 131 08.0	GpFl. (3) W 15 sec 0.13 E	14	6390	Batanta South coast of Island Strait Sagewin	0 54.5 S 130 36.0	GpFl. (2) W 10 sec 0.83 A	12
6130	Tg. Suaja	2 31.0 S 140 44.0	GpFl. (3) W 24 sec	18	6403	Tg. Memori Manokwari eastward	0 51.5 S 134 88.0	GpFl. (3) W 11 sec 0.75 A	12
6150	Numfoor Northern part Island	0 56.5 S 134 49.5	Fl. W 3 sec 0.75 A	12	6405	Tg. Pegun Mapia Island	0 48.5 N 134 17.7	Fl. W 5 sec A	15
6180	Rasi S. point Island	1 20.5 S 136 37.5	GpFl. (3) W 15 sec 0.83 A	12	6451	Tg. Rainbawi (Japan)	1 48.0 S 136 54.0	Fl. W 3 sec 0.75	12
6190	Amsterdam Northern part Island	0 20.5 S 132 10.5	Fl. W 3 sec 0.75 A	12					
6210	Nabire	3 06.3 S 135 32.6	Fl. W 5 sec A	12					
6211	Tg. Woka	1 36.0 S 135 24.6	Fl. W 3 sec A	12					
6341	Pu. Buaya	0 50.4 S 131 12.4	GpFl. (4) W 25 sec E	22					

LIGHTHOUSES UNDER CONSTRUCTION BY CREDIT EXPORT AND FRENCH AID

No.	NAME-position	Lat. N/S Long. E	Remarks
11.	KALUKALUKUANG	5 12 117 40 S	FRANCE
12.	GILI SELANG	8 24 115 43 S	ENGLAND
13.	BUKIT BADUNG	8 49 115 11 S	FRANCE
14.	SEDIHING	8 46 115 32 S	FRANCE
15.	PANJANG	8 26 116 52 S	ENGLAND
16.	BESAR (Pu.)	8 28 122 23 S	ENGLAND
17.	LETI (Pu.)	8 12 127 46 S	ENGLAND
18.	ARO USU (Tg.)	8 20 135 45 S	
19.	PAMALI	3 59 123 01 S	FRANCE
20.	PASANGKAYU	1 10 119 20 S	ENGLAND

No.	NAME-position	Lat. N/S Long. E	Remarks
1.	RONDO	6 04 95 06 N	ENGLAND
2.	BERHALA (Bank)	3 56 99 25 N	ENGLAND
3.	PARIT (Tg.)	10 32 102 27 N	ENGLAND
4.	PESENUIT	2 29 108 50 S	
5.	ENGANO	5 29 102 23 S	ENGLAND
6.	SERDANG (Pu.)	5 49 105 23 S	ENGLAND
7.	MIDAI	2 59 107 45 S	ENGLAND
8.	NATUNA UTARA	4 47 107 58 S	ENGLAND
9.	PUTING (Tg.)	3 32 111 48 S	FRANCE
10.	MASALEMBO	5 35 114 27 S	ENGLAND

No.	NAME-position	Lat. N/S Long. E	Remarks
21.	MAYU	1 19 N 126 23	FRANCE
22.	MARORE	4 45 N 125 29	ENGLAND
23.	DEHEK-LANO	1 50 S 126 29	ENGLAND
24.	SARMI	1 51 S 138 45	ENGLAND

**AIDS TO NAVIGATION SERVICE
VESSEL'S DATA**

(Ref: Section 2-3-1)

REPUBLIC OF INDONESIA

AIDS TO NAVIGATION SERVICE VESSEL'S DATA

March, 1985
Source: Directorate General of Sea Communication

NO.	NAME OF VESSEL	TYPE	CLASS	BUILT YEAR	PRINCIPAL DIMENSIONS (LxBxD IN M)	GROSS TONNAGE (TON)	PROPULSION MACHINERY (HP)	CREW	B A S E
1	KARAKATA	BUOY TENDER	I	1972	47.43x10.02x3.04	569.1	850	35	DUMAI
2	KUMBA	BUOY TENDER	I	1972	47.43x10.02x3.04	568.23	850	35	SURABAYA
3	MESA	BUOY TENDER	I	1975	47.90x10.00x4.50	644.46	850	35	TG PRIOK
4	MITHUNA	BUOY TENDER	I	1975	47.90x10.00x4.50	644.23	850	35	SAMARINDA
5	PARI	BUOY TENDER	I	1978	47.90x10.00x4.50	644.46	850	35	TG PRIOK
6	PRADAWANA	BUOY TENDER	I	1979	47.90x10.60x4.50	762.78	850	35	SORONG
7	PAJAPATI	BUOY TENDER	I	1978	47.90x10.00x4.50	864.68	850	35	SURABAYA
8	MANDALIKA	SUPPLY VESSEL	I	1975	44.90x9.85x5.10	767.82	1,200	35	SURABAYA
9	MUCI	SUPPLY VESSEL	I	1975	44.08x9.80x5.00	608.83	1,200	35	DUMAI
10	PAMANCASA	SUPPLY VESSEL	II	1978	45.60x10.00x5.70	904.52	1,200	35	TG PRIOK
11	INTAN	SUPPLY VESSEL	II	1952	53.27x9.74x2.19	668.50	550	35	SURABAYA
12	PERMATA	SUPPLY VESSEL	II	1953	53.27x9.70x2.95	664.89	550	35	TG PRIOK
13	POSPARAGAM	SUPPLY VESSEL	II	1953	53.87x9.79x2.15	668.50	550	35	SAMARINDA
14	BABUT	AIDS TENDER	II	1953	35.90x6.53x2.37	194.34	430	24	KUPANG
15	BALAM	AIDS TENDER	II	1953	35.90x6.53x2.37	192.87	430	24	TL BAYUR
16	BARAU	AIDS TENDER	II	1953	35.90x6.59x2.37	195.25	430	24	TG PINANG
17	BAYAN	AIDS TENDER	II	1953	38.20x6.50x2.95	192.87	430	24	TG PRIOK
18	BENDALU	AIDS TENDER	II	1953	35.90x6.53x2.37	192.87	430	24	AMBON
19	B E O	AIDS TENDER	II	1953	35.90x6.53x2.37	194.34	430	24	BITUNG
20	BETTET	AIDS TENDER	II	1953	35.90x6.53x2.37	194.34	430	24	UJUNG PANDANG
21	BIDO	AIDS TENDER	II	1953	35.90x6.53x2.37	194.34	430	24	BANJARMASIN
22	BOGA	AIDS TENDER	II	1953	35.90x6.53x2.37	192.87	430	24	SURABAYA

1	2	3	4	5	6	7	8	9	10
23	BLEKOK	AIDS TENDER	II	1953	36.03x6.54x2.38	191.53	430	24	BELAWAN
24	ELPA PUTIH	AIDS TENDER	II	1969	34.20x10.41x1.82	258.55	240x3	18	SORONG
25	DAGONG	AIDS TENDER	III	1953	24.79x5.04x1.90	79.22	250	12	SAMARINDA
26	DAIK	AIDS TENDER	III	1953	26.43x5.02x2.32	65.19	150	12	PALEMBANG
27	DAMARA	AIDS TENDER	III	1953	23.83x4.92x2.10	72.95	240	12	BENOA
28	DAYTA	AIDS TENDER	III	1953	26.48x4.97x2.08	57.97	250	12	PALEMBANG
29	DINGKI	AIDS TENDER	III	1953	24.79x5.04x1.90	79.22	215	12	KENDARI
30	DUATA	AIDS TENDER	III	1953	23.83x4.92x2.10	72.95	235	12	SIBOLGA
31	DUDAT	AIDS TENDER	III	1953	24.48x5.15x2.32	83.51	150	12	TG PINANG
32	DUKU	AIDS TENDER	III	1953	24.79x5.04x1.90	77.52	215	12	BALIKPAPAN
33	SUAR-001	AIDS TENDER	III	1951	22.38x4.12x1.85	36.12	115	10	PALEMBANG
34	SUAR-002	AIDS TENDER	III	1951	20.93x4.00x1.75	47.73	215	10	SURABAYA
35	SUAR-003	AIDS TENDER	III	1971	21.05x4.22x1.80	47.28	200	8	PONTIANAK
36	SUAR-004	AIDS TENDER	III	1971	20.86x4.45x2.07	55.93	200	8	TG PINANG
37	SUAR-005	AIDS TENDER	III	1975	21.05x4.22x1.80	47.28	200	8	SABANG
38	SUAR-006	AIDS TENDER	III	1973	21.13x5.00x1.98	65.34	200	8	DUMAI
39	SUAR-007	AIDS TENDER	III	1973	21.13x5.00x1.98	63.34	200	8	CILACAP
40	SUAR-008	AIDS TENDER	III	1973	21.52x5.02x2.01	67.28	240	8	BELAWAN
41	SUAR-009	AIDS TENDER	III	1973	21.52x5.02x2.01	67.28	240	8	BITUNG
42	SUAR-010	AIDS TENDER	III	1975	21.13x5.20x1.98	66.55	240	8	SAMARINDA
43	SUAR-011	AIDS TENDER	III	1980	22.90x6.60x2.30	115.37	380	8	SEMARANG
44	SUAR-012	AIDS TENDER	III	1981	22.00x6.60x3.70	115.37	380	8	DUMAI
45	SUAR-014	AIDS TENDER	III	1980	22.60x5.00x2.30	108.58	380	10	TG PRIOK
46	AE-012	AIDS TENDER	III	1967	17.75x4.50x2.58	47.99	150	8	PONTIANAK
47	AE-027	AIDS TENDER	III	1967	20.40x5.04x2.22	59.53	250	8	KUPANG
48	AE-029	AIDS TENDER	III	1969	19.50x5.00x0.72	82.65	200	8	KALIANGET SURABAYA
49	AE-032	AIDS TENDER	III	1969	19.50x5.00x2.72	82.63	200	8	BANJARMASIN
50	B - 008	AIDS TENDER	III	1945	18.10x4.60x2.40	59.63	165	8	SEMARANG

