Sir John Maffey (a

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1327–B.

COMMITTEE OF IMPERIAL DEFENCE

THE STRATEGIC IMPORTANCE OF THE PACIFIC ISLANDS.

Note by the Minister for Co-ordination of Defence.

THE accompanying Report by the Chiefs of Staff Sub-Committee was prepared in response to a request from His Majesty's Government in New Zealand that consideration should be given during the Imperial Conference to the strategic importance of the Pacific Islands.

2. The Report was laid before a meeting of the Chiefs of Staff Sub-Committee held on the 7th June, at which representatives of the Australian and New Zealand Delegations were present.

(Signed) T. W. H. INSKIP.

2 *Whitehall Gardens, S.W.* 1,
June 10, 1937.

ENCLOSURE.

[C.O.S. 586.]

Report by the Chiefs of Staff Sub-Committee.

HIS Majesty's Government in New Zealand has requested that consideration should be given at the Imperial Conference to the Strategic Importance of the Pacific Islands. We have accordingly examined this question from the general strategical aspect and in addition have collated, as requested by the New Zealand Government, other information in the form of notes on the Islands dealing with naval bases, air bases, commercial airways, meteorology, communications, population and administration, activities of the Japanese fishing craft, review of trade and shipping. For convenience of reference this latter information is annexed to the report (Annex I).

The Strategic Aspect.

2. The strategic importance of the Pacific Islands depends upon the extent to which their available facilities may be of military advantage to a potential enemy; and, conversely, the extent to which such facilities may assist us against the enemy.

3. In the Pacific our only anxiety arises from the possibility of aggression by Japan. In our Far Eastern appreciation we concluded that, to threaten the security of any Dominion through invasion, Japan would require the control of sea communications in the Pacific or Indian Ocean for an indefinite period. The presence of the British Fleet in Far Eastern waters, based on Singapore,

or its prospective arrival, would deprive Japan of this control, and she would therefore be in the highest degree unlikely to contemplate any operations in the nature of invasion.

4. We also concluded that although Japan could not anticipate any big material results from attack on British trade, particularly after the arrival of the British Fleet at Singapore, she would be likely to use armed merchant cruisers, and possibly cruisers, for operations against our trade in the Pacific Ocean, in order to cause such dispersion to our forces as to delay our Fleet, if not in its arrival at Singapore, at least in proceeding to Hong Kong. Japan might also endeavour to accentuate the effects of her operations against our trade by raids on Australian and New Zealand ports, in order to create a demand for the despatch of additional Naval forces for their local protection.

5. From the point of view of Japan, therefore, the various Islands in the Pacific are chiefly of value as advanced fuelling bases by means of which her naval operations, described above, may be facilitated.

6. As regards our security in the Pacific, we concluded, in our Far Eastern Appreciation, that before the arrival of our Fleet at Singapore we should have to rely on evasion for the security of our commerce, and upon local defences for the security of our ports and territories, coupled with operations against the raiders by the forces immediately available.

7. The vast area of the Pacific Ocean should enable evasion to achieve a considerable degree of success as a security measure. Moreover, Australian and New Zealand trade has a choice of either the Panama, Cape Horn, Suez Canal, or Cape of Good Hope routes. Our immediately available naval forces in the Pacific comprise the Australian and New Zealand cruiser squadrons, and their duty will be to conduct operations against any enemy raiders. After the arrival of our main Fleet in the Far East, more effective operations against enemy raiders should be possible, but we shall also rely on evasion for the security of our commerce.

8. Air forces maintained in Australia and New Zealand could also take part in operations against raiders. As aircraft ranges increase, it will become possible to extend these operations to the Pacific Islands area, and any development of air facilities in this area should, therefore, prove of strategic value.

9. Any operations against raiders would be facilitated by a good intelligence service in the Pacific Islands, comprising wireless stations at numerous positions.

10. From our point of view, therefore, the Pacific Islands are of strategic value in so far as they provide us with fuelling bases for our Naval forces, possible landing grounds for our Air Forces, and positions for the establishment of wireless stations. Moreover, if our system of communications can be sufficiently developed the chances of Japan using any Islands in our possession as fuelling bases, would be considerably reduced.

Conclusions.

11. We conclude that we should endeavour to establish our sovereignty over any of the Pacific Islands offering facilities for fuelling bases or landing grounds. It should be our policy to assist, where feasible, the development of those facilities which would be of value in war. We should at the same time take whatever measures are possible to gain information as to Japanese activities in the Islands.

(Signed) ERNLE CHATFIELD.
E. L. ELLINGTON.
C. J. DEVERELL.

2 *Whitehall Gardens, S.W.* 1,
May 28, 1937.

ANNEX I.

THE PACIFIC ISLANDS.

(Not including the Japanese Islands north of Latitude 20° N., the East Indian Islands or New Guinea.)

CONTENTS.

PART I.—ADMINISTRATION, POPULATION AND COMMUNICATIONS.

NOTE.—The islands are dealt with in the groups enclosed by coloured lines on the map. Groups are numbered consecutively in the following order of sovereignty :—

A. British.
B. Australian.
C. New Zealand.
D. Anglo-French.
E. U.S.A.
F. Japanese.
G. French.

The Philippine Islands are dealt with separately in Part VII.

PACIFIC ISLANDS.

PART I.—ADMINISTRATION, POPULATION, COMMUNICATIONS, &c.

A. *British.*

1. *Solomon Islands.*

Administration.—British Protectorate declared August 23, 1900. Resident Commissioner resides at Tulagi, Florida Island. Administrative Officers at Malaita, Guadalcanal, Gizo, Santa Cruz, Shortland, Santa Isabel and Eastern Solomons.

Population (1930).—497 Whites, 193 Asiatics (8 Japanese), 90,719 Natives (40,000 on Malaita Island).

Ports.—Tulagi (Florida Island) and Shortland.

Communications.—Steamer to Australia every six weeks. Inter-island communication by several lines of steamers.

W/T Stations at Tulagi and Kieta. Private station at Vanikoro.

2. *Pleasant Island* (*Nauru*). Ex-German.

Administration.—British Mandate December 17, 1920. Administrator.

Population (1929).—134 Europeans, 1,099 Chinese, 1,381 Nauruans.

No harbour or anchorage.

Communications.—Regular calls by steamers of British Phosphate Commission.

W/T Station.

3.—(i) *Gilbert and Ellice Islands.*

Administration.—British Colony, 1915 (under British protection since 1892). Resident Commissioner on Ocean Island, responsible to the High Commissioner, Western Pacific, at Suva. The sixteen groups of Gilbert Islands are

administered in three districts under District Officers, whose headquarters are at Butaritari, Tarawa and Beru. The Ellice Islands form a separate group with headquarters at Funafuti.

Population.—Gilbert Islands, 83 Europeans, 26 Chinese, 23,550 Natives (1929). Ellice Islands, 3,886 (1919).

Communications.—Steamer from Fiji about every three months, Mission steamer once a year.

W/T Stations at Ocean Island and Tarawa.

3.—(ii) *Fanning Island and Christmas Island.*

Administration.—Included in Gilbert and Ellice Island Colony, January 27, 1916 and November 10, 1916. Christmas Island is leased to a Frenchman.

Communications.—Motor schooner to Honolulu. Cable ship from Fiji occasionally, annual ship from Gilbert Islands. Fanning Island connected by cable to Suva and Vancouver.

Population.—Fanning Island, 36 Whites, 8 Chinese, 224 Native (1929). Christmas Island, 4 French, 30 Natives (Tahitans) (1928).

3.—(iii) *Vostok, Caroline and Flint Islands* (nine Islands).

Administration.—Leased to Maxwells Limited.

Population (1927).—Nil Vostok, 11 Caroline, 40 Flint.

Communications.—Schooner from Papeete calls at Flint Island about every two months.

4. *Fiji Islands.*

Administration.—Crown Colony September 1, 1875. Governor and Legislative Council. Seat of Government, Suva.

Population (1921).—154,864, including 3,848 Europeans, 60,619 Indians, 84,358 Fijians.

Ports.—Suva, Levuka, Lautoka, Na Savusavu, Nukulav, Mba River and Lambasa (first three the only ports of entry).

Communications.—Regular steamship from Suva with Sydney, Auckland, Honolulu, Panamá and Vancouver every five weeks. Inter-island communication by steamer.

Seaplane communication between Suva, Lautoka, Na Savusavu, Taveuni and Lambasa.

Telegraph cables connect Suva with Auckland via Norfolk Island, and Canada via Fanning Island.

W/T Stations at Suva, Lambasa, Savusavu and Taveuni.

5. *Friendly Islands (Tonga).*

Administration.—British protectorate, May 1900. Limited monarchy with Privy Council, Cabinet, Legislative Assembly and Judiciary. Great Britain is represented by an Agent. Seat of Government, Nukualofa in Tongatabu.

Population (1921).—24,935, of whom 571 Europeans, 23,759 Tongans.

Ports of entry.—Nukualofa in Tongatabu, Neiafa in Vavau and Lifuka in Haabai.

Communications.—With United Kingdom two monthly service by Clan Line. With New Zealand, Fiji and Samoa monthly service by Union Steamship Company of New Zealand.

W/T Stations at Nukualofa, Lifuka, Vavau, Niuafoo, Nivatobutabo and Niue.

6. *Phoenix Group.*

Administration.—British possession 1898. Leased to British trading companies.

Population (1914).—59.

Low coral islands surrounded by reefs.

No regular communication.

7. *Pitcairn Islands and adjacent islands.*

Administration.—British possession, administered by High Commissioner for Western Pacific.

Population (1915).—165.

Communications.—Frequent calls from vessels passing.

B. *Australian.*

8. *Lord Howe.*

Administration.—British Protectorate August 30th, 1900. Now dependency of New South Wales.

Population (1933).—160.

Low, sandy islands. Small trading stations. Several anchorages inside reefs.

Communication.—Occasional steamers to Australia.

W/T Station.

9. *Norfolk Island.*

Administration.—Administrator under Australian Commonwealth.

Population (1933).—1,231.

Anchorage in Sydney Bay.

Communications.—Regular steamer service to Australia and New Zealand. Cable to Canada (via Fanning Island and Suva), Australia and New Zealand.

C. *New Zealand.*

10. *Western Samoa.*

Administration.—Administrator under New Zealand Government. Legislative and Native Councils.

Population (1927).—42,865, including 2,564 Europeans and half-castes.

Port.—Apia in Upolu.

Communications.—Mail steamers between San Francisco and Sydney every two weeks, and those between Auckland, Sydney and Suva every four weeks.

W/T Stations at Tutuila and Apia.

11.—(i) *Union Group.*

Three small islands (Pakaofu, Nukunono, Atafu) British Protectorates 1889.

Population.—About 1,000 in 1925.

No regular communication, occasional visits from Western Samoa.

11.—(ii) *Cook Islands.*

Administration.—Administered for New Zealand Government by a Resident Commissioner living at Avarua in Rarotonga. Each island has a resident agent assisted by the island council.

Population (1926).—3,936 Lower Cook Islands, including 205 Europeans. 1,700 North Cook Islands (1925).

Communication.—Mail steamers between New Zealand and San Francisco call at Rarotonga monthly. More frequent communication with New Zealand during the summer. Inter-island communication by steamer and schooner.

W/T Station at Rarotonga.

12. *Kermadec Islands.*

Annexed to Great Britain, 1866, and to New Zealand, 1887. Uninhabited. Visited once a year by a government vessel, and depots of provisions and clothing maintained for the use of ship-wrecked mariners.

D. *Anglo-French.*

13. *New Hebrides.*

Administration.—By convention signed in 1906, islands are under joint control of the United Kingdom and France, each having a Resident High Commissioner at Vila in Efate Island. Government agents at Espiritu Santo, Malekula and Tana.

Population (1930).—6,221 Non-natives (including 260 British, 1,018 French, 4,943 Tonkinese coolies, Chinese, Javanese, &c.), 60,000 Natives.

Communications.—Five weekly by British steamers to Australia. Messyeries Maritimes call both ways, four steamers for inter-island communication.

W/T Station at Vila (Efate).

E. *U.S.A.*

14. *Guam.* (See Naval Bases.)

Administration.—Ceded to United States of America by Spain in 1898. Administered under a Naval Officer who is under the Admiral at Manila.

Population.—6,000 inhabitants in the capital, Agana.

Communications.—Trans-Pacific cable from San Francisco, Honolulu, Midway Island, Manila. Also cable to Yokohama and Yap.

W/T Station.

Good fleet anchorage.

15. *Wake Island.*

Uninhabited and occasionally submerged.

16. *Hawaii* (*Sandwich Islands*). (See Naval Bases.)

Administration.—Annexed by United States of America, 1898.

