GILBERT & ELLICE ISLANDS



PART 2 of 2

# Line Islands Expedition

AUGUST—OCTOBER 1974

CONTENTS

FANNING

Fanning Island is an atoll lying about 96 miles S.E. of Washington and is the centre island of the three Northern Line Islands, with Christmas Island to the south-east.

Fanning is held freehold, with Washington, by Burns Philp Ltd. At the time of our visit on 29th August the total population was 306 souls, 72 of these were labour of various categories. There are about 200 children under 16 years. Most of the population have lived on Fanning for many years and regard the island as their home rarely, if ever, visiting their home island in the Gilberts. Large remittances are made to absent relatives each month - possibly to keep them away. Management reserves the absolute right to say who shall and shall not be permitted to visit or stay on the island. The present Manager is Mr. Harold Cropp whose wife lives with him on the island.

ACREAGE 3122 acres mature coconut plantation
5405 acres underdeveloped and could possibly be planted

Total 8527 acres.

RAINFALL: Between 70" and 90"

THE PLANTATION:

In 1890 the first 172 acres of coconuts was planted by William Greig and planting was carried out sporadically until 1923 by which time 2397 acres of palms had been achieved. A further 725 acres have been planted since the 1950's. No replanting of old palm areas has been carried out and in consequence copra yields, which in the past had been up to 1000 tons per year, now average 550 tons. The 1975 crop was 460 tons. Replanting is most necessary. The Manager is certain that if Burns Philp felt that they had a medium term political future on the island they would agree to a replanting programme. To be of any value to the Company this would require an assurance of at least a further 30 years freehold tenure.

At present all labour is housed at the settlement at English Harbour; the Manager has put up plans to Burns Philp for rebuilding the four villages, which in the past were sited at strategic point round the atoll, and moving labour out to them. At the same time causeways and a ring road would be built. This would provide much lower recurrent costs, which presently include the running of copra cutters and overseers across the lagoon in boats every day - a journey often involving a two hour trip each way.

The implementation of these development plans depends to a great extent upon the future political climate in the Gilberts.

Like Washington, Fanning Island is amply endowed with breadfruit trees (many seedless), bananas, babai and pawpaws in the settlement area. There is plenty of easily available fresh water and the soil, rich in humus over most of the atoll, lends itself to vegetable growing much more readily than, say, Tarawa.

FUTURE DEVELOPMENT:

The Manager gave it as his opinion that Fanning, once developed as above, could adapt itself to settlement very easily with settlers producing the copra and with Burns Philp Ltd. acting as buying agents and concerning themselves with the infrastructure - stores, roads and so on. This, in the view of management, would have the added advantage of doing away with the Workers Union which causes so much unhappiness and frustration in what should be an idyllic set-up.

THE OCEANOGRAPHIC RESEARCH STATION:

Some of the buildings which originally housed Cable and Wireless Ltd. are now occupied by an Oceanographic and Weather Research Station of the University of Hawaii. Dr. Martin Vitousek is in charge of this all electronic and high powered set-up and flies down in his own Piper Aztec aircraft to service the station from time to time. He employs eight Gilbertese staff. This station is also a relay for his automatic recording station at S.E. Point on Christmas island. He hopes to be able to extend his data collection to Jarvis and Malden Islands. This is the sort of basic research that could be of inestimable benefit to the Gilberts in the future. Weather trends and ocean current temperatures and trends can be estimated at these stations and will be of great value to ocean fishing enterprises in forecasting fish movements. There are doubtless many other practical applications of Dr. Vitouseks work which it was not possible to elucidate in a short time. Apart from the bewildering collection of electronic radio and measuring equipment which Dr. Vitousek and his assistant Mr. Ray Jeffcott have installed on Fanning, they have 'borrowed' an old tug and a very large barge from the U.S. Navy - this vessel is equipped as an ocean research ship and at the time of writing is taking equipment to Jarvis Island.

# THE PHOENIX GROUP

Four islands in the Phoenix Group were visited during the period 14th to 17th October. These were Phoenix Island, Sydney, Hull and Gardner.