1	2	3	4	5	6	7	8	9	10
51	B - 025	AIDS TENDER	III	1945	18.99x4.60x1.50	30.06	200	8	PALEMBANG
52	B - 066	AIDS TENDER	III	1945	18.40x4.60x1.50	28.6	165	8	DUMAI
53	B - 082	AIDS TENDER	III	1945	18.09x4.62x1.66	36.97	165	8	TG PINANG
54	B - 118	AIDS TENDER	III	1961	21.60x4.60x1.66	45.10	250	8	BELAWAN
55	B - 120	AIDS TENDER	III	1961	21.60x4.60x1.86	41.38	250	8	KALIANGET SURABAYA
56	B - 124	AIDS TENDER	III	1961	20.44x4.58x1.64	44.37	250	8	SEMARANG
57	B - 125	AIDS TENDER	III	1961	21.41x4.59x1.66	34.54	200	8	PALEMBANG
58	B - 126	AIDS TENDER	III	1961	21.15x4.63x1.64	34.01	250	8	PALEMBANG
59	B - 133	AIDS TENDER	III	1964	21.20x4.60x1.61	34.08	250	8	SABANG
60	B - 134	AIDS TENDER	III	1964	21.54x4.55x1.63	34.68	200	8	BITUNG
61	S KAIBUS	AIDS TENDER	IV	1955	11.00x3.00x1.25	99.57	20x2	4	SORONG
62	AB - P3	AIDS TENDER	IV	1971	9.60x6.00x1.50	8.66	120	4	TG PRIOK
63	AP - 027	AIDS TENDER	IV	1966	17.15x4.80x2.30	46.67	150	7	TG PRIOK
64	RAJA AMPAT	INSPECTION BOAT	III	1954	37.00x6.72x2.13	397.79	150	20	SORONG
65	DWIWARNA	INSPECTION BOAT	III	1956	35.00x7.00x2.75	301.96	120x2	18	JAYAPURA
66	AE - 024	INSPECTION BOAT	III	1967	19.50x5.00x2.72	100.25	200	8	TG B KARIMUN SEMARANG
67	AE - 025	INSPECTION BOAT	III	1969	19.50x5.00x2.72	82.65	250	8	DUMAI
68	AE - 028	INSPECTION BOAT	III	1969	20.34x4.91x2.79	59.02	225	8	TG PANDAN PALEMBANG
69	B - 013	INSPECTION BOAT	III	1945	18.99x4.60x1.50	29.37	165	8	BENGKALIS DUMAI
70	B - 068	INSPECTION BOAT	III	1945	18.94x4.64x1.70	32.61	165	8	SURABAYA
71	B - 115	INSPECTION BOAT	III	1959	20.50x4.60x2.00	40.83	250	8	SAMPEIT BANJARMASIN
72	B - 129	INSPECTION BOAT	III	1961	21.15x4.63x1.64	44.37	250	8	TARAKAN SAMARINDA
73	B - 135	INSPECTION BOAT	III	1965	20.40x4.60x2.10	44.37	200	8	AMBON
74	TL ETNA	INSPECTION BOAT	III	1952	24.00x5.40x2.75	252.58	120	12	BIAK JAYAPURA
75	TL TN MERAH	INSPECTION BOAT	III	1966	27.50x6.30x2.65	141.96	230	12	JAYAPURA
76	TG FATAGAR	INSPECTION BOAT	III	1970	22.00x4.25x2.15	176.98	200	8	FAK-FAK SORONG
77	TG NAMARIPI	INSPECTION BOAT	III	1972	22.00x4.25x2.15	197.9	200	8	MERAUKE
78	TG VERKAMI	INSPECTION BOAT	IV	1970	26.02x5.02x2.13	150	200	8	JAYAPURA

1	2	3	4	5	6	7	8	9	10
79	TG SABRA	INSPECTION BOAT	IV	1967	18.10x4.70x1.20	120.55	105	8	BIAK JAYAPURA
80	BINTANGGUR	INSPECTION BOAT	IV	1967	19.00x4.52x1.51	133.68	105	7	MERAUKE
81	TAMI	INSPECTION BOAT	IV	1967	22.44x4.51x1.25	134.68	105	7	JAYAPURA
82	P BATANTA	INSPECTION BOAT	IV	1952	10.50x3.10x1.50	8.61	80	4	MANOKWARI SORONG
83	P JEPEO	INSPECTION BOAT	IV	1970	10.20x3.50x1.45	10.96	290x2	4	JAYAPURA
84	FJS RUMAINUM	INSPECTION BOAT	IV	1972	21.50x6.10x2.75	84.45	550	7	JAYAPURA
85	TENGGIRI-002	INSPECTION BOAT	IV	1954	18.51x4.50x2.70	46.2	150	5	TG PINANG
86	BIMASAKTI	SURVEY VESSEL	I	1984	59.75x13.00x2.35	1,373.65	1,386	46	TG PRIOK
87	MITRA - I	SURVEY CRAFT	II	1974	18.23x5.40x8.00	104.3	235	8	TG PRIOK
88	MITRA - II	SURVEY CRAFT	II	1960	24.40x6.30x3.15	186.3	360	8	TG PRIOK
89	MITRA - III	SURVEY CRAFT	III	1971	21.28x4.75x1.85	70	168	8	TG PRIOK
90	MITRA - IV	SURVEY CRAFT	III	1975	22.10x5.10x1.90	80.06	168	8	TG PRIOK
91	PONTON PANCANG	PILE PONTOON	V	1945	18.00x8.00x1.40	8	-	3	TG PRIOK
TOTAL		-	-	-	-	20,431.57	52,267	1,327	-

VESSEL'S SCRAPPING PLAN BY 1988/1989

TYPE	QTY	N A M E		
BUOY TENDER	0			
SUPPLY VESSEL	1	INTAN		
AIDS TENDER	27	ELPA PUTIH	AE-012	B-120
		DAGONG	AE-027	B-124
		DAIK	AE-029	B-125
		DAMARA	AE-032	B-126
		DATA	B- 008	B-133
		DINGKI	B- 025	B-134
		DUATA	B- 066	S KAIBUS
		DUDAT	B- 082	AB-P3
		DUKU	B- 118	AP-027
INSPECTION BOAT	22	RAJA AMPAT	B-129	BINTANGGUR
		DWIWARNA	B-135	TAMI
		AE-024	TL ETNA	P BATANTA
		AE-025	TL TN MERAH	P JEFBO
		AE-028	TG FATAGAR	FJS RUMAINUM
		B-013	TG NAMARIPI	TENGGIRI-002
		B-068	TG VERKAMI	
		B-115	TG SABRA	
SURVEY VESSEL	0	-	-	-
SURVEY CRAFT	0	-	-	-
PILE PONTOON	0	-	-	-
T O T A L	50	--	-	-

CALCULATION OF SERVICE RANGE
FOR
MF RADIOBEACON

1. Conditions of Calculation

(1) Transmitter Output 1 kW as defined in the Radio Regulations
(RR)

- a. A2A: $P_p = 1 \text{ kW}$
- b. H2A: $P_m = 1 \text{ kW}$ ($P_p = 4 \text{ kW}$)

(2) Minimum Receiving Field Strength

Non-directional radiobeacon:

100 $\mu\text{V/m}$ as defined in RR

Directional radiobeacon:

5 $\mu\text{V/m}$ at the point of 3° from a line of the minimum field strength

(i.e. 87° off the maximum strength line)

The calculation shall be carried out without modulation.