Population (1929).—357,649.

Communications.—Frequent steamer communication with United States of America, Canada, Australia, New Zealand, Philippines, China and Japan.

Cable to Manila and San Francisco. Harbours—Pearl Harbour, Honolulu, Hilo and Kahului.

W/T Station.

17. *Johnston Island.*

Administered as part of the territory of Hawaii. Uninhabited.

18. *Swain Island.*

Administration.—Annexed by United States of America in 1925. Dependency of Eastern Samoa.

Population (1926).—87.

19. *Eastern Samoa.* (See Naval Bases.)

Administration.—Administered by Naval Officer. Seat of Government, Pago-Pago on Tutuila Island.

Population (1926).—8,685.

Communications.—All vessels visiting the islands must call first at Pago-Pago and obtain the permission of the Governor.

Powerful W/T Station.

20. *Kingman Reef and Palmyra Island.*

Administered as part of the territory of Hawaii. No Native inhabitants in 1897.

CLAIM OF UNITED STATES OF AMERICA ADMITTED.

21.—(i) *Howland Island.*

Uninhabited.

21.—(ii) *Baker Island.*

Uninhabited.

21.—(iii) *Jarvis Island.*

A guano island. Uninhabited.

NOTE.—It is believed that the United States of America has meteorological observation stations in these islands.

F. *Japanese.*

22. *Marianas or Ladrones Islands.*

Administration.—Purchased by Germany, 1899. Mandated to Japan, 1919.

Population (1930).—19,496 (including 15,656 Japanese and 11 foreigners).

Communications.—Regular steamers to Japan, Celebes, Philippines, Carolines, &c.

Good inter-island communication.

W/T Station at Saipan.

23. *Caroline Islands.*

Administration.—Ceded by Spain to Germany, 1899. Mandated to Japan, 1919.

Population (1930).—39,718 (including 3,757 Japanese and 65 foreigners).

Communications.—Regular steamers to Japan, Celebes, Philippines, Marianas, &c.

Good inter-island communication.

W/T Stations at Angaur, Palau, Yap, Truk and Ponape.

G. *French.*

24. *New Caledonia.*

Administration.—Governor, assisted by Privy Council and elected Council General.

Population (1929).—48,000 (including 17,000 Whites and 11,000 Asiatics).

Communications.—Steamers to France via Panamá and Suez, Australia, Fiji, Java, New Hebrides, &c.

W/T Station at Numea.

25. *Hoorn Islands.*

Administration.—Annexed by France, 1888. Administered by Resident at Wallis Islands under the Governor of New Caledonia. Two Native kings residing at Sigave and Alo.

Population.—5,600 Natives.

Communications.—Six-weekly steamer between Futuna Island and Suva.

26. *Society Islands and Low Archipelago.*

Administration.—French colony. Seats of Government at Papeete, Fakarava and Rikitea.

Population (1926).—About 14,000 (including over 2,000 French).

Communications.—

W/T Stations at Papeete and Uturoa.

27. *Austral Islands.*

Administration.—"Agent special administrant" at Tubuai and "Gendarme Administrant" at Ruturu.

Population (1911).—2,263.

Communications.—Visited twice a year by French inter-island services.

28. *Rapa Island.*

Administration.—French special Agent at Ahurei.

Population.—

Communications.—French warship from Tahiti visits island quarterly.

29. *Marquesa Islands.*

Administration.—French Resident at Taiohae.

Population (1930).—2,255 and a considerable number of Europeans.

Communications.—Schooner to Tahiti nine times a year. Steamer between Numea and France to Taiohae every eight weeks.

PART II.—HARBOURS SUITABLE FOR NAVAL USE.

NOTE.—The groups of islands are numbered as in Part I.

Key "*A*" *Anchorage*—suitable for a large fleet, with 4 square miles or more of clear anchorage in not less than 7 fathoms.
"*B*" *Anchorage*—suitable for a mixed fleet, or 8 capital ships with attendant cruisers, &c., with careful berthing.
"*C*" *Anchorage*—suitable for cruisers and a very few capital ships.
"*D*" *Anchorage*—suitable for two or more large cruisers.
"*E*" *Anchorage*—suitable for one or more destroyers (and in many cases for a single cruiser).

PACIFIC ISLANDS.

PART II.—HARBOURS SUITABLE FOR NAVAL USE.

A. *British.*

1. *Solomon Islands.*

"*A*" *Anchorage.*

(i) *Thousand Ships Bay, Ysabel Island.*—Accessible to any class of ship, but requires thorough survey. Shores mostly fringed by mangroves. Difficult to defend.

"*B*" *Anchorages.*

(i) *Queen Carola Harbour, Buka Island.*—Well sheltered. Good holding ground. Unsuitable for repair base owing to extensive mangrove swamps.

(ii) *Maringe Lagoon, Ysabel Island.*—Incompletely surveyed, 1902. Would probably accommodate large fleet and floating dock. Shores densely wooded, defensible.

(iii) *Marau Sound, Guadalcanal Island.*—Accessible to any class of ship. Well sheltered. Pier. Large cocoanut plantations in vicinity.

"*C*" *Anchorages.*

(i) *Kieta Harbour, Bourgainville Island.*—Well sheltered. Plenty of water for floating dock, and land could probably be cleared for

shore sites. Best harbour for naval purposes in western Solomons.

(ii) *Port Purvis, N'gela Island.*—Accessible to any class of ship. Well protected. Excellent accommodation for deep water wharves, but shores heavily wooded.

"*D*" *Anchorages.*

(i) *Choiseul Bay, Choiseul Island.*—Good shelter. Shores densely wooded. Might be useful owing to its situation in Bourgainville Strait. Appears defensible.

(ii) *Rendova Harbour, Rendova Island.*—Surveyed 1893. Would probably accommodate capital ships and floating dock. Appears suitable for repair establishments.

(iii) *Tulagi Harbour, N'gela Island.*—Seat of Government of Solomon Islands Protectorate. Good anchorage for a few large vessels. Practically indefensible, but the neighbouring harbour of Gavantu offers better facilities.

"*E*" *Anchorages.*

(i) *Blanche Harbour, Mono Island.*—Occasionally used for re-fuelling His Majesty's Australian ships.

(ii) *Makira Bay, San Cristoval Island.*—Almost landlocked. Snug anchorage difficult to defend.

2. *Pleasant Island (Nauru).*

Two piers. Buoys at which cruisers could lie, sheltered from North-Easterly and Easterly winds.

3.—(i) *Gilbert and Ellice Islands.*

"*D*" *Anchorages.*

(i) *Butaritari Lagoon.*—Moderately well sheltered. Might be suitable for small repair base. Survey required.

(ii) *Tarawa Lagoon.*—Accessible to "D" class cruisers. Might serve as repair base. Requires survey.

(iii) *Funafuti Lagoon.*—Large lagoon with two entrance channels suitable for large ships. Moderately good shelter. Surveyed 1896.

Unclassified Anchorage.

(i) *Ocean Island.*—Seat of the Government of the Gilbert and Ellice Islands. Two large mooring buoys in Home Bay.

3.—(ii) *Fanning Island.*

(i) *Fanning Island.*—Of great strategical importance. Dredging and blasting would make the lagoon accessible to destroyers and submarines, but larger vessels would have to anchor outside.

4. *Fiji Islands.*

"*A*" *Anchorages.*

(i) *Savusavu Bay, Vanna Levu.*—Accessible to any class of ship. Large area for G. and T. practices. Not easy to defend. Detailed survey.

(ii) *N'gau Island Lagoon.*—Large smooth water anchorage unusually clear of dangers. Exposed to gunfire and surface torpedo attack. Unsuitable for shore establishments.

(iii) *N'galoa Harbour, Kandavu Island.*—Outer and Inner Harbours and North Bay. Outer harbour accessible to any class of ship; inner forms snug anchorage for a few vessels. Room for floating dock, but doubtful if site could be obtained for shore establishment. Easily defensible against submarines; mining impossible in the approaches.

"*B*" *Anchorage.*

(i) *Lauthala Harbour.*—Not very suitable for naval purposes, but might be useful as overflow from Suva Harbour or for rendezvous for mercantile convoys.

"*C*" *Anchorage.*

(i) *Suva Harbour, Viti Levu.*—Seat of Government and headquarters of the High Commissioner, western Pacific. Accessible to any class of ship, easy of access. Good shelter at all times. Government wharf affords good accommodation alongside. Workshops capable of carrying out extensive repairs to hull and machinery. Suitable for large floating dock. Patent slip for vessels up to 190 feet.

Unclassified anchorages suitable for fuelling, &c.

N'gele Levu Lagoon, Wailangilala Lagoon, Bay of Islands, Oneata Lagoon, Ongea Levu Lagoon, Moala Island, Totoya Island.

B. *Australian.*

8. *Lord Howe Islands.*

Sketch survey of lagoon makes it appear probable that anchorage could be found for a number of ships if properly surveyed.

9. *Norfolk Island.*

Anchorages in Sydney Bay and Cascade Bay, but neither have much shelter, and landing is often dangerous.

C. *New Zealand Dependencies, &c.*

10. *Western Samoa.*

"*E*" *Anchorages.*

(i) *Apia Harbour, Upolu Island.*—Capital of the islands under New Zealand Mandate. Very small and indefensible. Could accommodate two cruisers with sterns secured to mooring buoys. Unsafe during hurricane months. (January–April.)

(ii) *Saluafata Harbour, Upolu Island.*—The only sheltered anchorage in the Samoan group except for the American port of Pango-Pango. Modern large scale plan. Accommodation for two small cruisers.

11.—(ii) *Cook Islands.*

Small harbour at Rarotonga, only suitable f- sloop, &c.

"E" Anchorage.

(i) *Penrhyn Island.*—Possible anchorage for destroyers. Unsuitable for repair establishments.

12. *Kermadec Islands.*

No harbours, but anchorage over good sandy bottom can be found around Raoul Island. Swell nearly always experienced.

D. *Anglo-French.*

13. *New Hebrides.*

"A" Anchorage.

(i) *Pekoa Channel, Espiritu Santo Island.*—Good anchorage, easy access, well sheltered. Accessible to any class of ship. Ample room for largest floating dock.

"B" Anchorage.

(i) *Havannah Harbour, Efate Island.*—Well sheltered. Could accommodate capital ships and largest floating dock. Shore site probably available at old French trading station.

"E" Anchorages.

(i) *Port Sandwich, Malekula Island.*—Easy of access. Just room for squadron of cruisers. Good holding ground, completely sheltered. Shores densely wooded, but appears suitable for small repair establishment and could accommodate small floating dock. Detailed survey (1891).

(ii) *Fila Harbour, Efate Island.*—Small but accessible to any class of ship. Southern anchorage well sheltered, but deep. Northern exposed to westerly winds and torpedo attack through entrance. Defensible.

E. *U.S.A. Possessions.*

14. *Guam.*

"D" Anchorage.

(i) *Port Apra.*—United States of America Naval Station. The whole island is under naval administration. A battle cruiser could use the harbour with careful berthing, or four cruisers. Three mooring buoys for United States Navy ships, landing inconvenient. No permanent defences.

16. *Sandwich Islands, (Territory of Hawaii).*

"A" Anchorage.

(i) *Pearl Harbour, Oahu Island.*—United States Naval Station, closed to foreign shipping. Heavily fortified; (guns up to 16 in.). Oil and ammunition stowage. Major repair facilities. Graving dock which will take any capital ship or aircraft carrier. Large army garrison. Submarine and air base. The entire United States fleet (except the large aircraft carriers) can be accommodated.

"C" Anchorage.

(i) *Honolulu Harbour, Oahu Island.*—No anchorage, but numerous wharves. Busy commercial port normally congested by merchant shipping. Good shelter in all weather. Accessible to any ship not exceeding 33 ft. draft.

"D" Anchorage.

(i) *Hilo Bay, Hawaii Island.*—Partially protected by breakwater. Anchorage for one large and two small cruisers. Accommodation alongside pier 1,400 ft. long. Coal and oil available. Exposed to attack by gunfire and torpedo.

"E" Anchorage.

(i) *Kahului Harbour, Mani Island.*—Would afford temporary anchorage for a few destroyers. Accessible to London class cruisers. Two 800 ft. piers. Heavy swell during N. and N.W. winds. Exposed to direct gunfire.

19. *Eastern Samoa.*

"D" Anchorage.

(i) *Pango-Pango Harbour, Tutuila Island.*—United States Naval Station. Whole island under naval administration. The best island in the Samoan group, but only large enough for light forces. Outer portion of harbour exposed to heavy swell. Three mooring buoys (one for cruiser) in inner harbour. Coaling wharf which will accommodate vessel 500 ft. long, 30 ft. draft.