## PHOENIX ISLAND:

This is a small, low reef island. Smaller than Malden or Starbuck but similar in its uncompromisingly bleak appearance. There are no living trees and the vegetation comprises Sida fallax and Lecturus repens. The island is populated by brown boobies, masked (blue-faced) boobies, blue-grey and grey noddies, sooty terns and three breeding colonies of frigate birds on the periphery of the salt flats in the central depression of the island. A number of rabbits were landed here many years ago. There are still a considerable number of their decendants on the island - mostly brown and white in colour. There may be 200 - 300 rabbits in total. They probably obtain such moisture as they require portulaca, which is in abundance near the "lagoon swamp". There is no fresh water on the island.

As the ship stopped for only two hours at Phoenix it was not possible to carry out a lobster survey - but the reef is narrow and perpetually covered by breakers and is not worthy of consideration. The boat landing at Phoenix is hazardous due to the perpetual heavy surge and is not to be recommended to any but the most dedicated.

There is no development prospect for this tiny island and it is recommended that it is left as a declared bird sanctuary.

The island is visited from time to time by American ornithologists as several ringed birds were found all bearing rings from Washington (Smithsonian?) - there were also painted survey beacons probably for the purpose of counting birds and estimating bird colony populations.

# SYDNEY ISLAND

Sydney is a reef island which for some years was settled by Gilbertese who were eventually resettled in B.S.I.P. when an extended drought period on Sydney, Hull and Gardner Islands apparently rendered them untenable.

The landing is on the north-west side of the island where an old copra store is still visible from seaward. The flagpole ashore has collapsed and is no longer a landmark. Inland from the landing point is a rectangular concrete memorial about 4 ft. high commemorating the visit of H.E. Maudo, Jack Barley and others, from 1939-41. Inland from this is a water cistern full of good rain-water, the guttering is falling down and the inlet pipe is almost rusted through. This could be put into good repair with minimal effort and materials.

## THE PLANTATION:

The original coconuts may have been planted in lines in the immediate settlement area but in other places they appeared to be growing where the nuts were dropped, spacing, therefore, left a lot to be desired. An estimated 40% of palms were bearing no nuts at all and those that bore nuts had less than 25 per crown. There was evidence of poor pollination in the many nutless inflorescences seen. Most palms showed the marked "bottling" effect on their trunks which is a certain indicator of long drought periods.

There were many coconuts on the ground, mostly very old and small and reminiscent of the typical Christmas Island nut. Fallen nuts, possibly from 1972/73, were of better size - there may have been abundant rainfall then, as in Tarawa. It is estimated that a maximum of 20-30 tons of copra (most of it old 'bull' copra) could be collected from Sydney if the greater majority of fallen nuts were cut. Handcarts might have to be provided for transport of nuts to the central cutting and storage area. It is thought that only in this way could a systematic clearance of all uncut nuts be achieved.

There is evidence of ship rat (R. rattus) damage to old coconuts on Sydney. There is no evidence of damage on more recently fallen nuts. No tenable theory can be advanced for this phenomenonspeculation could run along several lines. No rats whatsoever were seen, although it would be unique if R. exulans was not present.

In the centre of the island is an exceedingly saline, land-locked lagoon of 100-200 acres in extent. Brine froth blows off this lagoon on to the shore. Red algae are present in quantity around its periphery. The foetid stench of the lagoon mud can be smelt several hundred yards before the lagoon is reached.

There are no palms on the windward side of Sydney (the eastern shore).

See General Remarks on Sydney, Hull and Gardner Islands.

## HULL ISLAND

Hull is an atoll with central lagoon but with no boat passages through the periphery. The island is now visible from considerable further at sea than a few years ago. In 1970 the U.S. Air Force constructed a 120 ft. radar mast and installed a missile-cum-satellite tracking station near the site of the old settlement. This evinced surprise as none of the expedition party or ships company knew anything about an American presence on the island. Considerable embarrassment could have been avoided had warning been received of this from Tarawa when permission was granted to visit this island.

An American civilian engineer, Mr. Larry J. Menge, has been stationed on Hull for the last 15 months and has an American Samoan assistant with him. Their accommodation and equipment are contained in several air-conditioned caravans. The area of the tracking station is about 5 acres and contains two helicopter pads. During our visit two U.S.A.F. helicopters did, in fact, land and we were interviewed by the 2 in-charge of the base on Canton Island. We received the distinct impression that the C.O. on Canton might not relish the prospect of outside parties spending extended periods on the island.

There is a wide and excellent boat passage through the reef near the old settlement with recently erected leading marks for boats. A good water cistern in excellent condition exists near the landing point.