(3) Antenna System

a. Non-directional radiobeacon

- i) Effective height 27 m
- ii) Efficiency of coupler 80%
- iii) Effective resistance 40 Ohms

b. Directional radiobeacon

- i) Area of loop antenna 1,100 m^2
- ii) Number of turn 1 turn
- iii) Effective resistance 7 Ohms

2. Equations

D: Distance

λ : Wave length

h: Effective antenna height

I_A : Antenna current

ρ : Conductivity ($\rho = 1$ s/m at sea)

E: Field strength

$$D = 120\pi \cdot \frac{h}{\lambda E} \cdot I_A \cdot \rho \text{ (Non-directional)}$$

$$D = 120\pi \cdot \frac{h}{\lambda E} \cdot I_A \cdot \rho \cdot \cos 87^\circ \text{ (Directional)}$$

3. Results

a. Non-directional (A2A)

The non-modulated power (P_c) is given as:

$$P_c = \frac{15}{40} \cdot \frac{1}{\left(1 + \frac{m^2}{2}\right)} P_p$$

$$(P_c = \frac{1}{4} P_p \text{ at } m = 1)$$

where, P_p : Peak power
 m : Modulation degree

The antenna input power, P_A is shown as follows with η for the efficiency of antenna coupler :

$$P_A = \eta \cdot P_c = \eta \cdot \frac{15}{40} \cdot \frac{1}{\left(1 + \frac{m^2}{2}\right)} P_p$$

And, when $m = 0.8$, $\eta = 0.8$ and $P_p = 1 \text{ kW}$ are applied:

$$P_A = 227.3 \text{ (W)}$$

Accordingly, the antenna current and covering range are given below:

$$I_A = \sqrt{\frac{P_A}{R_E}} = 4.03 \text{ (A)}$$

$$\begin{aligned} D &= 120 \cdot \frac{h}{\lambda E} \cdot I_A \cdot \rho \\ &= 120 \pi \cdot \frac{27}{10^3 \cdot 100 \times 10^{-6}} \times 4.03 \times 1 \\ &= 410.1 \text{ (km)} \\ &\approx 220 \text{ nautical miles} \end{aligned}$$

b. Non-directional (H2A)

The non-modulated power (P_c) is given as:

$$P_c = \frac{2}{1 + m^2} P_m$$

($P_c = P_m$ at $m = 1$)

where,

P_m : Mean power

m : Modulation degree

The antenna input power is calculated as follows as in a. above:

$$P_A = \eta \cdot P_c = \frac{2 \cdot \eta}{1 + m^2} P_m = \frac{2 \cdot 0.8}{1 + 0.8^2} \cdot 10^3$$
$$= 975.6 \text{ (W)}$$

Accordingly, the antenna current and covering range are given below:

$$I_A = \sqrt{\frac{P_A}{R_E}} = 8.35 \text{ (A)}$$

$$D = 120 \cdot \frac{h}{\lambda \cdot E \cdot I_A \cdot \rho}$$
$$= 120 \pi \cdot \frac{27}{103.100 \times 10^{-6}} \times 8.35 \times 1.0$$
$$= 849.7 \text{ (km)}$$
$$\approx 460 \text{ nautical miles}$$

(In case of $P_p = 1 \text{ kW}$, $D = 424.9 \text{ km}$ and then $P_m = 250 \text{ W}$)

c. Directional (A2A)

The antenna power of directional radiobeacon is defined at the output of goniometer, and therefore the power is given by reducing the coupler efficiency from P_A , calculated in a. above.

Accordingly, the transmitter output, P_p' should be: -

$$\begin{aligned} P_p' &= 1 \text{ kW/Efficiency of Goniometer} \\ &= 1 \text{ kW}/0.75 \\ &= 1.33 \text{ kW} \end{aligned}$$

$$\begin{aligned} P_A &= \frac{15}{40} \cdot \frac{1}{\left(1 + \frac{m^2}{2}\right)} P_p \\ &= 284.1 \text{ (W)} \end{aligned}$$

The effective height of loop antenna is given below:

$$h' = \frac{2 S}{\lambda} = \frac{2\pi \cdot 1100}{10^3} = 6.9 \text{ (m)}$$

where,

S = Area of loop antenna

Accordingly,

$$\begin{aligned} I_A &= \sqrt{\frac{P_A}{R_E}} = \sqrt{\frac{284.1}{7}} = 6.37 \text{ (A)} \\ D &= 120 \pi \cdot \frac{h'}{\lambda E} \cdot I_A \cdot \rho \cdot \cos 87^\circ \\ &= 120 \pi \cdot \frac{6.9}{10^3 \times 5 \times 10^{-6}} \cdot 6.37 \cdot 0.0523 \\ &= 173.4 \text{ (km)} \\ &\approx 94 \text{ (NM)} \end{aligned}$$

d. Directional (H2A)

With the same reasons as c. above (i.e. $P_m' = 1.33 \text{ kW}$ is required):

$$P_A = 1219.5 \text{ W}$$

$$I_A = \sqrt{\frac{P_A}{R_E}} = \sqrt{\frac{1219.5}{7}} = 13.2 \text{ (A)}$$

$$\begin{aligned}
 D &= 120\pi \cdot \frac{h^4}{\lambda E} \cdot I_A \cdot \rho \cdot \cos 87^\circ \\
 &= 120 \cdot \frac{6.9}{10^3 \times 5 \times 10^{-6}} \cdot 13.2 \cdot 0.0523 \\
 &= 359.1 \text{ (km)} \\
 &\approx 194 \text{ (NM)}
 \end{aligned}$$

(In case of $P_p = 1 \text{ kW}$, $D = 179.6 \text{ km}$, and then $P_m = 250 \text{ W}$ since $P_p' = 1.33 \text{ kW}$ is required)

(Translated from Indonesian Original)

DECREE OF MINISTER OF COMMUNICATIONS

NO. RM 154/OT.002/PHB.80

Decree of Minister of Communication

No. KM164/OT.002/Phb.80

Concerning

Improvement of organization and working method of Directorate General of Sea Communication, Directorate General of Air Communication, Directorate General of Tourism, Meteorological and Geophysical Agency, and the Board of National Search and Rescue, under the Ministry of Communication as the realization of Presidential Decree No. 45 Year 1974 and Presidential Decree No. 47 Year 1979

Minister of Communication

Considering:

that it is deemed necessary to formulate again the duty, function, organization and working system of Directorate General of Sea Communication, Directorate General of Tourism, Meteorological and Geophysical Agency, and the Board of National Search and Rescue, as the realization of Presidential Decree No. 45 Year 1974 and Presidential Decree No. 47 Year 1979.

In view of:

1. Presidential Decree No. 44 Year 1974
2. Presidential Decree No. 45 Year 1974
3. Presidential Decree No. 59/M Year 1978
4. Presidential Decree No. 47 Year 1979
5. Decree of Minister of Communication No. KM91/OT.002/Phb-80.

Taking into account:

Approval of Minister of State for State Administrative Reform vide letter No. B-642/I/MENPAN/7/80 dated July 5, 1980.

Decides:

To effect:

Decree of Minister of Communication concerning improvement of the organization working system of Directorate General of Sea Communication, Directorate General of Air Communication, Directorate General of Tourism, Meteorological and Geophysical Agency, the Board of National Search and Rescue under the Ministry of Communication as the realization of Presidential Decree No. 45 Year 1974 and Presidential Decree No. 47 Year 1979.

Chapter I

Directorate General of Sea Communication

Part 1

Main duty, function and composition of organization

Article 1

The main duty of Directorate General of Sea Communication is to carry out a part of the main duty of Ministry of Communication in the field of Sea Communication in line with the policy determined by the Minister.