F. *Japanese.*

22. *Marianas.*

"D" Anchorage.

(i) *Saipan Harbour, Saipan Island.*—A snug harbour for a squadron of small cruisers, but the entrance is narrow and studded with dangers. Channel marked with buoys. Open to gun and torpedo fire. Floating defences could be maintained.

23. (i) *Caroline Islands.*

"A" Anchorage.

(i) *Truk.*—Islands and islets surrounded by a reef enclosing an area of 30 miles across. Numerous entrances. Fleet anchorage could be protected by nets and mines. After survey G. and T. practice areas would probably be found inside the lagoon. Fleet could enter on Japanese chart.

"B" Anchorages.

(i) *Koror Road* (leading to Malakal Harbour) *Palan Group.*—Good holding ground, but poor shelter, only suitable as temporary anchorage. Accessible to ships of largest size. Incapable of being defended.

(ii) *Schonian Harbour, Palan Group.*—Well sheltered, good holding ground. Suitable for docks and repair facilities. Could probably be used by heavy ships after survey. Open to gunfire.

"C" Anchorages.

(i) *Woleai Islands.*—Not properly surveyed. Might be suitable for heavy ships. Well sheltered from all directions except S.W. Exposed to observation from seaward.

(ii) *Malakal Harbour, Palan Group.*—Very well sheltered. Good holding ground.

Appears quite suitable for floating docks and repair facilities. Accommodation for a number of cruisers and destroyers. Easy to defend, but open to long range gunfire.

" E " Anchorages.

(i) *Yap Island.*—Very secure harbour, but too small for anything larger than sloops unless buoys are laid down. Easily defensible against torpedo attack, but open to gunfire.

(ii) Other small " E " anchorages are Chalrol Harbour, Coquille Harbour, Port Lottin (all in Kusaie Island) and Rontiki Haven, Ponape Haven and Paliker Haven (all in Ponape Island).

Unclassified Anchorages.

There are many " unclassified " anchorages in this group, and it is probable that a survey would disclose several suitable for fleet purposes.

23. (ii) *Marshall Islands*

" A " Anchorages.

(i) *Mili or Mulgrove Atoll.*—After survey and erection of leading beacons would give safe anchorage to a large fleet. Open to observation and gunfire. Good holding ground; good protection from sea, but none from wind.

(ii) *Wotje Atoll.*—Dangerous for heavy ships until surveyed. Possible " A " anchorage.

(iii) *Majeiro or Arrowsmith Atoll.*—Dangerous for heavy ships until surveyed. Possible " A " anchorage.

(iv) *Rongerik.*—Dangerous for heavy ships until surveyed. Open to wind, gunfire and observation from seaward.

(v) *Bikini or Escholtz Atoll.*—Dangerous for heavy ships until surveyed. Wide and deep entrances. Very little protection from southward.

" D " Anchorages.

(i) *Arno Atoll.*—Well protected from the sea, but exposed to wind, observation from the sea and gunfire. Probably suitable for small cruisers.

(ii) *Jaluit Atoll.*—Capital of the Marshall Islands. Very good anchorage for cruiser squadron and some destroyers. Coaling jetty. Possibly after survey lagoon might be suitable for large ships.

Unclassified Anchorages.

The following anchorages might be suitable for naval purposes after survey:—

Aush Atoll, Maloclap Atoll, Erikub Island, Likieb Atoll, Watts Atoll, Boston Atoll, Aikinglat Atoll, Namu Atoll, Katherine Atoll, Ronglap Atoll, Eniwetok Atoll, Ujelang Atoll.

G. *French.*

24. *New Caledonia.*

" A " Anchorage.

(i) *Prony Bay.*—Good protection from the sea, but rather deep and exposed to torpedo attack. The " Great Roadstead " forms an excellent " B " anchorage. Accessible to any class of ship, but would require partial re-survey before use by a large fleet.

" B " Anchorages.

(i) *Port Bouquet.*—Inner anchorage accessible to any class of ship. Poor holding ground.

(ii) *Kanala Bay.*—Well sheltered from all but N.W. winds; mud bottom. Too hilly for shore establishment. Exposed to torpedo attack.

" C " Anchorage.

(i) *Port Noumea.*—Access easy and harbour well sheltered. Probably suitable for small repair base.

" E " Anchorage.

(i) *Lavaissiere Bay.*—Good shelter in all weathers. Probably suitable for cruiser refuelling base. Holding ground doubtful.

26. *Society Islands and Low Archipelago.*

" A " Anchorage.

(i) *Fakarava Island, Low Archipelago.*—Rectangular lagoon with three entrances. Excellent holding ground, but exposed to bad weather. Possible " A " anchorage after survey.

" D " Anchorages.

(i) *Teavanui Harbour, Borabora Island.*—Accessible to ships of 30 ft. draft in fine weather, but if bar were dredged would probably form " C " anchorage for ships of all classes. Good shelter and holding ground. Easily defensible, but exposed to gunfire from southward.

(ii) *Tahiti Island.*—Papeete Harbour well sheltered but restricted. Seat of government. Wharf and mooring buoys. Could just accommodate cruiser squadron. Probably suitable as small repair base. Defensible, but exposed to direct gunfire.

" E " Anchorages.

(i) *Raiatea and Tahaa Islands.*—Several anchorages suitable for destroyers or sloops. No ground suitable for repair facilities. Caution necessary, as soundings are scanty on the French charts.

(ii) *Moorea Island.*—Good anchorage for destroyers; well sheltered from all but northerly winds. Papetoai Bay could accommodate one cruiser.

28. *Rapa Island.*

" E " Anchorage.

(i) Ahurei Bay is well protected, and accessible to destroyers with caution.

29. *Marquesas Islands.*

" C " Anchorages.

(i) *Comptroller Bay, Nukuhiva Island.*—Outer bay exposed to heavy swell, but could accommodate two capital ships. Shelter for destroyers in coves.

(ii) *Taiohae Bay, Nukuhiva Island.*—Could accommodate a cruiser squadron, or possibly one or two capital ships. Sheltered only from October to March.

(iii) *Anaho Bay, Nukuhiva Island.*—Good anchorage in S.E. trade.

NOTE.—All these bays are indefensible, and being often exposed to heavy swell, are unsuitable as repair bases.

Part III.—Trade and Shipping.

(Island Groups numbered as before.)

Trade and Shipping of Pacific Islands.

(1935 figures except where otherwise stated.)

A.—*British.*

1. *Solomon Islands.*

Exports.—(Mainly to Australia and Europe. Principal items copra and trocas and green snail shell)—£94,000.

Imports.—(Principal items rice (mainly from Burma) preserved meat (mainly from Australia) and manufactured goods (United Kingdom and Australia))—£146,000.

Shipping.—Ships calling for cargo, year 1934–35 :—British—26 of 54,300 tons, German—5 of 4,600 tons, Japanese—1 of 3,300 tons: Total 31 of 62,200 tons.

2. *Nauru.* (1933 figures.)

Exports.—Phosphate—£437,000 (mainly to Australia and New Zealand).

Imports.—Food supplies and machinery, value £98,000.

Shipping.—70 vessels of 302,000 tons entered and cleared.

Trade is entirely in the hands of the British Phosphate Commissioners, and practically all shipping is under charter to them.

3. (i) *Gilbert and Ellice Islands (and Ocean Island).* (ii) *Fanning and Christmas Islands.* (Administered as one territory.)

Exports.—(Phosphate from Ocean Island and copra from the other islands, mainly to Australia, New Zealand and United States of America)—£340,000.

Imports.—(Food and manufactured articles) —£117,000.

Shipping.—72 vessels called at Ocean Island and 67 at Gilbert Islands.

(iii) *Vostock, Caroline and Flint Islands.*

Caroline and Flint grow cocoanuts and are visited by occasional schooners. Vostock is an uninhabited guano island. Islands are leased to the New Zealand company of Maxwell & Company. No figures for trade, which is very small.

4. *Fiji.*

Exports.—Sugar (all to United Kingdom and Canada) 72 per cent. by value, copra (to Australia) 12 per cent., and some bananas, trocas shell and gold bullion. Total value £1,800,000. Mining is being developed and some gold and silver are produced, with prospects of copper, lead, zinc blende and barytes.

Imports.—(Principally manufactured articles from United Kingdom and Australia)—£1¼ million.

Shipping.—Entrances and clearances approximately 160 vessels of 1½ million tons, 54 per cent. British.

5. *Friendly Islands (Tonga).*

Exports.—(Mainly copra, to Europe)—£90,000.

Imports.—(Principally manufactured goods and tinned meat, mainly from British Empire, but imports from Japan increased enormously in 1935)—£69,000.

Shipping.—116,000 tons entered and cleared. (50 per cent. British, 16 per cent. Swedish.)

6. *Phoenix Islands.*

(8 islands with a total area of 16 square miles and a total population of 60.) Trade and shipping insignificant.

7. *Pitcairn Island.*

Exports.—Limited to the sale of fruit and curios in small quantities to visiting ships.

Imports.—Negligible (the population is under 200).

Shipping.—About 50 ships call at the island annually.

B.—*Australian.*

8. *Lord Howe.*

Exports.—Small quantity of palm-seeds.

Imports.—Small quantity of general goods (the population is under 200).

Shipping.—Vessels on the Canada-Australia-New Zealand run call regularly. Occasional other visits from Sydney.

9. *Norfolk Island.*

Exports.—Bananas and other sub-tropical fruits and a little coffee, value (1934–35) £8,300.

Imports.—Foodstuffs and manufactured goods: value (1934–35) £26,500.

Shipping.—As for Lord Howe.

Practically all trade is with Australia.

C.—*New Zealand.*

10. *West Samoa.* (1934 figures.)

Exports.—(To New Zealand, United Kingdom, United States of America and Europe)—copra (48 per cent.), bananas (29 per cent.), cocoa beans (22 per cent.)—total value £128,000.

Imports.—(Mainly from New Zealand, Australia and United Kingdom)—manufactured goods and foodstuffs—total value £93,000.

Shipping.—96 entrances of 113,000 tons.

11. (i) *Union Islands.*

Exports.—Copra, to the value of about £2,500.

Imports.—Small quantities of foodstuffs and manufactured goods.

Shipping.—Occasional visits from Western Samoa, through which all trade is conducted.

(ii) *Cook Islands* (1934 figures).

Exports.—(Mainly to New Zealand)—Oranges (44 per cent.), bananas (28 per cent.), tomatoes (15 per cent.)—total value £59,000.

Imports.—(Mainly from New Zealand)—foodstuffs and manufactured goods—total value £61,000.

Shipping.—No figures available.

12. *Kermadec Islands.*

Normally uninhabited. Trade and shipping Nil.

D.—*Anglo-French.*

13. *New Hebrides.*

Exports.—(To Australia and Europe, especially France)—copra (47 per cent.), cocoa (32 per cent.), coffee (15 per cent.) and smaller quantities of shell and sandalwood—total value £131,000.

Fruit is abundant but is not exported for lack of markets. Coal and sulphur are known to exist but have not been exploited.

Imports.—(Mainly from United Kingdom and France, but increasing quantities from United States of America and Japan. Principal items—machinery, rice and other foodstuffs, tobacco)—£115,000.

Shipping.—Entrances and clearances: French 60 vessels of 219,063 tons, British 23 vessels of 22,055 tons, other nationalities 26 vessels of 50,266 tons, total 109 vessels of 290,384 tons.

E.—*U.S.A.*

14. *Guam.*

Exports.—Mainly copra (1933–34, 1,770 tons) and cocoanut oil. Total value (1933–34) 44,000 dollars.

Imports.—Mainly for the garrison. Value (1933–34) 346,000 dollars.

Shipping.—Apart from naval and military transports the only regular communication is the quarterly call of a merchant ship on passage from San Francisco to Manila.

16. *Sandwich Islands (Territory of Hawaii).*

Exports.—Almost exclusively to United States. Total value (1933) 94 million dollars, of which 70 per cent. sugar and 25 per cent. pineapples. Also coffee, hides, bananas and wool. More than half of the very large import of sugar into the United States of America comes from Hawaii.

Imports.—(1933) 63 million dollars.

Shipping.—Over 1,000 ships of 10 million gross tonnage normally call annually.

19. *Eastern Samoa.*

Exports.—Mainly copra (1,000–1,500 tons). Total value (1933) 22,000 dollars.

Imports.—Mainly for the garrison. Value (1933) 127,000 dollars.

F.—*Japanese.*

22–23. *South Sea Islands.*

No separate figures available for the different groups. The Governor of the South Sea Islands has his headquarters in the "South Sea Office" at Koror in the Palan Islands. Revenue now balances expenditure in a budget of 6 million yen, and in the years previous to 1934 showed a considerable surplus.