THE PLANTATION:

The original planting lines of coconuts are still very evident. Spacing was apparently 21'x21' square. There are plenty of nuts on the ground which are of a better size than those on Sydney Is. Again, there are very few nuts on the palms themselves and few inflorescences are evident. The appearance of the palms suggests that they have been through at least two and probably three years of fairly severe drought. Rainfall figures obtained from the Tracking Station show that 22 inches had fallen between September 1973 and August 1974 and although recording only started in September 1973 diary notes indicated that early 1973 was somewhat better than this, although no figure can be put on it.

A rapid and limited survey indicated that only 20% of palms had any nuts at all on them. There may be 400 acres of palms on Hull although limited time did not permit any sort of estimate to be made. There may be the equivalent of 30-40 tons of copra (mainly "ball" copra) on the ground.

The ground under the palms is much more clear than on Sydney and the use of handcarts for nut collection would speed up any copra operation considerably.

As with Sydney, there are no palms planted on the weather side of the island, the plantation extends for perhaps 3 miles round the circumference of the lagoon, which is less than half the total distance. The width of the island varies probably between 200yds. and 300yds.

## GARDNER ISLAND

Gardner is a small atoll with a side but non-navigable entrance to the lagoon near the landing site. An old wreck of a Norwegian freighter is impinged on the reef near this channel. There are several other small passages into the lagoon but boats are denied access by the interstitial reef. The boat passage through the reef to the settlement area is wide and in excellent condition and is marked by a beacon obelisk of rendered cement.

The settlement area is largely overgrown with thick stands of Scaevola and Morinda. The old Co-op Store building is still in good condition as is the fresh water cistern (though this was not seen by the writer), the radio operator's house, on the shore of the main channel is also in fair condition. All houses made of local materials have collapsed. There are several "domestic" chickens now running wild.

### THE PLANTATION:

Only two hours were available to view this. The prospect was very similar to Hull although undergrowth was dense on Gardner. There is a fair quantity of reasonable nuts on the ground but they will be difficult to obtain without a modicum of clearing. The palms themselves are carrying a poor crop at present. Perhaps 20 tons of copra could be obtained from Gardner. There are no pawpaw or breadfruit trees now.

Again, there are no palms on the weather side of this island, which uniquely for the Phoenix group, contains a large stand of Pisonia trees. Gardner Island would make an ideal "get away from it" hotel site. There is plenty of room for an airstrip.

Rod fishing in the lagoon and passage is excellent with plenty of bonefish (Tarpon). Lobster fishing is reported to be good on the wide fringing reef. Four different species of butterflies were noted on Gardner.

## GENERAL REMARKS ON SYDNEY, HULL AND GARDNER ISLANDS

One of the principal reasons for visiting these three islands was to attempt a quick appraisal of their current potential for copra. It has been thought that a charter of a Colony ship could take a gang or gangs of copra cutters from Christmas Island to harvest such copra as may be available on these uninhabited islands and possibly turn in a profit at the end of the venture.

It is evident that these islands have suffered a long period of low rainfall, there are many nuts on the ground but certainly not in profusion, but there are few nuts on the palms and very few inflorescences - a certain sign of short term (12 months) drought. Many of the palms on Sydney show marked "bottling" symptoms indicating long periods of severe drought interspersed by rainy periods. The nut crop on the ground, probably from 1972/73, seemed of better size than that of previous years on Hull and Gardner.

The failure of inflorescences to pollinate one another was of great interest and is uncommon anywhere else. This may be due to a physical lack of pollen. It has been noted that on each island palms were only present on the windward side. It may be that over a narrow strip of palms, as on these islands, insufficient pollen is available for the female flowers as the bulk of pollen would be blown straight out to sea. An experiment to test the veracity of this theory would be an intriguing one to set up.

On all three islands there may be a total of some 70-90 tons of copra to be obtained if every nut on the ground were to be cut. This total would not be reached if, for political reasons, it was not possible to include Hull Island in the venture.