Article 2

In order to execute the main duty as set forth in Article 1, Directorate General of Sea Communication has the function of:

- a. formulation of technical policy, provision of guidance and managing, and granting of licences in line with the policy determined by the Minister and basing upon the current laws and regulations.
- b. execution in line with the main duty of Directorate General of Sea Communication and basing upon the current laws and regulations.
- c. technical safeguarding upon execution of the main duty of Directorate General of Sea Communication in line with the policy determined by the Minister and the current laws and regulations.

Article 3

Directorate General of Sea Communication consists of:

- a. Secretary to Directorate General
- b. Directorate of Sea Traffic and Transportation
- c. Directorate of Shipping
- d. Directorate of Ports and Dredging
- e. Directorate of Navigation
- f. Directorate of Maritime Services
- g. Directorate of Sea and Coast Guard

Part 6

Directorate of Navigation

Article 116

The Directorate of Navigation has the duty to execute a part of the main duties of Directorate General of Sea Communication in the field of navigational matters in line with the policy of Directorate General of Sea Communication.

Article 117

In order to execute the duty set forth in Article 116, the Directorate of Navigation has the function of:

- a. to manage navigational aids and coastal lighting facilities in order to support navigation safety at sea, off-shore and harbour.
- b. to manage navigation electronics and telecommunication between ship and coastal station so as to secure safety of human life at sea (SOLAS) and internal communication of Directorate General.
- c. to manage operation of state's ships for executing the duty on navigational aids and coastal lighting, smoothness of Government's mission in the regions, and transportation in the weak areas.
- d. to manage execution of ship's maintenance and repair, and readiness of state owned ships for executing the duty of Directorate General.
- e. to manage and supervise the maritime occupational health.
- f. to execute Administration of Directorate

Article 118

The Directorate of Navigation consists of:

- a. Administration Division
- b. Sub-Directorate of Navigational Aids and Coastal Lights
- c. Sub-Directorate of Electronics and Maritime Telecommunication
- d. Sub-Directorate of State's Ships
- e. Sub-Directorate of Ship's Engineering and Repair
- f. Sub-Directorate of Hygiene and Occupational Health

Article 127

Sub-Directorate of Navigation Electronics and Telecommunication has the duty to execute management of navigation electronics, telecommunication and technical equipment and execute administration of calculation and control on realization of revenue from radio communication services.

Article 128

In order to execute the duty set forth in Article 127, the Sub Directorate of Navigation Electronics and Telecommunication has the function of:

- a. to prepare the arrangement for demand on coastal station communication equipment, ship and aid to navigation equipment
- b. to prepare the arrangement of control on procurement and use of navigation telecommunication for either Government or Private Sector.
- c. to prepare the arrangement for demand on workshop equipment, storage and repair of navigation electronic equipment.
- d. to carry out administration of calculation and collection of payment and checking upon the use of radio communication.

Article 129

The Sub-Directorate of Navigation Electronics and Telecommunication consists of:

- a. Navigation Electronics Development Section
- b. Navigation Telecommunication Control Section
- c. Technical Equipment Section
- d. News Administration Section

Article 130

- (1) Navigation Electronics Development Section has the duty to prepare arrangement of demand on coastal station communication equipment and state's ship, and also aid to navigation facilities in order to improve internal communication of Directorate General.
- (2) Navigation Telecommunication Control Section has the duty to prepare arrangement of control on procurement and use of navigation telecommunication equipment by either Government or Private Sector.
- (3) Technical Equipment Section has the duty to prepare the arrangement for demand on workshop equipment and storage as well as to prepare the arrangement for repair of the navigation electronic equipment.
- (4) News Administration Section has the duty to carry out administration of calculation and collection of payment for use of radio communication according to the current telecommunication tariff, and control upon realization of revenue from radio communication service.

(Translated from Indonesian Original)

DECISION OF DIRECTORATE GENERAL OF SEA COMMUNICATION

NO. DKP 44/1/13

**Necessity to Possess Radio Telecommunication
Equipment with Minimum Covering Range of
100 miles for Ships Measuring 100 m³
up to 850 m³ Gross Weight**

Decision of Directorate General of Sea Communication

No.: DKP 44/1/33

**Necessity to Possess Radio Communication Equipment with Minimum
Covering Range of 100 miles for Ships Measuring 100 m³ up to 850 m³
Gross Weight**

Directorate General of Sea Communication

Considering:

- a. that in National Development, especially for sea transportation, the small ships are occupying an important part;
- b. that for the safety of life and property at sea, it is necessary to decide on requirement for radio telecommunication equipment used on ships which measure 100 m³ up to 850 m³ gross weight;

In view of:

1. Law No. 5, 1964;
2. Ships Ordinance 1935 and Ships Regulation 1935;
3. Presidential Decree No. 44, 1974
4. Presidential Decree No. 45, 1974 in connection with No. 47, 1979;
5. Presidential Decree No. 65, 1980
6. Decree of Minister of Communication No. KM164/OT.002/Phb-80 dated July 14, 1980;

To pay attention to:

The Minister of Communication Instruction No. IM.18/AL.45/Phb-82 dated December 16, 1982, in connection with necessity to possess radio telecommunication with covering range of 100 miles for ships measuring 100 m³ up to 850 m³ gross weight.

Decided

Established:

Regulation in connection with necessity to possess radio Telecommunication equipment with the minimum covering range of minimum 100 miles for ships which measure 100 m³ up to 850 m³ gross weight.

Article 1

In this decision it means that:

- a. Ship is motor ship or motorized sailing ship or sailing ship, which measures 100 m³ up to 850 m³ gross weight, for sea sailing use.
- b. Radio telecommunication equipment is telecommunication equipment which is possible for ship telecommunication use.
- c. Licence holder is every person or company which has executed shipping and navigation business, and obtained licence for use of radio telecommunication equipment
- d. Radio operator is person which has fulfilled technical terms and conditions and administration as Radio Operator, who has the duty to operate radio telecommunication onboard ship.

Article 2

Every ship must be fitted with radio telecommunication equipment with the minimum covering range of 100 miles at sea.

Article 3

In this decision, radio telecommunication equipment is used for transmitting and receiving information on navigation accident and other information which does not interfere with safety and public order and is not against ethics according to laws and regulations of telecommunications which are in effect.

Article 4

In operating radio communication licence holder and radio operator are necessary to obey:

- a. Stipulation in connection with manners and direction of operation for radio telecommunication on ship which was decided by Directorate General of Sea Communication.
- b. All stipulation for other telecommunication to be issued by Directorate General of Post and Telecommunications.

Article 5

Licence holder and radio operator shall be responsible in every operation for authority and for utilization of radio telecommunication equipment.

Article 6

The matters which do not regulate in this decision will be regulated further.

Article 7

This decision shall take effect as of the date it is established.

Established in: Jakarta

Dated on: 9th August, 1983

Directorate General of Sea Communication

PONGKY SOEPARDJO

NIP. 120003631

C.C.

1. **Minister of Communication**
2. **Secretary General to Communications Department**
3. **Directorate General of Post & Telecommunications**
4. **Secretary General of Directorate General of Sea Communication**
5. **All of Directors of Directorate of Sea Communication**

APPENDIX-16

LIST OF DISTRICTS OF NAVIGATION

LIST OF DISTRICTS OF NAVIGATION

NO.	KANWIL	PLACE	CLASS	REMARKS
1.	I	BELAWAN	(II)	
2.		SABANG	(II)	
3.		SIBOLGA	(II)	
4.	II	DUMAI	(I)	
5.		TG. PINANG	(II)	
6.		TLK BAYUR	(II)	
7.	III	TG. PRIOK	(I)	
8.		PALEMBANG	(II)	
9.		PONTIANAK	(II)	
10.	IV	SURABAYA	(I)	
11.		SEMARANG	(II)	
12.		CILACAP	(II)	
13.		BENOA	(II)	
14.		KUPANG	(II)	
15.	V	SAMARINDA	(I)	
16.		BANJARMASIN	(II)	
17.		BALIKPAPAN	(II)	
18.	VI	UJUNG PANDANG	(II)	
19.		KENDARI	(II)	
20.	VII	BITUNG	(II)	
21.	VIII	AMBON	(II)	
22.	IX	SORONG	(I)	
23.		JAYAPURA	(II)	
24.		MERAUKE	(II)	

LAMPIRAN IV
KEPUTUSAN MENTERI PERHUBUNGAN
NO. KM. 48 / OT / Phb - 1978.