Exports.—Nearly all to Japan, though they only provide 1 per cent. of her total imports. Principal items—sugar (44,000 tons in 1934—increasing), phosphate, (65,000 tons from Angaur and Feys Islands), copra, dried fish. Total value 19 million yen.

Imports.—Total value 9 million yen, of which 1·5 million yen is rice.

G.—*French.*

24. *New Caledonia.*

Exports.—(1935) 55,500,000 fr. (56 per cent. to France). Mainly minerals, *e.g.*, 7,000 tons of nickel matte (10 per cent. of total world nickel output and 66 per cent. of world output less Canada), chrome ore 74,000 tons (9 per cent. of world chrome output).

Imports.—(1935) 54,700,000 fr. About one-third from or via Australia. Includes 80,000 tons of coal, mainly for the mining industry.

26. *Society Islands and Low Archipelago.*

Exports.—(1935) 130,000 tons of phosphate rock were exported from Makatea Island, 88 per cent. of which to Japan (this is 15 per cent. of total Japanese imports of phosphate). Also £170,000 of copra. 60 per cent. of exports go to France.

Imports.—40 per cent. (by value) from United States.

Part IV.—Japanese Fishing Activities.

Japanese Fishing Activities in the Pacific.

1. Poaching and other illegal activities by Japanese fishing vessels in foreign territorial waters in the Pacific appear to be on the increase. In many cases the crews of fishing boats have resisted arrest, and in others they have landed and plundered native villages. These offences have been particularly frequent in the Netherlands East Indies, in New Guinea, and in the New Britain group mandated to Australia, but these islands are outside the area dealt with in this survey.

2. The boat most frequently used by the Japanese in the Pacific for fishing, &c., is a sampan with an engine giving a speed of 12 knots or more, and carrying a crew of between 20 and 30 men. It is very seaworthy, has a large radius of action, and its holds will carry 20 tons of "shell." Some of these boats are believed to be fitted with a wireless set which can transmit up to 1,000 miles. Besides rifles and revolvers machine guns are often carried. They are thus very formidable craft for the local customs patrol boats to tackle, and particularly suitable for reconnaissance work. They are usually accompanied by a number of small boats from which the actual fishing is done.

3. The Japanese fishing fleets are based mainly on Singapore, Formosa, Aberdeen (Hong Kong), Mindanao, Tawao, Batavia and the Carolines. In 1934 there were 53 power and 160 sailing fishing boats based on Singapore.

4. The following is a summary of the offences by Japanese fishing craft reported since the beginning of 1933 in the area under review. They are grouped under three headings, (*a*) vessels seen in territorial waters, but no illegal act reported; (*b*) illegal acts reported, but the offenders escaped (*c*) prosecutions.

Solomon Islands.—1933 (*a*) 1, (*b*) 1, (*c*) 1. 1935 (*b*) 1. 1936 (*a*) 1, (*b*) 2, (*c*) 1.
Fiji Islands.—1936 (*b*) 2.
Western Samoa.—1936 (*a*) 1.
New Hebrides.—1933 (*a*) 1. 1936 (*b*) 1.
New Caledonia.—1936 (*c*) 1.
Gilbert and Ellice Islands.—1933 (*a*) 1.

A report on the subject of Japanese fishing activities from the Staff Officer (Intelligence), Wellington, dated the 2nd March, 1937, contains the following information:—

There have been very few reports of illegal fishing activities in territorial waters on this station. The areas most likely to be visited are the Gilbert and Ellice Islands, Fiji and Samoa. A summary of the incidents that have occurred on the New Zealand Station in recent years is attached.

The High Commissioner for the Western Pacific, Suva, and the Administrator of Samoa, Apia, were consequently requested to supply the following information as regards the Gilbert and Ellice Islands and Fiji and Samoa respectively;

(*a*) Resources available under their Administration to combat Japanese illegal fishing activities.
(*b*) Information *re* any laws affecting illegal fishing with any suggestions how they could be strengthened.

No reports of any visits by Japanese sampans to the French Possessions in this area, namely the Society Islands, the Marquesas and the Low Archipelago, can be traced. These Islands, situated as they are in the South Pacifici, are probably too far afield to be visited by these vessels. It was not considered necessary to communicate with the Reporting Officer at Tahiti, Society Group, in view of the unlikelihood of obtaining any useful information and the probable long delay before a reply could be obtained.

Unconfirmed reports indicate that Japanese sampans are a source of annoyance in the vicinity of the Hawaiian Islands, especially at Honolulu, during any American naval exercises in that area.

Part V.—Existing Air Facilities of Possibility of Development for Air Purposes.

Note.—The islands are arranged in the groups shown on the coloured maps. Groups are numbered consecutively under the following main headings:—

A. British.
B. Australian.
C. New Zealand.
D. Anglo-French.
E. U.S.A.
F. Japanese.
G. French.

A.—*British.*

1. *Solomon Group.*

(i) *Christoval Island.*

There is a deep landlocked bay at *Wakira* with an entrance 400 yards wide. The bay is surrounded by hills 300–400 ft. high with peaks up to 1,000 ft., and is probably not suitable for large seaplanes.

(ii) *Fauro Island.*

Tomo Harbour is believed to be suitable for seaplanes.

(iii) *Florida Island.*

There is a harbour 3 miles by 1 mile which, owing to the conformation of the surrounding hills, is subject to variable winds which alter direction by as much as 90° in 100 yards.

(iv) *Gavatu Island.*

There is sheltered water 1¼ miles by 1 mile between *Gavatu and Florida Islands.* The North shore of *Gavatu Island*, if cleared of trees, is suitable for the construction of slipways and hangars.

(v) *Gizo Anchorage*

Between Gizo and Shelter Islands. There is sheltered water 1½ miles by ½ mile.

(vi) *Guadalcanal Islands.*

Malapa Bay has sheltered water 1¼ miles by 2½ miles. The shore appears suitable for the construction of slipways or hangars.

(vii) *Malaita Island.*

(a) *Bina Harbour* is completely sheltered and offers runways of 1½ miles in all directions. There is a beach between Arabalo and Takwori in the North-West corner of the harbour on which slipways and hangars could be constructed.

(b) *Royalist Harbour* is completely sheltered water with high hills surrounding three-quarters of its perimeter. Runways of 1 mile by 600 yards are available.

(c) *Sio Harbour.*—This bay is 4 miles by 2 miles with shallow water and coral reefs near the beach. It is unprotected to the North-West. The shores are suitable for the construction of slipways or hangars.

(viii) *Mono Island.*

Blanche Harbour between Mono and Stirling Islands is a possible alighting place for seaplanes.

(ix) *Rendova Island.*

Rendova Harbour is protected from all directions except from the South-West. Runways of 1 mile can be obtained in any direction. There are large spaces of shore on which hangars or slipways could be made.

(x) *Shortland Island.*

Shortland Harbour is exposed and subject to very bad seas in rough weather.

(xi) *Tulagi Island.*

There is a stretch of water between *Mokambo* and *Florida Islands* which is protected against the swell by reefs. Its dimensions are 1¼ miles by 1,400 yards. There is a small flat piece of land on *Mokambo* on which slipways or hangars could be made.

(xii) *Ysabel Island.*

There is no suitable water for the operation of seaplanes.

2. *Pleasant Group.*

No information available.

3.—(i) *Gilbert and Ellice Islands.*

(a) *Funafuti (Ellice).*

There is an extensive lagoon which would offer good runways if a few coral pinnacles were blasted. There is a pier and a good anchorage for ships. This site is reported as most suitable for flying boats.

(b) *Taputeuea.*

Not suitable.

(c) *Onotoa.*

Not suitable.

(d) *Nukufetau.*

There is a large sheltered lagoon with a good anchorage for ships and seaplanes. Runways are available, but there are probably many coral pinnacles.

(e) *Tarawa.*

There is an extensive lagoon with good access and ample anchorage for ships and seaplanes. There are good runways with no obstructions. There is a pier 400 yards long. A landing ground might be cleared on the island.

(f) *Vaitupu.*

There is a small lagoon suitable for the use of seaplanes. There is no safe anchorage for ships.

(g) *Nui.*

Unsuitable.

(h) *Taritari (Butaritari).*

There is an extensive lagoon accessible to ships with ample anchorage for ships and seaplanes. There are long runways with many coral pinnacles and reefs.

(i) *Ocean Island.*

Unsuitable.

(j) *Nauru.*

Unsuitable.

3.—(ii) *Fanning and Christmas Group.*

(a) *Fanning Island.*

There is a good lagoon with runs up to 1 mile in all directions, but liable to strong currents, and some blasting of coral would be necessary. The harbour has a pier 129 ft. long, with a 5-ton crane. There are cable and W/T stations, small workshops, and a resident doctor. There is room for sheds and slipways at *Whaler Anchorage* or at *Baerau.* A landing ground might be possible, but considerable drainage would be required.

(b) *Christmas Island.*

There is a lagoon which could be made suitable for seaplanes. There is a sheltered bay on the West of the island. There is room for hangars and slipways at *Paris.* Fresh water is available from a well and from catchment tanks. A good landing ground 2 miles by 2 miles could be made on the Northern fringe of the island.

3.—(iii) *Vostock, Caroline and Flint Group.*

(a) *Flint Island.*

Unsuitable

(b) *Caroline Island.*

The lagoon is unsuitable but the open sea is feasible in prevailing winds, but gives no shelter from westerly winds.

(c) *Vostock Island.*

Unsuitable

(d) *Starbuck Island.*

There is no lagoon and the open sea is unsuitable. A landing ground might be made in the centre of the island, but would probably be marshy after heavy rain.

(e) *Malden Island.*

Unsuitable.

4. *Fiji Group.*

(i) *Exploring Islands.* (*Lau Group.*)

There is a large lagoon surrounded by coral reef with adequate depth of water and runways. There is a good anchorage for ships.

(ii) *Suva Harbour.*

There is a spacious harbour suitable for all types of vessels and seaplanes. There is no proper landing ground, but the Suva sports field 17 acres in extent was used by Kingsford Smith who also used *Naseali* beach when taking off with a heavy load. There is a cable station, W/T station, hospital and workshops. Petrol and oil are available.

(iii) *Ono-i-Lau.*

A group of islands surrounded by a lagoon which offers runs of 1 mile in all directions. The depth of water is believed to be adequate. There is an anchorage for ships.

(iv) *Vita Levu.*

Lautoka Harbour offers runs of 6,000 yards by 500 yards. A landing ground could be made without great difficulty. Petrol and oil are available.

(v) *Levuka.*

Seaplanes could alight in the lagoon which is, however, rather exposed.

(vi) *Kandavu Island.*

N'Galoa Harbour might be suitable for seaplanes.

(vii) *N'Gau Island.*

Unsuitable.

(viii) *Vanua Levu.*

There are two creeks which might be suitable for seaplanes giving a depth of water of from 4–8 fathoms. *Labasa* (*Mali Anchorage*) might also be suitable for seaplanes.

(ix) *Taviuna Island.*

It is known that a seaplane has made regular trips to this island.

(x) *Yawawa Island.*

Lands Harbour might be used in an emergency, but is unsuitable during most of the year owing to the strong prevailing winds.

5. *Friendly Group* (*Tonga*).

(i) *Neiafu Harbour.*

Neiafu Harbour in the *Vavua Group* has a landlocked harbour offering runs of 1¼ miles in all directions and having ample depth of water. There is a wharf, hospital, W/T station, and a small hotel.

(ii) *Nukualofa* (*Tongatabu*).

There is a landlocked harbour with ample depth of water offering runs of 3 miles in all directions. The race course might be adapted for a landing ground. There is a W/T station.

(iii) *Niuatobutabo.*

Unsuitable.

(iv) *Minerva Reef.*

This is a barren coral reef. There is a lagoon which offers runs of 2 miles in all directions.

6. *Phoenix Group.*

(i) *Phoenix Island.*

Unsuitable.

(ii) *Canton Island.*

There is a large lagoon with many patches of reef which would require blasting before seaplanes could use it.

(iii) *Hull Island.*

There is a large lagoon which could be made suitable for seaplanes by considerable blasting of coral. There is no anchorage for ships.

(iv) *Sydney Island.*

There is an enclosed lagoon with ample depth offering runs of 1 mile in all directions. There is no access from the sea, but there is a possible anchorage outside for small ships.

(v) *McKean Island.*

This is a small swampy lagoon and is probably unsuitable.

7. *Pitcairn and adjacent islands.*

(i) *Pitcairn.*

Impossible.

(ii) *Oeno.*

No information available.

(iii) *Henderson.*

There is a plateau on this island 7 miles by 4 miles, where a landing ground might be constructed.

(iv) *Dulcie Island.*

No information.

B.—*Australian.*

8. *Lord Howe Group.*

No information.