As a result of preliminary discussions with the Manager of Christmas Island Plantation before these islands were visited we concluded that if a Colony ship called at Christmas Island on a normal voyage and on her return trip to Tarawa dropped off the copra parties (consisting of 1 foreman and 7 cutters per island) and picked them up again 3 months (or less) later again, on a normal voyage, and returned them to Christmas Island with about 70 tons of copra then the effort might be financially worthwhile. The crux of the matter being that the small amount of copra harvestable should not have to bear the full charter costs of a special voyage but only the diversion costs of a normal run from Christmas Island to Tarawa. The diversion involved is approximately 553 miles longer than the normal voyage. It is thought that "Teraaka" would be the ship of preference as she does the Line Islands run anyway and she can carry up to 100 tons of copra. There is certainly insufficient copra on these three islands to warrant a special charter.

It should be particularly noted that there is fresh water available in ample amount in cisterns on all three islands. Most other buildings are in ruins with the exception of Gardner where at least two buildings are habitable. There are few building materials in the form of hardwood available on any island; there is pandanus on all of them but not to any great extent. No doubt temporary accommodation for a stay of two to three months could be erected using old poles salvaged from the settlement areas.

From the drought stricken appearance of Sydney, Hull and Gardner islands it would seem that a copra cutting expedition would not be worthwhile at any shorter interval than once every three or four years, if that.

It is recommended, however, that a Colony ship should call at these islands at least twice each year and make some sort of assessment of production.

CHRISTMAS ISLAND - AGRICULTURE

On a recent visit to Christmas Island in July 1974 it was noted that there was a marked lack of local and introduced crops on the island. Three weeks before "Teraaka" sailed on August 22nd pandanus cuttings, banana setts and taro (Xanthosoma) were planted in potting medium in polybags in the hope that they might arrive at Christmas Island in better condition than some previous introductions. Planting setts of sugar cane were taken, also seeds of Rhodes grass, dwarf star grass and various vegetables of types and varieties found to be useful on Tarawa.

All living plants in polybags were stowed aft on the boat-deck and as much as possible under cover thus minimising the effect of salt spray. During the 10 days which it took to get to Christmas Island (via Washington and Fanning) these plants were watered with fresh water three times and all arrived in good condition. This is believed to be the largest and most successful introduction of living plants made to Christmas Island from Tarawa. Its success is in the main due to the most helpful co-operation of the ships officers and cadets who assisted in careful stowage and ensured, as far as possible, that plants were not doused with salt water whilst deck scrubbing operations were in train.

It is the intention to bulk up these various introductions and then get them planted in the villages of London, Banana Waterhole and Poland for the benefit of the inhabitants. It is gratifying to report that all these introductions were doing well when inspected five weeks later.

Three whole day tours round the various and widespread sections of the Plantation revealed that there was still a heavy crop of nuts on the palms and that these nuts were of a reasonable size - not the usual Christmas Island wizened nuts at all. To date in 1974 slightly in excess of 1,000 tons of copra has been shipped by the Plantation. This is a record for C.I.P. This good outturn is due to good rainfall in 1972/73, the bearing of new areas planted by Mr. Langston, and most importantly, to the good management-ship of Mr. J.M. Bryden. The handling of a crop of this size has required great ingenuity by the manager in drying and storage - including the removal of a shed from the main airfield and its re-erection at London wharf. Bonus payments have brought unaccustomed prosperity to many C.I.P. workers.

There is still a good crop of nuts on the palms. It is estimated that 000 tons of copra will be made in 1975, barring accidents. In late 1975 the crop will probably fall off again if rainfall continues as at present (from January to mid-October 1974 only 15" of rain had been received).

One rather elderly block of palms not far from London appears to be suffering from "stem-bleeding". This has caused the death of a number of palms. This disease, if such it be, noted as noted as being of uncertain aetiology in the literature and requires further investigation. The outbreak appears to be confined to one area at the moment.

It was decided to start a new planting of coconuts at the western end of the area known as New Zealand Airfield near Poland Village. A good well for nursery purposes is conveniently sited and the fresh water lens is shallow. It is hoped to plant 220 acres in 1975. A total area of over 2,000 acres is available for planting at N.Z. Airfield. Various experiments in the area have shown that a triangular spacing of 24 ft. x 24 ft. and planting 1 ft. above the lens provide the best means of obtainigna successful stand of palms. These planting methods will be adopted.

The Manager of Christmas Island Plantation and the Fisheries Officer have pioneered a method successful small scale vegetable growing under polythene sheeting. An attempt will be made to rouse the interest and co-operation of C.I.P. workers in the three villages to grow a self sufficiency of proven vegetable types and varieties. There seems to be no reason why the system should not be expanded to supply the proposed Fishing Lodge and other developments.