DAFTAR INSTALASI DISTRIK NAVIGASI
SATUAN KERJA PERAMBUAN DAN PENERANGAN PANTAI
(LIST OF DISTRICT OF NAVIGATION UNIT)

<u>KANWIL</u>	<u>DISTRICT OF NAVIGATION</u>	<u>CLASS</u>	
I	Belawan	II	1. Panghalan Susu
III	Tg. Priok	I	1. Cirebon
IV	Semarang	II	1. Tegal 2. Pekalongan
	Surabaya	I	1. Kalianget 2. Banyuangi 3. Panarukan/Besuki 4. Probolinggo
	Benoa	II	1. Buleleng 2. Ampenan
V	Samarinda	I	1. Tarakan
VII	Menado	II	1. Donggala
IX	Japapura	II	1. Biak
	Sorong	I	1. Manakwari

LAMPIRAN V
KEPUTUSAN MENTERI PERHUBUNGAN
NO. KM. 48 / OT / Phb - 1978.
TANGGAL. 8 MARET 1978.

DAFTAR INSTALASI DISTRIK NAVIGASI
SATUAN KERJA PERAMBUAN DAN PENERANGAN PANTAI
(LIST OF DISTRICT OF NAVIGATION CHART UNIT)

<u>KANWIL</u>	<u>DISTRICT OF NAVIGATION</u>	<u>CLASS</u>
I	Belawan	II
II	Dumai	I
	Teluk Bayur	II
III	Palembang	II
IV	Surabaya	I
V	Banjarmasin	II
VI	Samarinda	I
	Ujung Pandang	II
VII	Menado/Bitung	II
VIII	Ambon	II
IX	Japapura	II

APPENDIX-17

RADAR BEACON (RACON)

Extract from Supplement No. 4
to the IALA Bulletin, 2nd Edition, May 1983

RADAR BEACON (RACON)

1. RACONS Currently In Operational Use

No racons using swept frequency magnetrons or carcino-trons are now in use. Starting in 1968 they were replaced by solid state equipments and all modern racons make use of this technology.

The use of long range racons is now under study in France and the UK. The target in the French study is for ranges of 25-30 nautical miles for which a power output of around 5 watts is expected to be required.

1.1 Slow Sweep Racons

So far as the slow sweep racons are concerned, two types are currently in use. The first, the older design, uses an oscillator operating in the UHF band, its output being multiplied up to the required frequency by the use of varactor diode multipliers. This type of racon is capable of providing a minimum output power in the order of 120 milliwatts at the band edges, rising to a minimum of around 180-200 milliwatts at the centre of the band. The power outputs in practice are often in excess of these figures.

An alternative type of oscillator used in some swept frequency racons was the Gunn diode oscillator which operated in the microwave band. These were capable of being tuned electronically over the required 3cm band. The minimum power output into the antenna for these racons was given as 160 mW at the band edges, rising to a maximum of around 200 mW at the centre of the band. They do however suffer from frequency instability due to junction heating. More recently improved solid state microwave oscillators have been used.

A recent development on slow sweep racons carried out in France is worthy of note. Current racons of this type use a wide band receiver to detect the transmitted radar pulses. This is a simple means of providing the necessary bandwidth, but there is a limit set to the sensitivity of the receiver by the signal to noise ratio which can be obtained.

The new racon receiver, intended for use with long range racons, overcomes this signal to noise restriction by using a narrow band receiver. The receiver pass band is, however, shifted through the frequency spectrum at the same rate as the racon frequency, the centre frequency of the pass band being the same as that of the transmitted frequency.

Racons operating in the 10cm band using a solid state oscillator and having an output of 0.5 watt have also been developed and put into service in Finland. In France slow sweep solid state racons operating in the 10cm band have been produced and put into service in Corsica and at Le Havre while a fast sweep racon, also operating in the 10cm band, has been developed and is now installed in southern France.

The slow sweep racons in general use today have a sweep period which is preset to a value between 60 and 150 seconds, though the most usual sweep period is 90 seconds, fig. 2 (a). Racons of this type are now used in many areas of the world. The pulse length is usually preset to a value which lies between 18 and 24 microseconds, corresponding to ranges on the radar display of between 1.5 and 2.0 nautical miles. However in some countries where this type of racon is used, notably in

Finland, the pulse length has been reduced to as low as 12 microseconds.

1.2 Random Slow Sweep Racons

Some slow sweep racons were also introduced using a random selection of sweep periods varying from 10 seconds to 120 seconds. These are known as RANDOM SLOW SWEEP RACONS. The slow sweep periods were supposed to give the operator time to identify the racon signal while the short times helped to provide a random rapid update. Reports on the effectiveness of this type of sweep were very mixed, and few, if any, of these racons were installed operationally.

1.3 Stepped Sweep Racons

Slow sweep racons with considerably reduced sweep times are also available. These were developed as a means of reducing the long sweep periods while providing a signal which would appear on the radar display long enough to be recognisable. At sweep speeds less than 60 seconds, it is generally true that synchronism with the antenna rotation speed can cause problems in loss of the signal. In addition the dwell time of the racon frequency in the radar receiver band will be very short and only one response may be presented. A STEPPED SWEEP RACON system is a means of overcoming this problem. One such racon operates in the 3cm band. The 180 MHz radar band is split up into four sub-bands, each 45 MHz wide, Fig. 3. The racon frequency is initially swept through one of these sub-bands in a period of 12 seconds. When a radar pulse is received, the racon responds on the frequency to which it is tuned and then immediately steps on 45 MHz to the corresponding point in the adjacent sub-band, where

the next triggered response occurs. This process is repeated for each interrogation, the next step from the top sub-band being to the bottom sub-band. There will normally be 8 to 24 interrogations on each antenna revolution so that there will be between 2 and 6 interrogations in each sub-band. Any radar will therefore display a racon response every 12 seconds. The penalty of the system is that the trace brilliance is reduced because the number of useful responses is reduced to a quarter of those possible. Tests have also shown a drop in the effective power output of some 1 to 2 dB giving a range reduction of about 10%. However, since these racons were designed primarily for short range operation, this reduction is not of great significance. In practice, a nearly continuous response is often obtained at short ranges. This racon is used extensively in the United States.

Another stepped sweep racon was developed in Sweden for operation in the 10cm band. Again an attempt was made to overcome the problems of the long sweep times normally encountered. The radar band was divided into four sub-bands each 50 MHz wide. In this equipment the microwave source started off being tuned to the centre frequency of the bottom sub-band i.e. 2925 MHz, for a period of 7.5 seconds. During this period the frequency was swept rapidly over a band ± 25 MHz giving an effective tuning range of 2900-2950 MHz. After the 7.5 seconds the oscillator stepped on 50 MHz to 2975 MHz where it was again swept over a band of ± 25 MHz for 7.5 seconds and so on, the whole band 2900-3100 MHz being covered in a total time of 30 seconds. The radar would receive a response when its frequency was contained within the appropriate 50 MHz slot, and the beacon would be received during the whole of that period.

Since the superimposed sweep was rapid the response pulse, usually 45 microseconds long, was composed of a large number of random dots which integrated on the radar screen to provide a solid signal at reduced brilliance. The 7.5 seconds period during which the response was displayed, was sufficiently long for the response to be detected and identified.

1.4 Fast Sweep Racons

The modern FAST SWEEP RACON also uses Gunn diode oscillators as the microwave source, though in some cases the output power is restricted. A number of these racons are now in service in lighthouses and lightvessels, rivers and estuaries. The racons now used on navigation marks usually sweep through the radar band eight times consecutively for each interrogation, Fig. 2 (b). Each sweep occupies a time of 3.6 microseconds. In rivers and estuaries the racons use a total of 40 consecutive frequency sweeps for each interrogation, the sweeps being 1.2 microseconds long. In some applications, particularly in rivers and estuaries, horn antennas are used having a coverage restricted to about 55½ in azimuth.

Although most fast sweep racons in use operate in the 3cm band, some racons operating in the 10cm band have been established in France.

1.5 Frequency Agile Racons

A further type of racon which is now available is the FREQUENCY AGILE RACON. Recent advances in solid state technology have introduced oscillators with a fast slew rate, such that they can be tuned to frequencies within the microwave bands in a microsecond or less. The

frequency agile racon makes use of this type of oscillator to enable it to be rapidly turned to the frequency of an incoming radar pulse, so that the racon transmits its response on the same frequency as the interrogation. There are various means available for carrying out this operation. In essence it is necessary to measure the incoming frequency, either by comparing it with known references, or by allocating it a slot corresponding to one of a number of frequency sub-bands into which the operating band is divided. This information can then be stored. The interrogation signal itself is then processed to produce the characteristic response signal of the racon. The frequency information is then recalled and combined with the response signal modulation in order to provide, from the racon transmitter, the characteristic signal on the frequency at which it was interrogated.