9. *Norfolk Group.*

(i) *Norfolk Island.*

There is no lagoon and no sheltered anchorage.

C.—*New Zealand.*

10. *Western Samoa.*

(i) *Apia.*

There is a harbour which is exposed towards the North which would be suitable for seaplanes in fine weather only. It offers runs of about 880 yards in all directions. There are workshops and meteorological and W/T stations. A landing ground might be constructed on the race course.

(ii) *Upolu Island.*

The fringing reefs provide most of the coastline with a belt of sheltered water varying in width from a few hundred yards to 2½ miles.

(iii) *Malifanua Beach.*

Seaplanes might use this in calm weather.

(iv) *Safata Harbour.* (10 miles S.S.W. of *Apia.*)

There is a large sheltered area of water at *Vaijee.*

(v) *Satapuala Beach.* (16 miles W. of *Apia.*)

Seaplanes could alight in calm weather.

11.—(i) *Union Group.*

The islands in this group are reported as unsuitable for the operation of seaplanes.

(ii) *Cook Group.*

(a) *Penrhyn.*

There is a lagoon with coral shoals which could offer runs of 1 mile in all directions. There is an anchorage for small ships with a pier at *Okomo* where there is also room for hangars and slipways. Open sea anchorages are practicable on the leesides of the island.

(b) *Danger Island.* (*Pukapuka.*)

Unsuitable.

(c) *Nassau Island.*

Unsuitable.

(d) *Aitutaki Island.*

Unsuitable.

(e) *Anchorage Island.*

There is a lagoon which might be used by seaplanes.

(f) *Atiu Island.*

This is unsuitable for seaplanes, but a landing ground might be made in the centre of the island.

(g) *Harvey Island.* (*Manuae.*)

There is a deep lagoon studded with coral heads which might be made suitable for the operation of seaplanes. The beach between *Via Toka and Arekai* has flat clear stretches on it sufficiently large and hard for landplanes.

(h) *Manahiki Island.*

There is a lagoon, but the large number of coral heads would make it unsuitable for use by seaplanes.

(i) *Palmerston Island.*

There is a very shallow lagoon with many coral heads and sandbanks.

(j) *Rakahanga Island.*

There is a lagoon which could be used by seaplanes.

(k) *Rarotonga Island.*

Ngatangiia Harbour might be used for seaplanes, but a large part of it dries up at low water.

(l) *Takutea Island.*

Unsuitable.

12. *Kermadec Group.*

There are no sheltered waters in this group, but it might be possible to operate seaplanes from *Sunday Island.*

D.—*Franco-British.*

13. *New Hebrides Group.*

The island of *Vila* is reported to have a harbour from which seaplanes could operate.

E.—*U.S.A.*

14. *Guam Group.*

The Americans have selected *Port Apra* as a base for their Trans-Pacific flying boat service. There are repair facilities, a radio station, and a hotel.

15. *Wake Group.*

This group consists of three islands round a central lagoon on which Pan-American Airways have developed a base for seaplanes, and have provided repair facilities, fuel supplies, &c.

16. *Hawaii (Sandwich Group). Including Midway Island.*

(i) *Midway Island.*

The lagoon is used on the American Trans-Pacific air route. There are repair facilities and other services.

(ii) *Maui Island.*

(a) *Hana.*—There is a private landing ground which is also used for commercial purposes.

(b) *Maalaea* (*Kihei*).—There is a landing ground used by Inter-Island Airways Limited.

It is 1,350 yards by 700 yards and has two runways each of 400 yards by 25 yards.

(c) *Wailuku* (*Kahului*).—There is a landing ground used by Inter-Island Airways.

(d) *Honakahau*.—There is a landing ground.

(e) *Kahului*.—There is a seaplane alighting area.

(f) *Lahaina*.—There is a landing ground.

(g) *Spreckelsville*.—There is a landing ground.

(iii) *Kauai Island*.

(a) *Hanapepe* (*Port Allen*).—There is a civil and military landing ground 699 yards by 250 yards.

(b) *Lihue* (*Wailua*).—There is a civil and military landing ground used by Inter-Island Airways.

(c) *Waimea* (*Barking Sands*).—There is a landing ground on the beach, 457 yards by 667 yards.

(d) *Nawiliwili Bay*.—There is a seaplane alighting area.

(e) *Wainiha* (*Sanborn*).—There is a landing ground.

(iv) *Hawaii Island*.

(a) *Hawi* (*Upolu Point*).—There is a civil and military landing ground, 400 yards by 133 yards, used by Inter-Island Airways Limited.

(b) *Hilo*.—There is a civil aerodrome with runways of 833 yards by 100 yards and 600 yards by 67 yards. It is used by Inter-Island Airways Limited.

(c) *Hilo Bay*.—There is a seaplane alighting area 1,800 yards by 1,800 yards.

(d) *Ka Lae Point*.—There is a military landing ground.

(e) *Honuaula*.—There is a landing ground.

(f) *Volcano House*.—There is a landing ground.

(v) *Oahu Island*.

(a) *Hickhan Field*.—There is a military aerodrome.

(b) *Lukefield* (*Ford Island*).—There is a military and naval aerodrome, 1,000 yards by 133 yards.

(c) *Honolulu* (*John Rodgers*).—There is a civil aerodrome which is used by Inter-island Airways. It has landing strips 733 yards by 183 yards, and 683 yards by 83 yards.

(d) *Pearl Harbour*.—There is a seaplane base, naval and civil.

(e) *Schofield Barracks*.—There is a military aerodrome 2,200 yards by 440 yards.

(f) *Ewa*.—There is an airship station with a mooring mast.

(g) *Waianae*.—There is a seaplane alighting area.

(h) *Waimanalo*.—There is a military landing ground.

(i) *Haleiwa, Kahuku, Mokuleia, Waianae*.—There are landing grounds.

(vi) *Molokai Island*.

(a) *Hoolehua*.—There is a civil landing ground 1,333 yards by 167 yards which is used by Inter-Island Airways Limited.

(b) *Kalaupapa*.—There is a civil landing ground 325 yards by 125 yards.

(c) *Halawa* (*Brant Field*).—There is a landing ground.

(vii) *Lanai*.

There is a private landing ground which is also used by Inter-Island Airways Limited.

(viii) *Kahoolowe*.

There is a landing ground.

(ix) *Niihaw*.

(a) *Kona Point*.—There is a landing ground.

(b) *Puu Wai Point*.—There is a landing ground.

17. *Johnston Island*.

Reported unsuitable for flying boats.

18. *Swain Island*.

There is a lagoon in the centre of the island about 8 fathoms deep which would allow runs of half a mile in all directions. There is no entrance to the lagoon from the sea.

19. *Eastern Samoa*.

(i) *Tutuila* (*Pago-Pago*).

There is an excellent natural harbour on the South side of the island which gives runs of 1 mile in all directions. The Americans use it as a naval base. It has a W/T station.

20. *Kingman Reef and Palmyra*.

(i) *Kingman Reef*.

There is a lagoon about 10 miles by 4½ miles, but there is very little land surface.

(ii) *Palmyra*.

There are three enclosed lagoons which are inaccessible to ships. The largest might be suitable for seaplanes as it gives runs of 1,500 yards in all directions. It is surrounded by palms and coconut trees.

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21. (i) *Howland*.

Reported as unsuitable for seaplanes, but is being developed by the Americans as an aerodrome with W/T facilities.

(ii) *Baker*.

Might be suitable for landplanes.

(iii) *Jarvis*.

There is a landing ground and a W/T station.

F.—*Japan.*

22. *Mariana Group.*

(i) *Saipan.*

There is a landing ground and seaplane facilities. The projected civil air route from *Japan* to *Pelew Island* will call at *Saipan*. The stage to *Saipan* may be operated by flying boats in April, 1937.

(ii) *Pagan.*

There is a landing ground which was used during the Japanese naval manoeuvres in 1933.

NOTE.—The Japanese probably maintain emergency landing grounds in this Group other than those mentioned above.

23. *Caroline and Marshall Group.*

(i) *Pelew.*

There are landing grounds and seaplane facilities. A civil air route *Japan–Saipan–Pelew* is projected, and the stage to *Saipan* may be started in April, 1937. There is a W/T station and reserves of fuel oil.

(ii) *Marshalls.*

There is a landing ground at *Jaluit* which has been used by Japanese naval aircraft. There are probably other emergency landing grounds in the *Marshall Group*.

G.—*French.*

24. *New Caledonia.*

There is a landing ground near *Paita* 25 miles from *Noumea*. It has one runway and two more are being built. There are two underground petrol tanks each holding 500 gallons.

25. *Hoorn.*

No information.

26. *Society Group.*

Seaplane slips have been made and stores of oil laid down.

27. *Austral.*

No information.

28. *Rapa.*

No information.

29. *Marquesas Group.*

Seaplane slips have been made and stores of oil laid down.

PART VI.—METEOROLOGICAL INFORMATION.

NOTE.—The information has been arranged to cover 8 groups of islands, as follows :—

Group 1. Fanning, Christmas, Jarvis, Palmyra, Phœnix, Gilbert, Ellice, Howland, Baker, Pleasant, Ocean, Union, and Swain Islands.
Group 2. Sandwich, Johnston and Wake Islands.
Group 3. Vostock, Caroline, Penrhyn, Flint, Society, Low Archipelago, Austral, Cook, Marquesas and Pitcairn Islands.
Group 4. Easter Island.
Group 5. Solomon Islands.
Group 6. Guam, Marianas and Caroline Islands.
Group 7. Lord Howe, Norfolk and Kermadec Islands.
Group 8. Fiji, Friendly, Samoa, New Hebrides, New Caledonia, Hoorn and Manua Islands.

Group 1.—*Fanning, Christmas, Jarvis, Palmyra, Phœnix, Gilbert, Ellice Howland, Baker, Pleasant, Ocean, Union (Tokelau), and Swain Islands.*

1. *General climate.*

This is warm and humid, with much rain in places. The average relative humidity is between 75 per cent. and 80 per cent.

2. *Surface winds.*

Local surface wind variations are considerable but, in general, these islands are under the influence of the N.E. Trade from December to May and the S.E. Trade in the remaining months. In the most western islands of this group, however, W. and N.W. winds tend to predominate from November to March, with frequent calms at night. Gales are rare.

3. *Cloud.*

Average cloud amounts vary from 3/10ths to 6/10ths of sky covered, being least on or near the equator. There is little seasonal variation.

4. *Temperature.*

The mean temperature is about 82° F. in all months. The highest recorded temperature is 106° F. whilst the lowest recorded is 65° F.

5. *Visibility.*

Fog is rare, but visibility may be seriously impaired during intense rainfall.

6. *Rainfall.*

This varies considerably from year to year and also from place to place. At Ocean Island 159 ins. were recorded in one year, whilst only 15 ins. occurred in another year. On Christmas Island the mean annual rainfall is 40 ins., but during the period January to October, 1905, inclusive, 298 ins. of rain were recorded. On Fanning Island, the mean annual rainfall is about 99 ins.

7. *Thunderstorms.*

These are infrequent, though they may be severe.

8. *Special phenomena.*

Hurricanes.—The area between 5° N. and 5° S. in the vicinity of these islands is probably free from hurricanes.

The Ellice Islands, however, were devastated by a severe hurricane in February, 1891, the only one in this group of islands of which record has been traced.

Group 2.—*Sandwich, Johnston and Wake.*

The notes below refer to the Sandwich Islands. No data are available for Johnston and Wake but conditions there are probably similar to those at the Sandwich Islands.

1. *General climate.*

This is warm, equable and humid; the average relative humidity is about 70 per cent.

2. *Surface winds.*

These are mainly from between N.E. and E. Land and sea breezes are pronounced on the larger islands. Gales are not frequent, but may occur occasionally during the period November to April.

3. *Cloud.*

Cloud amounts average about 5/10ths of sky covered.

4. *Temperature.*

Monthly mean values at Honolulu vary between 71° F. in January and February, and 78° F. in July, August and September; the highest recorded temperature at that station is 88° F. and the lowest recorded is 52° F.

5. *Visibility.*

Fog is rare, but visibility may be reduced to very low values during heavy rainfall.

6. *Rainfall.*

The total rainfall for any one year and the distribution throughout the year may vary considerably from place to place. The average annual fall at Hilo is 139 ins. whilst at Mahukona it is only 17 ins. The rainfall is chiefly of the showery type, but the showers may be intense.

7. *Thunderstorms.*

These, though infrequent, are not confined to any particular months.

8. *Special phenomena.*

These islands do not appear to be subject to tropical storms or hurricanes.

Group 3.—*Vostok, Caroline (Line), Penrhyn, Flint, Society, Low Archipelago, Austral, Cook, Marquesas, Pitcairn and dependencies Islands.*

1. *General climate.*

This is warm and humid, with an average relative humidity of about 80 per cent. In the islands about 20° S., however, the climate is somewhat less warm, there being a definite, if not pronounced, cool season from June to September.

2. *Surface winds.*

These are mainly from between N.E. and S.E. Land and sea breezes are well marked on the coasts of the larger islands. Gales are infrequent.

3. *Cloud.*

Cloud amounts average between 5/10ths and 6/10ths of sky covered. The most cloudy months are December to March.

4. *Temperature.*

The mean annual temperatures increase from about 74° F. in the Cook Islands (where the range of mean monthly temperatures is about 12° F.), to about 80° F. in those islands nearer to the equator, where the highest recorded temperature is nearly 100° F. The lowest recorded temperature in the Cook Islands is 48° F.

5. *Visibility.*

Fog is probably infrequent, but visibility may be reduced to low limits during intense rainfall.

6. *Rainfall.*

Amounts vary considerably from place to place and also from year to year. The mean annual rainfall on Cook Island is about 80 ins., nearly 70 per cent. of which occurs between October and March.

7. *Thunderstorms.*

These are infrequent except from November to April when two or three storms occur on the average in each month.

8. *Special phenomena.*

The hurricane season is from December to March. They have been experienced most often near the Society Islands, where the frequency is less than one per season.

Group 4.—*Easter Island (Rapa Nui).*

1. *General climate.*

This is mild and humid, with an average relative humidity of about 80 per cent.

2. *Surface winds.*

During the period October to April surface winds are mainly from between E. and S. though with N. and N.E. winds also fairly frequent. In the remaining months they are very variable.

Gales are infrequent.

3. *Cloud.*

Cloud amounts average about 6/10ths of sky covered in all months.

4. *Temperature.*

The mean annual temperature at Mataveri is about 68° F. The warmest months are January to March and the coolest July to September. The range of mean monthly temperature is about 10° F.

5. *Visibility.*

Fog is infrequent except perhaps in May.

6. *Rainfall.*

The average annual rainfall is about 50 ins. In June 6·6 ins. have been recorded in 24 hours.

7. *Thunderstorms.*

Data regarding thunderstorms are very limited, but they are probably not very frequent.

Group 5.—*Solomon Islands.*

1. *General climate.*

This is warm and humid, with much rain; the average relative humidity is about 80 per cent. There is no cool season.

2. *Surface winds.*

The surface wind is almost exclusively south-easterly (the S.E. Trade) from April to November, but in the remaining months the Solomon Islands are near the boundary between the S.E. Trade and the N.W. Monsoon, and consequently they may then experience either of these winds, though mostly the N.W. Monsoons.

Land and sea breezes are pronounced on the larger islands. Gales are infrequent.

3. *Cloud.*

Cloud amounts average 5/10ths to 6/10ths of sky covered. There is little seasonal variation.

4. *Temperature.*

The mean temperature is about 80° F. in all months. The highest recorded temperature is 97° F. and the lowest recorded is 67° F.

5. *Visibility.*

No information regarding visibility is available.

6. *Rainfall.*

The mean annual rainfall at Tulagi is 121 ins.; 38 per cent. of this falls during the period January to March, whilst the remainder is fairly evenly distributed throughout the remaining months. Amounts vary considerably from year to year and from place to place, dependent on topography and degree of exposure to the prevailing winds. There is a so called "dry season" from June to September, but in no month is the average fall less than 6·6 ins.

When the hurricanes affect the islands, very heavy rains may be widespread and cause severe floods; over 9 ins. of rain have been recorded in a period of 24 hours in February.

7. *Thunderstorms.*

These are infrequent, but may occur in any month.

8. *Hurricanes.*

Hurricanes may occur between December and March, but the normal frequency is only about one in five years.

Group 6.—*Guam, Marianas and Carolines.*

1. *General climate.*

This is warm and humid, with much rain; the average relative humidity is from 80 per cent. to 85 per cent.

2. *Surface winds.*

These are from between N.E. and E. for most of the year, though during the months July to September (inclusive) S.W. winds are also fairly frequent. Calms commonly occur at night during the months May to October. May is the month in which gales are most likely to occur, but they are in any case infrequent. Land and sea breeze effects are pronounced on the larger islands.

3. *Cloud.*

Cloud amounts average between 7/10ths and 8/10ths of sky covered. There is a tendency for cloud amounts to be greatest during the period July to October.

4. *Temperature.*

The mean temperature is about 81° F. in all months. The highest recorded temperature on the Caroline Islands is 98° F., and the lowest recorded is 67° F.

5. *Visibility.*

No observations of fog or mist are available. It is probable that visibility may be reduced to very low values during intense rainfall.

6. *Rainfall.*

Amounts vary considerably from year to year and also from place to place. At Sumay, Guam Island, the yearly average is 91 ins., with a marked period of heavy rainfall from July to October; in the latter month 16 ins. have been recorded during a period of 24 hours. At Ponape, Caroline Islands, the yearly average is 178 ins. The rains associated with typhoons are often widespread and intense and may cause severe floods.

7. *Thunderstorms.*

These, though infrequent, may occur in any month, especially from July to November.

8. *Special Phenomena.—Typhoon.*

These islands are in a region where typhoons commonly develop. Whilst no month can be regarded as immune from them, they have mostly occurred between July and November; those may be particularly violent. At Guam, 15 typhoons were experienced in the 26 years, 1883–1908.

Group 7.—*Lord Howe, Norfolk and Kermadec.*

1. *General climate.*

This is mild and equable.

2. *Surface winds.*

During the period December to May winds from between N.E. and S.E. prevail (the S.E. Trade), but from June to November, winds are variable, with those from between S. and W. and from between E. and S.E. predominating. Gales may occur in any month; on Norfolk Island they are most frequent in July, in which month they average three.

3. *Cloud.*

Cloud amounts average between 5/10ths and 6/10ths of sky covered.

4. *Temperature.*

Mean annual temperatures are about 67° F. The highest recorded temperature at Norfolk Island is 89° F., and the lowest recorded is 46° F. Monthly mean values at both Norfolk Island and Lord Howe Island vary from 61° F. in July and August to 73° F. in January and February.

5. *Visibility.*

Fog, though infrequent, may occur in any month from August round to April, though more especially in September, October and December. Visibility may be reduced appreciably during heavy rainfall.

6. *Rainfall.*

Annual rainfall amounts average 66 ins. on Lord Howe Island and 53 ins. on Norfolk Island. The rainiest months are June to August.

7. *Thunderstorms.*

These, though infrequent, may occur in any month, but chiefly between May and December.

8. *Special phenomena.*

These islands may be affected by southward or south-eastward moving hurricanes, which are most common in the months December to April.

Group 8.—*Fiji, Friendly (or Tonga), Samoa, New Hebrides, New Caledonia, Hoorn and Manua.*

1. *General climate.*

This is equable, warm and humid, with much rain in places. The average relative humidity is about 80 per cent.

2. *Surface winds.*

These are mainly from between N.E. and S.E. throughout the year, but from December to March (inclusive) winds from between W. and N. interrupt the trade winds. Land and sea breezes are pronounced on the larger islands. Gales, though infrequent, may occur in any month, especially from January to March.

3. *Cloud.*

Amounts vary from island to island, but the general average is about 6/10ths of sky covered.

4. *Temperature.*

The annual mean temperatures vary between 75° F. and 80° F. The highest recorded temperature is 98° F. in these islands, which occurred at Suva, Fiji, whilst the lowest recorded, which occurred at Nukualofa, Tonga Islands, is 52° F. The warmest months are from January to March and the coolest July and August.

5. *Visibility.*

Fog is rare, but during intense rainfall the visibility may be seriously impaired.

6. *Rainfall.*

Rainfall amounts vary considerably from place to place and also from year to year. The annual average for most of these islands is about 100 ins., but at Numea, New Caledonia, it is only 51 ins. The period of heaviest rainfall is from December to May (inclusive); but at Suva, Fiji Islands, 27 ins. of rain were recorded in a period of 24 hours in August. Rains which occur during the passage of hurricanes may be widespread and heavy and cause severe floods.

7. *Thunderstorms.*

The period of greatest frequency is from October to April, the average at Apia, Samoa, being three storms in each of these months. At Suva, Fiji Islands, six storms occur on the average in each of the months January to April.

8. *Special phenomena.—Hurricanes.*

These islands are situated in the hurricane region and may experience a hurricane in any of the months September to May, though December to April is usually regarded as the hurricane season. Although the average frequency of these storms is only about one per season, they may produce very destructive effects.

Part VII.—The Philippine Islands.

The Philippine Islands.

Section I.—*General Survey.*

1. *General.*

The Philippine Archipelago, which extends for 950 miles from north to south, lies in the tropics; the most northerly island is 65 miles from Formosa; the most southerly 30 miles from Borneo. There are 7,083 islands in the group, of which 30 islands have an area of over 100 square miles each, and 466 are over one square mile in area. The total area in square miles is 114,400. Luzon, the largest island, has an area of 40,800 square miles and Mindanao is next largest with 36,000 square miles. Ten million acres, or 13½ per cent. of the total area of the islands is cultivated.

The islands are very mountainous, and the ranges, which generally run north and south, lie close to the sea in many places. 55 per cent. of the country is occupied by forests. Communications in most of the islands are primitive.

American strategic interests are centred in Luzon in which island is the port of Manila and the naval base at Cavite, and their naval, military and air forces are concentrated in Luzon for the defence of these places. The Valley of Luzon is the dominant strategic, economic and political area of the islands. Commencing at Lingayan Gulf on the north-west coast it extends about 100 miles to Manila Bay. It is the seat of large scale agriculture, and its inhabitants are considered the most educated and best organised politically of the islands. The valley is broad enough to permit of large scale military operations, and the many miles of railway which connect the sugar fields with the milling plants would be of great assistance to a defender delaying an attack from the north.

2. *Population.*

The population in 1933 was estimated at 13½ millions, of which 1,200,000 are non-Christian; half a million being Moslem (Moros).

The alien population was estimated as follows:—

Chinese	... ...	150,000
Japanese	... ...	50,000
(increase of 43,000 in 9 years)		
Americans	... ...	8,500
Spaniards	... ...	4,000
Other Europeans	...	3,000

Note.—Chinese are now excluded from the islands unless closely related to an authorised resident.

The Philippinos proper are descendants of Malays, Christianised by the Spaniards. The aborigines are Pygmies, Indonesians and Malays. Great varieties of race exist throughout the islands and 43 different languages are spoken.

3. *Climate.*

The climate is mildly tropical. The mean temperature varies very slightly throughout the year, May being the warmest month (80·4° F. to 82·5° F.) and January the coolest (77·7° F. to 80° F.).

In the northern and western portions of the islands the rainfall occurs in summer and autumn (June to October). In the southern and eastern portions it continues throughout the year, the maximum being during the winter months. In Manila it averages 80 inches. Typhoons can occur all the year round, but are prevalent from June to September. The cooler months November to March are the most suitable for military operations and for an invading force on account of a lesser chance of a typhoon.

4. *Transport Facilities.*

(i) *Railways.*—There are 799 miles of railway (3 ft. 6 in. gauge) in the islands, of which 667 miles are in Luzon and the remainder in Panay and Cebu.

(ii) *Roads.*—There are 7,385 miles of roads, of which 3,956 are first class—that is from a military point of view suitable for all arms at all seasons.

Figures for 1935:—	No.
Passenger motors ...	23,059
Passenger buses ...	2,600
Motor trucks	8,500

(iii) *Airways.*—The Philippine Air Taxi Co. operates land and water planes to most parts of the Archipelago.

5. *Signal Communications.*

(i) *Cables.*—The Commercial Pacific Cable Co. (U.S.A.) maintains cable communication between San Francisco, Honolulu, Midway Island, Guam, Manila and Shanghai. The Eastern Telegraph Co. (British) operate cables via Hong Kong and Singapore to Australia, India, Africa and Europe.

(ii) *Wireless Telegraphy. Naval.*—Station at Cavite communicates with Guam, Pearl Harbour, San Francisco and Peiping.

Commercial.—A station at Manila communicates with Tokyo, Shanghai, Bandoeing, Makan, Bangkok, Saigon, Hong Kong, Bolinas and some European stations.

(iii) *Telephones.*—There is telephonic communication between Iloilo and Manila, and also a long distance system to most large towns in Luzon Island. Radio telephone service is maintained between Manila and the principal islands.

Section II.—*Naval Base Facilities and Maintenance of the Fleet.*

1. *Naval Dockyards and Bases.*

(i) *Cavite* in Manila harbour was selected in 1920 as a naval base after fifteen years' discussion of the rival merits of Olongapo, but very little appears to have been done. Workshops exist, but no information is available as to their capabilities.