This ability to retune itself rapidly to match the interrogating frequency means that the racon is capable of giving a response every time it is interrogated. Although this increased up date time is a great advantage, the operator has no control over the display and it is possible that the racon response could be superimposed on the echo of a wanted target and mask it. This can be overcome by providing time modulation to the response signal so that it is presented on the radar screen only during preset time intervals.

Because it is an inband system, its response cannot be separated from the normal radar returns and so when the equipment is fitted at a shore station, the response could be superimposed on ground returns. These could mask the racon signal making it difficult to identify and obtain a range reading. This problem also applies to the slow sweep and stepped sweep racons.

In Sweden a frequency agile racon has been developed which responds to both S and X-band radar interrogations to serve the increasing number of ships now being fitted with S-band radar. An advanced sidelobe suppression mode is available with this racon to overcome false echoes due to triggering of the racon by radar antenna sidelobes. The output power is 1W in the 3cm band and 0.5W in the 10cm band. The frequency accuracy is ± 3 MHz.

In the UK work has been carried out by manufacturers on two X-band frequency agile racons. The first of these had an output power of 100 mW and a range of approximately 10 nautical miles. The triggering radar signal is received in a slotted waveguide antenna and then divided into two paths - one is used to trigger control logic and the other passed into a resonant loop which is excited into resonance at a frequency within 5 MHz of the received signal. This resonant oscillation is then fed out to the antenna via a coding switch. The beacon has a 100 microseconds of dead time after a transmission during which it cannot be triggered, and it also shuts down for 10 seconds in every 25 to reduce 'flooding' of the radar picture by sidelobe triggering when passing close to the beacon. Work on this racon has now been discontinued.

The second racon developed in the UK is suitable for installation at lighthouses, lightvessels or lanby stations. It has an output power of 1W, and a frequency accuracy of ± 5 MHz. A slotted waveguide or other suitable antenna is connected to a 3 port circulator. The incoming signal passes through a mixer and IF amplifier, the local oscillator being a stabilised Gunn diode. The signal then follows two different paths, a response loop and a frequency control loop.

In the former the signal passes through a second detector, the pulse output from which passes through a gate to produce the response pulse in an uncoded form. This is then fed to the code generators and the modulator circuits for the oscillator. This forms a standard response loop.

In the second path the signal is passed to a band limiter and then to a frequency discriminator, which provides a d.c. voltage proportional to its input frequency. This voltage is fed to a track or hold circuit from which it passes to an error amplifier, the output of which feeds an interpulse track and hold circuit. This circuit has two functions; it tracks the discriminator voltage and passes it forward, and also holds the information between pulses. The frequency dependent voltage is then used to tune the transmitter oscillator to a frequency near that of the incoming frequency, this being transmitted. By a further process the d.c. voltage is corrected in such a way as to bring the transmitted frequency into closer agreement with the input frequency. Because of the fast slew rate of the oscillator final tuning can be accomplished in a maximum of two microseconds from the receipt of the interrogation pulse.

2. Developments in Racons

The racons described above transmit responses which appear on the radar display automatically i.e. they need no operator action for their reception. The racons now to be described are "user-selectable" and do not appear on the radar screen unless selected by the radar operator.

2.1 Fixed Frequency Racons

One racon of this type which has been developed and tested experimentally is the FIXED FREQUENCY RACON. It transmits on a fixed frequency which is situated at one end of the conventional marine radar band. It requires the same type of broadband receiver as in the swept frequency racon but it transmits only on the preset frequency, so there is no need for the sweep generating circuits. The need for good frequency stability in this type of racon is much more important than in the swept frequency system.

This type of racon needs additional receiving equipment on the ship, but since it operates within the conventional marine radar band it should be possible to make use of part of the receiving section of the radar set, this having some advantages. The extra circuits required are simplified somewhat and since the radar and racon signals are at different frequencies, they may be displayed independently on the radar PPI. Following on from this, it is possible to provide an automatically interleaved display of the radar and racon signals. This is dealt with further in Section 9.2.

2.2 Offset Frequency Agile Racons

An alternative method of obtaining characteristics similar to those exhibited by a fixed frequency racon, is for the racon to respond on a frequency which is offset from that of the interrogation by an amount equivalent to about twice the bandwidth of the radar receiver. A racon of this type is called an OFFSET FREQUENCY AGILE RACON. The frequency of each interrogation pulse is measured at the beacon. It triggers a morsecoded response pulse in

the conventional way, but in the offset system the response frequency is offset by an agreed fixed amount, say 40 or 50 MHz. The co-operating radar has two receiver channels, tuned to the radar frequency for reception of echoes, and to a frequency offset by the agreed amount for reception of the beacon responses. An operator's switch permits the display of either the radar echoes, the beacon signals, or both interleaved.

As with the fixed frequency racon, an offset frequency agile racon will require the production of a radar set having a special receiving mode. This will obviously increase the cost of the radar set, but since the transmitted frequency is within the radar band and only about 50 MHz from the radar frequency itself, a separate local oscillator will not be necessary.

One advantage of this system is that both the requirements for a standard frequency agile racon and an offset frequency agile racon can be met by the same equipment, with a simple selector for the required service. Frequency agile racons which can be operated in the offset mode are now being put into production.

Another possible advantage is that when in the racon mode, it would still be possible to see the swept frequency racons on the radar as they swept through the offset frequency corresponding to the radar set. The operator would, in those circumstances, be able to see both offset and swept frequency racons uncluttered by radar signals when in that receiving mode.

At present, limited information is available on these racons although a number of manufacturers are working on them, and some problems will have to be resolved before a final decision on their use can be taken.

2.3 Interrogation Time Offset Frequency Agile Racon

A further development of the frequency agile racon, referred to as the INTERROGATION TIME OFFSET FREQUENCY AGILE RACON (ITOFAR), has recently taken place in Sweden. The two racons described above make use of a change in the frequency domain to provide a user selectable service. The ITOFAR concept makes use of a change in the time domain to provide the service. It has a number of interesting features and its basis of operation is as follows.

Due to the shape of the radar propagation characteristics, the response received from signals at long range is very small compared with those at short range. At these long ranges no sea clutter is apparent.

If the racon response could be delayed and presented at a time corresponding to these long ranges, it should be seen clear of all other echoes, except perhaps those from very large targets. Even these echoes would be weak though. In practice a delay of about 500 microseconds is used.

When operation in the ITOFAR Mode was required, the standard radar p.r.f. would be replaced by another, precisely defined, p.r.f., at the same time switching in the 500 microsecond delay. This would inhibit the generation of the radar scan until the end of the delay period.

At the racon this p.r.f. would be sought and if it was recognised, the response of the racon would also be delayed by a precise 500 microsecond delay. This response would therefore appear on the delayed radar scan

at a position corresponding to that of the target echo on a normal scan.

So far as the response frequency is concerned, the racon would operate as a frequency agile racon, the frequency being the same as that of the interrogation pulse.

3. Present Use of Racons

Racons have added a new dimension to the use of radar at sea. The racon receiver detects the pulse transmission from any radar set in the vicinity, which is operating in the appropriate marine radar frequency band, and for each radar hit sends back a characteristic transmission, which can be detected by the shipborne radar. This signal is displayed on the radar PPI and is used to identify the target to which it is fitted. Since a particular target on the radar display can now be recognised by its identify code, it gives additional information of great value to the mariner. This means that from the operational point of view, great care must be taken by the appropriate authority in the siting of the racon, in order to ensure that the navigational information it provides cannot be misunderstood; the same applies to the coding of the signal. Care must also be taken that the number of racons installed in a given area does not in any way cause a degradation of the radar display by causing unnecessary interference.

The swept frequency racons in operational use today were introduced primarily as a means of improving the identification of a radar target, be it a navigation mark or a point on the coastline. Some lighthouses, due to their position or their structure, do not produce a good radar echo, and if these are of some importance to safe radar

navigation, then means of improving their detectability and identification is a great assistance. This the racon is able to do. The station can be identified by the code allocated to it, and if the range is such that the echo of the lighthouse itself does not appear on the radar display, the racon response can, with care, be used to obtain an indication of the range and bearing. Account must be taken in measuring the range, of the inherent delay in the racon itself, which is shown up on the radar display as a difference in range between the target echo and the beginning of the racon response. This delay is usually in the order of 100 metres, and so can often be ignored at ranges greater than about 10 miles.