There is stowage for the following quantities of oil fuel:—

Fuel oil: 15,700 tons.
Diesel oil: 750 tons.
Gasoline (aviation): 10,000 gallons in drums.
Gasoline (motor): 105,600 gallons.

Three new oil tanks to hold about 2,500 tons each are to be built close to the pier on Corregidor Island.

Manila Bay is an "A" class anchorage 20 miles by 20, and is open to all vessels, but Cavite naval anchorage has depths of under 5 fathoms.

(ii) *Olongapo* in Subig Bay has declined in importance since Cavite was chosen to supersede it as a naval base. The Dewey floating dock is still in use, as is the power station. A number of workshops are situated opposite the floating dock, but it is believed that much of the machinery has been removed to Cavite.

Subig Bay is an "A" anchorage with a main entrance about 1¼ miles wide with a depth of 33 fathoms. Olongapo Bay is a good typhoon anchorage.

2. *Commercial Ports and Establishments.*

(i) *Manila.*—Ships under 1,100 tons can be docked by the Bureau of Commerce and Industry. Workshops of the same company, the Atlantic Gulf and Pacific Co. and the San Nicholas Iron Works can carry out large repairs to boilers and machinery. About 35,600 tons of commercial fuel are kept.

(ii) *Cavite.*—Valdero de Manila, Earnshaw's Docks and Honolulu Iron Works have patent slips and can carry out large repairs.

(iii) *Zamboanga.*—The port and principal town of Mindanao Island. A poor anchorage exposed to gales from the west and south-west. There is a pier with 26 feet of water at the end, and oil fuel can be obtained.

(iv) *Iloilo* in the Island of Panay.—A dredged channel 500 feet wide and 24 feet deep leads to the quays in the river with 20 to 24 feet alongside. There are a few tugs and lighters and facilities for minor repairs. The port is being improved.

(v) *Cebu.*—Harbour is formed by the channel which separates Mactan Island from Cebu, and is one of the best in the Philippines. The navigable channel is narrow, but comparatively straight, the depth varying from 5 to 11 fathoms. There are a number of concrete wharves with railways, cranes and oil fuel. Some repairs—including castings up to 1,000 lbs.—can be carried out.

3. *Port Facilities at Manila.*

The harbour consists of 1,250 acres of anchorage protected by 10,000 feet of rock breakwater wall. Approximately 9,000 feet of berthing space is available at the piers and and wharves. Fresh water is available at all piers and wharves, and water pump boats deliver to vessels at anchor. Heavy lifts up to 75 tons can be handled. A great deal of open and tank lighterage is available. The water supply comes from a reservoir in the Montalban Gorge, 20 miles to the north-east.

4. *Defences.*

Manila Bay is defended from seaward by four fortified islands, of which Corregidor is the most important. 14 inch guns and 12 inch mortars are mounted, besides batteries of smaller guns. The defences are modern, and very formidable. In addition to fixed lights in the ports there are portable 36 inch searchlights, tractor drawn, designed for H.A. use. Minefields have been prepared, but details are not available. The total strength of the garrison is 11,000, of whom 4,600 are white troops. The headquarters of the G.O.C. is at Fort Santiago, Manila. There are also military posts at Baguio (171 miles north of Manila), and at Zamboanga in Mindanao Island. There are marine barracks at Cavite and Olongapo.

Except for a small garrison at Zamboanga the remaining islands are protected and policed only by constabulary, which number approximately 6,500 all ranks.

Efforts are being made to raise a Philippino army for the defence of the Islands, if and when independence is achieved. Up to the present little progress has been made. The fighting value of the Philippino is low.

Section III.—*Landing Places.*

1. *Manila Harbour and Subic Bay.*—Too heavily fortified to offer much chance of success.

2. *Lingayen Gulf* is the place where a landing is most feared. It is 100 miles from Manila, to which it is connected by road and rail through the central plain.

3. *Aparri*, at the extreme north end of Luzon. A landing here would be relatively easy, but would entail a long line of communication through difficult and possibly hostile country.

4. *Antimonan*, east coast of Luzon, connected by road and rail to Manila.

5. *Balavan and Batangas Bays*, open beaches 40 to 50 miles south of Manila with good rail and road communication.

Notes.—(1) As matters stand it is estimated that a Japanese Expeditionary Force of 3 Divisions should be able to occupy Luzon and capture Manila some considerable time before any United States relieving force could arrive from Hawaii or elsewhere.

(2) It is evident that the Philippines can only be held by a Power which possesses command of the sea in the Western Pacific. Should a strong fleet regain command of this area after the Island of Luzon had been occupied by a Japanese army it is presumed that Manila could be retaken. This would, however, require operations on a large scale, and would probably involve landing in the face of opposition.

Section IV.—*Anchorages suitable for Naval Use.*

Key "*A*" *Anchorage.*—Suitable for a large fleet, with 4 square miles or more of clear anchorage in not less than 7 fathoms.

"*B*" *Anchorage.*—Suitable for a mixed fleet, or 8 capital ships, with attendant cruisers, &c., with careful berthing.

"*C*" *Anchorage.*—Suitable for cruisers and a very few capital ships.

"*D*" *Anchorage.*—Suitable for two or more large cruisers.

"*E*" *Anchorage.*—Suitable for one or more destroyers (and in many cases for a single cruiser).

"*A*" *Class Anchorages.*

1. *Kasiguran Bay*, Luzon, east coast. Accessible to all classes of vessels, but approaches require survey. Completely landlocked, 5 ft. by 2½ ft. good holding ground, excellent shelter from all winds. Appears suitable for floating dock, but shores are hilly and thickly wooded.

2. *Burdeos Bay*, Luzon, east coast, Polillo Island, well sheltered, capable of defence, clear area of 4 square miles, would be accessible for all classes of ships if some dangers in approaches were marked. Neighbourhood of Burdeos Village would probably prove suitable for floating dock and repair base. Coal mine in vicinity.

3. *San Miguel Bay*, Luzon, east coast. Large bay exposed to all northerly winds. Calm during S.W. monsoon.

4. *Danahon Bank Anchorage*, Bokol Island, north coast. Reef anchorage with many channels. Recent United States survey. Unsuitable for repair facilities and aircraft requirements.

5. *Port Sibulan*, Mindanao, south coast. Accessible to any class of ship with inner harbour for small vessels. Accommodation for large and small floating docks, but shores appear to be heavily wooded.

6. *Igat Bay*, Mindanao, south coast. Well sheltered, easily defensible, 7 ft. by 2 ft., could accommodate a large floating dock, but doubtful if suitable for shore establishment.

7. *Palak Harbour*, Mindanao, south coast. Well sheltered and safe, but of little use except in times of peace.

8. *Bongao*, Sulu Archipelago. Good protection by high land on northern side only; much exposed to strong N.E. and S.W. winds; very difficult to defend. Accommodation for large floating dock in Chongos Anchorage.

9. *Kulion Anchorage*, Kulion Island. Outer harbour 4 ft. by 1¾ ft., 12 to 23 fathoms. Inner harbour could accommodate large floating dock, but foreshores appear to be thickly wooded and hilly. Easily defensible.

10. *Malampaya Sound*, Palawan, west coast. Spacious and landlocked anchorage, with suitable berthing accommodation for large and small floating docks. Probable site for shore base.

11. *Port Barton*, Palawan, west coast. Only partially surveyed. Not comparable to Malampaya Sound, only 30 miles away.

"*B*" *Class Anchorages.*

1. *Polillo Harbour*, Luzon, east coast, Polillo Island. Capable of defence, and accessible to ships of any class. Open to observation and gunfire. Well sheltered from sea by reef, but open to winds between N. and W.

2. *Lamit Bay*, Luzon, east coast. Two entrances; well sheltered, with good holding ground; best typhoon anchorage on east coast of Luzon. No suitable site for shore base.

3. *Port Sorogon*, Luzon, south coast. Entrance 1½ ft. wide, probably capable of A/S defence. Area 1½ ft. by 1½ ft. for heavy ships, much larger for smaller vessels.

4. *Port Looc*, Tablas Island, N.W. coast. Anchorage 2 ft. by 1 ft. to 2 ft., good holding ground and shelter from prevailing winds. Could accommodate large floating dock. Foreshore obstructed by coral reefs.

5. *Port Kataingan*, Masbate Island, S.E. coast. Moderate protection by high land except from S.E. Could accommodate large floating dock. Modern survey.

6. *Port Borongan*, Samar, east coast. Entrance capable of A/S defence. Good typhoon shelter. W/T station at Borongan town.

7. *Zumarraga Channel*, Samar Island, west coast. Big ship anchorage 1¾ ft. by 1½ ft., much larger area for cruisers and below.

8. *Malalag Bay*, Mindanao, south coast. Clear approach, accessible to any class of ship. Could accommodate large floating dock, but shores heavily wooded. Anchorage 3 ft. by 1 ft.; good shelter from all winds.

9. *Shark Fin Bay*, Palawan, east coast. Accessible to any class of ship; several navigable approaches; sheltered inner harbour. Easily defensible; excellent protection against observation and gunfire from seaward.

"*C*" *Class Anchorages.*

1. *Ports Masinlok and Matalvi*, Luzon, west coast. Port Masinlok is accessible to heavy draft ships. Port Matalvi is excellent typhoon harbour. Could accommodate large floating docks. Unsuitable for shore base. Requires considerable buoyage.

2. *San Fernando Harbour*, Luzon, west coast. One square mile, good holding ground, exposed to strong northerly winds. Unsuitable for repair establishment. Buoyed.

3. *Santa Cruz Harbour*, Marinduque Island, N.E. coast. 3 miles by 4 to 5 cables. Excellent holding ground; harbour of refuge in bad weather. Unsuitable for repair establishment.

4. *Port Palapag*, Samar, north coast. Good anchorage with moderate shelter. Easily defensible. Accessible to any class of ship. Unsuitable for repair base.

5. *Manikani Island Anchorage*, Samar, south coast. Much encumbered with islets and reefs, but appears to afford secure and well sheltered anchorage. Unsuitable for repair base.

6. *Port Lebak*, Mindanao, south coast. Easy of access with good shelter except from westerly winds. Little use except in peace.

7. *Kabilaun Island*, Busuanga, north coast. Anchorage 4 ft. by 1½ ft., but much reduced by small islands and shoals. Well sheltered by high land. Could accommodate large floating dock, but shores hilly and heavily wooded.

8. *Halsey Harbour*, Kulioi, S.W. coast. Accessible to any class of ship, but if only used

by small cruisers and destroyers could be defended by A/S obstructions. Could accommodate large floating dock, but appears more suitable as repair base for destroyers.

"D" Class Anchorages.

1. *West Dilasak Bay*, Luzon, east coast. Very inadequate survey. Typhoon anchorage for vessels of moderate draft.

2. *Pagbilao Bay*, Luzon, south coast. Accessible to *Hawkins* class. Easily defensible. Rather exposed to S. and S.W. winds.

3. *Kabalitian Bay and Port Sual*, Luzon, west coast. Anchorage for light forces; protection from N.E. winds; good holding ground.

4. *Masbate Harbour (Port Palanog)*, Masbate Island, north coast. Anchorage 1¼ ft. by ½ ft., well sheltered. Accessible to any class of ship. Could accommodate large floating dock with possible shore site.

5. *Port Libas*, Samar, east coast. Easily defended against under water attack. Accessible to any class of ship. Open to the eastward. Shores are foul.

6. *Matarinao Bay*, Samar, east coast. Could accommodate a cruiser squadron and destroyers. Good typhoon harbour but unsuitable for repair base. Modern survey.

7. *Katbalogan*, Samar, west coast. Open to S.W. monsoon. Accessible to *Kent* class cruisers. Could be defended against under water attack.

8. *Port Misamis*, Mindanao, north coast. Good holding ground, but rather exposed to N.E. winds. Buoyed. Unsuitable for repair base.

9. *Port Banga*, Mindanao, south coast. Entrance easily defensible, but anchorage exposed to gunfire. Accessible to *Hawkins* class. Shores thickly wooded.

10. *Taba Bay*, Mindanao, south coast. One square mile, good shelter. Defensible, but exposed to gunfire from seaward. Shores fringed with mangroves.

11. *North Harbour*, Balambangan Island. Unsuitable for heavy draught ships except in emergency. Well protected from prevailing winds. Unsuitable for repair establishment.

"E" Class Anchorages.

1. *Bolinao Harbour*, Luzon, west coast. Easily defensible against submarines. With the small floating dock, shore base and moorings could probably make good destroyer base. Typhoon anchorage.

2. *Port Busin*, Burias Island, north coast. Well sheltered, accessible to destroyers.