Racons can also be useful in identifying a floating seamark, such as a lightvessel or a buoy in those areas where shipping may be dense, or where it is used to mark the entrance into a channel or as a turning point. There may be a number of echoes on the radar display in the vicinity of the wanted target, and if that one could be positively identified as the required mark, navigation would be simplified. Racons are also being found useful when fitted on floating aids or on shore stations, to support navigation within separation schemes.

In addition, racons can be very useful in identifying specific points on a radar inconspicuous coastline, or on a shoreline which gives a good radar echo but has no radar identifiable features. This application is not much used at present, but where racons have been installed for this purpose they have proved very successful.

Racons in the past have been used on buoys marking wrecks. In this application they often used a special

type of response and were coded with a morse letter W so that they would not be confused with those racons fitted on navigation marks. In the IALA Maritime Buoyage System, now being introduced, the use of racons on those marks indicating new dangers is provided for. These racons would make use of the code letter D for identification purposes.

One application for short range racons which is currently being adopted, is their use on bridge piers and spans to indicate that part of the bridge which should be used for navigation. This is a somewhat specialised application which might need a racon having specific operational characteristics. The antenna pattern could also be such that only a restricted arc is covered.

These racons can also be used on navigation marks in a restricted channel, where close range identification is required.

Finally, there is a need for racons in areas where ice forms on the sea, severely distorting the shape of the coastline and the islands on the radar screen. Sometimes pack ice creates entirely new targets making the radar picture even more difficult to interpret. The racons employed in this application are used to indicate the most important navigational points along the fairway.

Table 1A: USER SELECTABLE RADAR BEACONS: SUMMARY

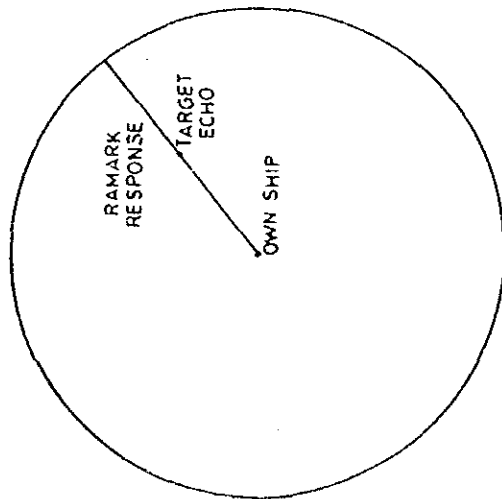
	FIXED FREQUENCY	OFFSET FREQUENCY AGILE	ITOFAR RACON
ADVANTAGES	<ul style="list-style-type: none"> - Display of response under control of the operator - Beacon response on each revolution of radar antenna - Greater freedom in locating beacon site - Reduced interference - Improved signal/clutter ratio - Modification required to radar set - Considerable signal loss due to differential squint angle possible - Can be affected by signal processing - Improved frequency precision and stability required 	<ul style="list-style-type: none"> - Display of response under control of operator - Beacon response on each revolution of radar antenna - Greater freedom in locating beacon site - Reduced interference - Improved signal/clutter ratio - Modification required to radar set - Some signal loss due to differential squint angle, though this is fixed and can be allowed for - Can be affected by signal processing 	<ul style="list-style-type: none"> - Display of response under control of operator - Beacon response on each revolution of radar antenna - Greater freedom in locating beacon site - Reduced interference - Improved signal/clutter ratio - Modification required to radar set - Can be affected by signal processing
DISADVANTAGES	<ul style="list-style-type: none"> - Modification required to radar set - Considerable signal loss due to differential squint angle possible - Can be affected by signal processing - Improved frequency precision and stability required 	<ul style="list-style-type: none"> - Modification required to radar set - Some signal loss due to differential squint angle, though this is fixed and can be allowed for - Can be affected by signal processing 	<ul style="list-style-type: none"> - Modification required to radar set - Can be affected by signal processing

	FIXED FREQUENCY	OFFSET FREQUENCY AGILE	ITOFAR RACON
USES	<ul style="list-style-type: none"> - Ranging on and identification of inconspicuous coastlines - Identification of positions on coastlines which permit good ranging but are featureless - Identification of selected navigation marks - Landfall identification 	<ul style="list-style-type: none"> - As for fixed frequency racons 	<ul style="list-style-type: none"> - As for fixed frequency racons

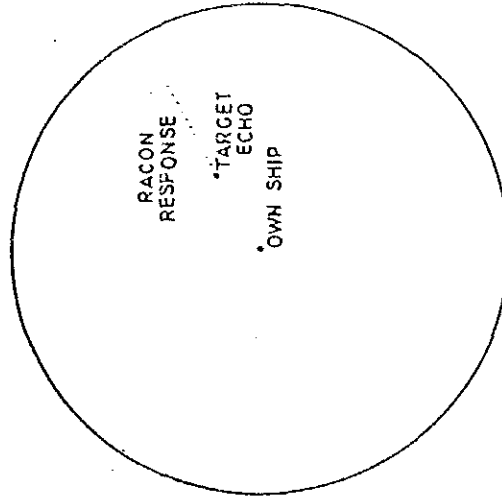
Table 1B: NON SELECTABLE RADAR BEACONS: SUMMARY

	SLOW SWEEP	STEPPED SWEEP	FAST SWEEP	FREQUENCY AGILE
ADVANTAGES	<ul style="list-style-type: none"> - Display of response automatic at all times - No modifications to normal navigation radar 	<ul style="list-style-type: none"> - Display of response automatic at all times - No modifications to normal navigational radar - Improved update time compared with slow sweep racon 	<ul style="list-style-type: none"> - Display of response automatic at all times - No modifications to normal navigational radar - Display of response on each antenna revolution 	<ul style="list-style-type: none"> - Display of response automatic at all times - No modifications to normal navigational radar - Display of response on each antenna revolution
DISADVANTAGES	<ul style="list-style-type: none"> - Display not under control of operator - Interference problems in vicinity of racon - Update time often too long - Can be affected by signal processing 	<ul style="list-style-type: none"> - Display not under control of operator - Interference problems in vicinity of racon - Can be affected by signal processing 	<ul style="list-style-type: none"> - Display not under control of operator - Interference problems in vicinity of racon - Dotted line of response cannot be directly arranged in form of Morse code 	<ul style="list-style-type: none"> - Display not under control of operator - Interference problems in vicinity of racon - No clear period as with slow sweep racon unless time modulated - Can be affected by signal processing

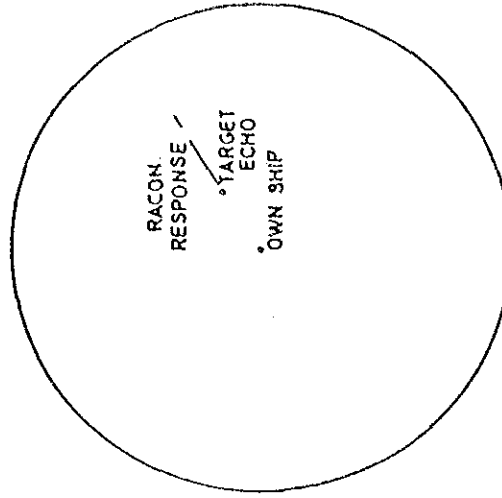
	SLOW SWEEP	STEPPED SWEEP	FAST SWEEP	FREQUENCY AGILE
USES	<ul style="list-style-type: none"> - Identification of temporary navigational hazards and uncharted dangers - In special cases, same uses as for fixed frequency racons 	<ul style="list-style-type: none"> - As for slow sweep racons 	<ul style="list-style-type: none"> - As for slow sweep racons, particularly for short range racons and also for SAR purposes 	<ul style="list-style-type: none"> - As for slow sweep racons