3. *Kasul Bay*, Mindanao, north coast. Snug and well sheltered, but small. Could accommodate small floating dock, shores fringed with mangroves.

4. *Puerto Princesa*, Palawan, east coast. Could accommodate one cruiser in inner harbour. Several capital ships could obtain shelter in outer harbour. Could accommodate small floating dock with shore site at town. Shores densely wooded elsewhere.

Section V.—*Economic Notes.*

1. *Agriculture.*

The chief occupation of the population of the Philippine Islands is agriculture, but up to 1932 only 15 million acres were cultivated out of 39 million acres suitable for cultivation. The chief agricultural product is rice, which is the basic foodstuff of the native population. Output is, however, inadequate to meet consumption, and some £150,000 worth has to be imported annually, mostly from French Indo-China, as well as about £500,000 worth of wheat flour.

Second in importance is cane sugar, of which there is an annual exportable surplus of over a million tons, taken mostly by the United States of America, representing 19 per cent. of the total United States annual import of this commodity.

The Philippines rank only after the Dutch East Indies and the Federated Malay States in the production of coconuts. Exports of coconut products, mainly to the United States of America, are about 600,000 tons per annum, representing over 90 per cent of United States imports of these commodities.

A further important export product is manilla hemp, the production and sales of which are largely controlled by Japanese interests. The average exportable surplus is about 180,000 tons or more per annum, and passes all over the world for the manufacture of rope and cordage. (United States dependence 99 per cent.)

Some 28,000 tons of tobacco is available for export annually, mainly in the form of leaf or cigars. Rubber is being increasingly grown, but at present the production is negligible.

There are 50 million acres of commercial forest, with an annual output of over a million cubic metres of timber and an annual export of about 50 million board feet. In addition to constructional timber, hard woods, gums, resins and commercial bark are also exported, the hard wood being taken mainly by Japan and the United States of America.

2. *Mineral products.*

The Philippines are rich in minerals, including metallic ores, many of which, however, await exploitation and development. Apart from gold, the output of which in 1935 was 444,655 fine ounces, silver and platinum are recovered.

There are three known deposits of iron ore, of which the Larap-Calambayanga with a 63 per cent. iron content is being energetically mined, the total output going to Japan who derived over half a million tons in 1935 and probably a million tons in 1936 from this source.

Two large deposits of fine chromite are about to be seriously exploited. The working of manganese has commenced. Other metals known to exist, but so far not exploited, are copper, lead and zinc, while amongst other minerals there are corundum, asbestos, sulphur, bitumen and mica, with important deposits of phosphates including natural guano.

Of fuels, coal occurs as semi-anthracite, sub-bituminous and lignite, but there is no known coking coal. So far no success has followed efforts to find workable quantities of petroleum.

The majority of the above minerals are deficiency products to Japan, whose interest in the deposits in the Philippines is correspondingly great.

3. *Shipping.*

The Philippine Islands possess no foreign going vessels, but there were in 1932 66 steamers totalling 29,730 net tons register engaged in coastwise trade, apart from a large fleet of small sailing vessels. The following table shows the total value of the carrying trade by vessels of various flags during 1934, from which it is seen that this trade was worth over £12 million per annum, or 46 per cent. of the total to the United States and over £10 million, or 39 per cent. of the total to the British Empire, the next flag on the list being the Japanese with £6¼ million, or 26 per cent. of the total:—

Flag.	Imports.	Exports.	Total Trade.
	£	£	£
British	5,452,000	4,707,000	10,159,000
United States ...	5,222,000	7,117,000	12,339,000
German	919,000	335,000	1,254,000
Japanese	1,578,000	5,002,000	6,580,000
Netherlands ...	862,000	546,000	1,408,000
Norwegian ...	1,446,000	2,909,000	4,355,000
Other countries ...	1,243,000	1,464,000	2,707,000
	16,722,000	22,080,000	38,802,000

4. *Visible trade.*

The total imports to and exports from the Philippines for 1933 and 1934, the last years for which accurate figures are available, amounted to:—

(Million sterling.)

Year.	Imports.	Exports.	Balance.
1933...	14·9	21·1	+ 6·2
1934...	16·8	22·0	+ 5·2

As a result of the trade policy of the United States and the imposition of high tariffs on imported goods, with mutually protected markets in the United States and Philippines for each other's products, 76 per cent. of the total trade of the Philippines is carried on with the United States, the closest approach to this figure being 7½ per cent between the Philippines and Japan, the value of imports from Japan being 2½ times that of exports to that country. The British Empire enjoys only about 7 per cent. of the total trade, and in 1934 this was made up as follows:—

(£ thousand.)

	Imports from—	Exports to—	Total Trade.
United Kingdom ...	417	490	907
Australia	211	58	269
Canada...	127	55	182
British East Indies...	379	66	445
Irish Free State ...	15	...	15
Hong Kong	25	122	147
Total	1,174	791	1,965

Apart from gold bullion, the most valuable export is sugar and its products, totalling over £13 million per annum, followed by coconuts, &c., at £3·7 million and hemp at £2 million. Of imports by value, cotton goods head the list with £3 million, iron and steel manufactures at nearly £3 million, then chemicals, fertilisers, electrical apparatus, dairy products, petroleum products, paper and silk goods, the total of which in each case is between £4 million and £5 million.

Section VI.—*Existing air facilities or possibility of development for air purposes.*

NOTE I.—A map showing the location of aerodromes and landing grounds is attached as Annex II.

NOTE II.—The unusual dimensions of some of the landing grounds are explained by the fact that the Americans often publish only the size of the runways. Where the dimensions are specially small, it must be assumed that further space exists which might not be available in all weather conditions.

AMERICAN ARMY AIR CORPS.

1. The American Army Air Corps keep the following forces in the *Philippines*:—

Station.	Unit.	Number of Aircraft.	Type.
Nichols Field (Manila)	H. Q. 4th Composite Group	...	...
Ditto	Air Depot ...	...	...
Ditto	2nd Observation Squadron	10	Morse O. 19. C.
Ditto	28th Bombardment Squadron	5	Keystone B. 3. A.
Ditto	66th Service Squadron	2	Transport type.
Clark Field (Fort Stotsenberg, Lonuz Island)	3rd Pursuit Squadron	10	Boeing P. 12. E.

CIVIL AIR SERVICES.

2. *Pan-American Airways.*

The terminus of Pan-American Airways Trans-Pacific air service in *Manila*. They are extending this service to *Hong Kong* in April 1937.

3. *Iloilo-Negros Air Express.*

This company operates services between *Manila, Iloilo, Bacolod, Cebu, Zamboanga* and *Fabrica*.

4. *The Philippine Air Taxi Company.*

This company operates a service between *Manila* and *Baguio* and also undertakes charter work.

5. *Royal Netherlands Air Service (K.N.I.L.M.).*

This company has applied to extend its services to *Manila*. The projected route is

Batavia–Sourabaya–Bendermasin–Balikpapan – Tarakan–Iloilo (or *Cebu*)*–Manila.*

DETAILS OF AERODROMES AND LANDING GROUNDS.

(*Vide* Map, Annex III.)

6. *Luzon Island.*

(i) *Aparri.*—Private landing ground 800 yards by 223 yards.
(ii) *Vigan.*—Army landing ground 660 yards by 200 yards.
(iii) *Tuguegarao.*—Army landing ground 660 yards by 200 yards.
(iv) *Naguilian.*—Civil landing ground with strips of 822 yards by 103 yards and 627 yards by 206 yards.
(v) *Baguio.*—Civil landing ground with two runways each 1,093 yards by 103 yards.
(vi) *Villasis.*—Civil landing ground 700 yards by 65 yards.
(vii) *San Miguel.*—Civil landing ground 717 yards by 334 yards.
(viii) *Clark Field* (*Stotsenberg Camp*).—Army aerodrome 460 yards by 55 yards, with hangars and repair facilities.
(ix) *Iba.*—Emergency landing ground 1,000 yards by 500 yards.
(x) *Del Carmen.*—Civil landing ground 600 yards by 600 yards.
(xi) *Grace Park, Manila.*—Private aerodrome with 2 runways 1,000 yards by 14 yards and 417 yards by 14 yards.
(xii) *Nichols Field, Manila.*—Army aerodrome 450 yards by 675 yards, with hangars and repair facilities.
(xiii) *Calamba.*—Civil landing ground with 2 runways 415 yards by 87 yards and 158 yards by 94 yards.
(xiv) *Nasugbu.*—Private landing ground 634 yards by 8 yards and 448 yards by 8 yards.
(xv) *Calatagan.*—Private landing ground 400 yards by 380 yards.
(xvi) *Paracale.*—Civil landing ground 387 yards by 67 yards.
(xvii) *Legaspi.*—Army landing ground 480 yards by 260 yards.

7. *Mindoro Island.*

(i) *San Jose.*—Civil landing ground 500 yards by 217 yards.

8. *Romblon Island.*

(i) *Ferrol.*—Civil landing ground 550 yards by 70 yards.

9. *Masbate Island.*

(i) *San Agustin.*—Civil landing ground 567 yards by 100 yards.

10. *Panay Island.*

(i) *Banga.*—Civil landing ground 600 yards by 100 yards.
(ii) *Iloilo.*—Civil landing ground 650 yards by 100 yards.

11. *Negros Island.*

(i) *Bacolod.*—Civil landing ground 700 yards by 200 yards.
(ii) *Fabrica.*—Civil landing ground 600 yards by 20 yards.
(iii) *La Carlotta.*—Civil landing ground 600 yards by 150 yards.

12. *Cebu Island.*

(i) *Cebu.*—Civil landing ground with strips of 767 yards by 200 yards and 600 yards by 200 yards.

13. *Leyte Island.*

(i) *Tacloban.*—Civil landing ground 900 yards by 100 yards.

14. *Mindanao Island.*

(i) *Del Monte.*—Civil landing ground with strips of 800 yards by 100 yards and 420 yards by 100 yards.
(ii) *Keithley Camp, Dansalan.*—Army landing ground 650 yards North to South.
(iii) *Malabang.*—Army landing ground 700 yards by 900 yards.
(iv) *Cotobato.*—Private landing ground 500 yards East to West.
(v) *Davao.*—Civil landing ground 950 yards by 120 yards.
(vi) *Zamboanga.*—Army landing ground 650 yards by 900 yards.

15. *Sulu Archipelago.*

(i) *Jolo.*—Army landing ground 763 yards by 50 yards.

DETAILS OF SEAPLANE STATIONS AND ANCHORAGES.

16. According to our information there are no fully equipped seaplane stations in the *Philippine Islands*. *Manila* has good mooring facilities and stocks of fuel and oil. It is a base for the Pan-American Airline flying boats and therefore has some repair facilities.

17. There are many good anchorages for seaplanes. *Puerto Princesa* in *Palawan Island* has been used for British flying boats, and was reported to offer excellent protection in all weathers.

Section VII.—*Meteorological information of the Philippine Islands.*

1. *General climate.*

Warm and humid with much rain; average relative humidity is about 80 degrees.

2. *Surface winds.*

These are, in general:—

N.E. from November to May.
S.E. from June to October.

There is considerable local variation due to topography. Land and sea breezes are well marked on the larger islands. Strong winds, reaching gale force (or over) occasionally are not infrequent from June to November.

3. *Cloud.*

Amounts are variable, but average between 5/10ths and 7/10ths of sky covered.

4. *Temperature.*

The mean temperature is about 80° F. in all months in southern latitudes. In northern latitudes the range of mean monthly tempera-

tures is about 90° F., the warmest months being April–June and the coolest December–February. The highest recorded temperature is 101° F. and the lowest recorded is 58° F.

5. *Visibility.*

Few data available, but fog is not likely to be frequent. Visibility may be reduced to almost nil during intense rainfall.

6. *Rainfall.*

Amounts vary appreciably from year to year and also from place to place on account of topography and also of exposure to prevailing winds. At Zamboanga the yearly average is about 46 ins., whilst at Manila it is 159 ins.; on higher ground average amounts are appreciably higher according to altitude.

Droughts have, however, been experienced during the period November to May. Typhoon rains may be intense and widespread and cause severe floods.

7. *Thunderstorms.*

The frequency of thunderstorms varies from place to place. The following table gives the average number of thunderstorms experienced at Manila in each month of the year:—

January	0·2
February	0·2
March	0·4
April	6·0
May	13·4
June	12·6
July	12·0
August	10·8
September	11·4
October	10·8
November	4·6
December	3·2

8. *Special phenomena.*

Typhoons.—These islands are situated in the typhoon area and experience on the average, one disturbance in any one month. The average number which cross or move in the vicinity of the islands is about 13 per annum, about 75 per cent. of which pass to the northward of Manila. The period of greatest frequency is from June to November.