(a) RAMARK

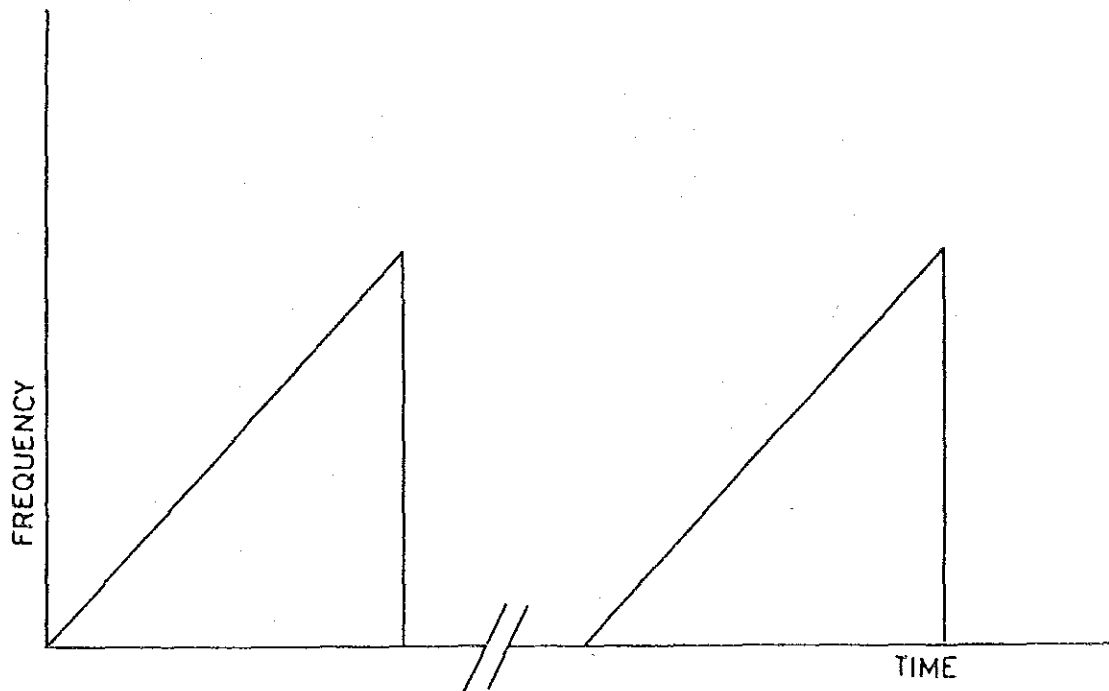


(b) FAST SWEEP RACON

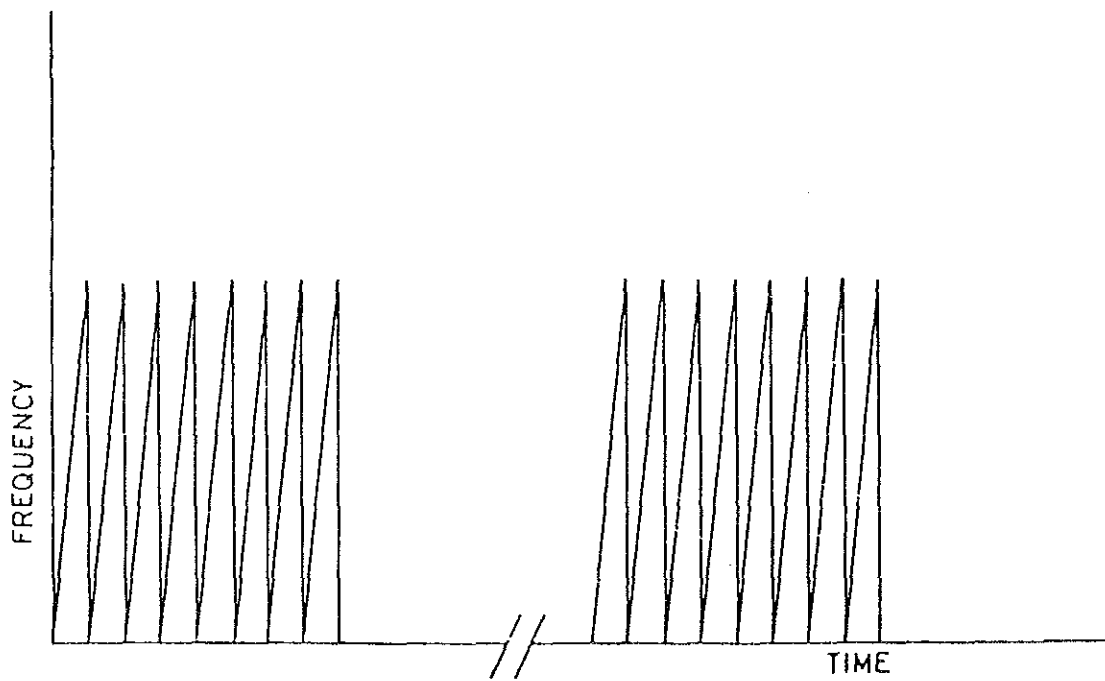


(c) SLOW SWEEP
STEPPED SWEEP
FREQUENCY AGILE
AND FIXED FREQUENCY RACONS

FIG. 1. RADAR BEACON RESPONSES



(a) SLOW SWEEP



(b) FAST SWEEP

FIG. 2. RACON FREQUENCY SWEEPS

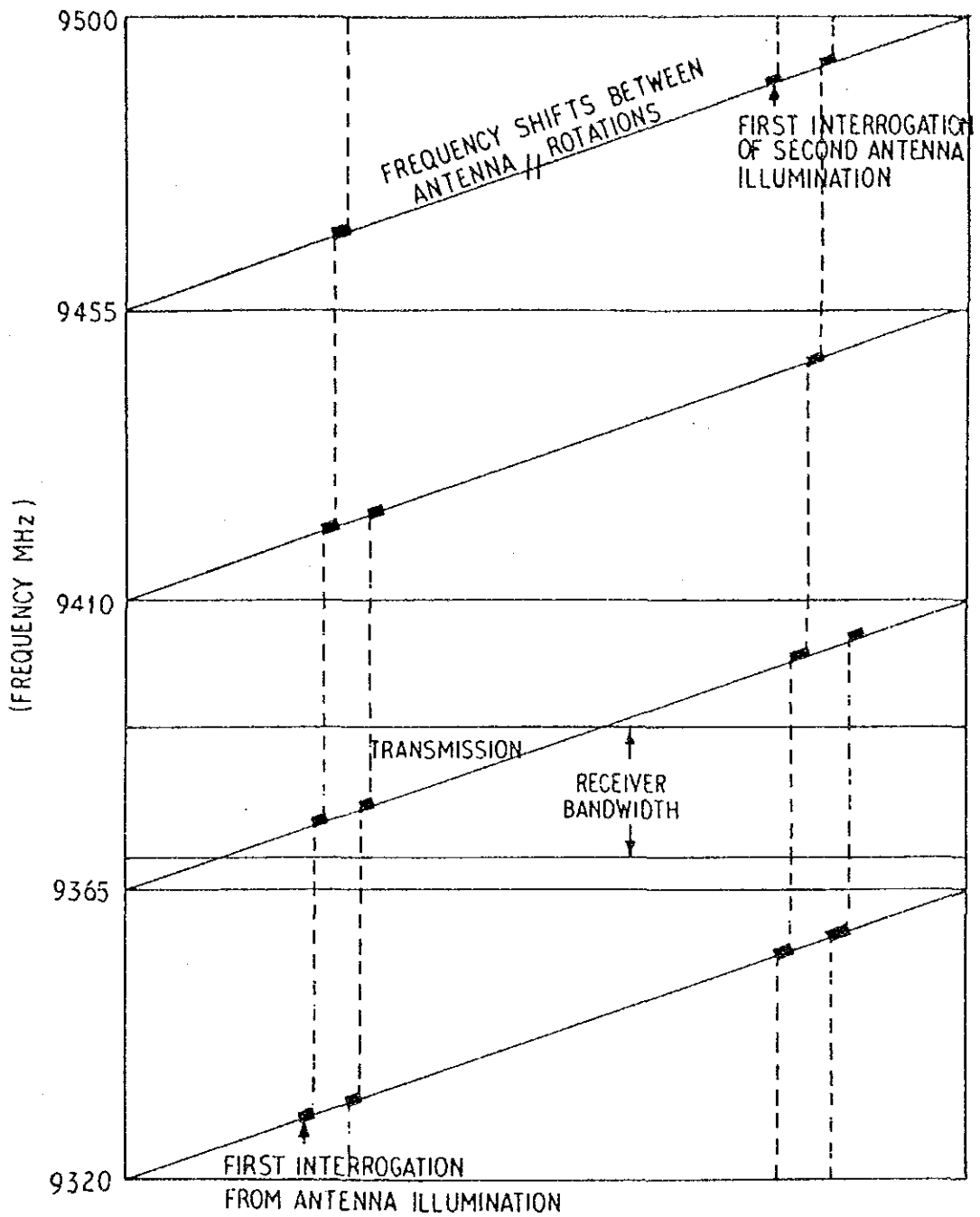


FIG. 3. STEPPED SWEEP RACON REPRESENTATION