The Line Islands Agricultural Service has been suspended for the time being. When a decision is made concerning the future of Fanning and Washington Islands the appointment of an Agricultural Officer to serve that area can be considered. The present incubent, whose contract ends in December 1974, will not be returning to G. & E.I.C.

During the course of the visit the author, who had recently been appointed a director of the new company Atoll Plantations Ltd., took the opportunity of exploring possibilities for the island from the touristic point of view.

An excellent site for a golf course (18 holes) exists in the vicinity of Deep Water hole which is not far from the proposed site of the Fishing Lodge. Historical interest may be evinced in the wrecks of "Fremont" and "Aeon". There are interesting fossil forms in the coral pavement slabs at Aeon Point. The possibilities of currently "with it" shells for necklaces and hat bands are almost unlimited on the astonishingly beautiful sandy beaches near Paris. The rod fishing in the passages between some of the lagoon lakes is of a very high order indeed - bait is freely available in the large hermit crabs, which are in abundance.

It is regrettable to have to record that the killing of red-tailed tropic birds continues unabated. This will have to be stopped if we wish to attract outsiders to the island. The law exists to prevent the molestation of birds. The will to inforcement the law does not apparently exist at present.

# Fisheries Survey Report Southern Lines Islands

By J. Watt. M.B.E. Fisheries Officer

Departed Christmas Island 1000 Saturday 31st August Sunday 1st September at sea very few birds were sighted and very little signs of surface fish, wind light easterly usual deep swell. "Lobster" in this report refers to the double spined rock lobster, Panulirus penicillatus, and allied varieties.

## Malden Island (lat 4° 03's long 155° 01 w)

Arrived off Malden 0730 Monday 2nd September; as there was no safe anchorage the Teraka drifted off. Proceeded ashore at 0900 to survey the reef area if suitable for rock lobster fishing. The reef at Malden is steep to and is unsuitable for lobster fishing at night, there is only a very narrow reef with numerous surge channels and constant surf rolling in. Numerous empty lobster shells were found on the beach indicating that there are lobsters in the area. A ledge extending seawards with a depth of 40-48 fathom, this could be a possible trap fishing area. It is believed that Hawaiian fishermen worked this Island using traps.

Proceeded trolling in the afternoon large flocks of birds were observed working in the NW point area, on trolling into this area all lures were lost on the first run all fish were estimated at over 100 lbs. One Yellowfin tuna was landed it scaled 90 lbs. Red Snapper were abundant on the edge of the reef, none of these species were landed as they are considered poisonous. Tuesday 0830 proceeded trolling in SW point area with more success, again large tuna were lost, fish were wild and only a few skipjack were landed. Black terns were observed working a school of skipjack; fish always sounded when skiff approached the school. Several Wahoo were landed this indicates a low water temperature. No thermometer was available therefore no water temperatures were taken. Several flocks of terns were observed working in the afternoon; as the wind had strengthened and sea choppy it was impossible to investigate. At the settlement a stock of marine Diesel Gasoline was left by Americans, dates on the drums were 1961. Should a fishing operation be conducted there the Marine Diesel fuel could be used.

Starbuck Island (lat 5 37's, long 155 55'w)

Arrived off Starbuck Island 0700 Wednesday 4th September at NW point no suitable landing place was found in that area. Captain Ward decided to circle the Island as to whether a suitable landing could be found. A suitable landing was found two miles from NW point. On rounding East point several large flocks of birds were working on fish schools, six trolling lines steamed by Teraka's crew had very good fishing when passing through the birds, all fish were Yellow Fin Tuna average weight around 40lbs. On proceeding ashore found the reef very wide and similar to the reef at Christmas Island. It was decided to survey the reef at night. Proceeded ashore with the two Fisheries Staff who accompanied me for this sort of operation as they had plenty of experience at Christmas Island. Entered the water at 1930 and surveyed towards NW point in the first half hour had caught 56 lobsters. Entered the water again at 2100 hours and again in half an hour filled the remaining empty sacks, returned to camp. At 0430 decided to have a last go before daybreak covering the same area as first so caught 30 lobsters, returned to Teraka at 0700 with 3 sacks full. The German scientist Dr. Grossman who spent the night in the east or weather side of the island reported seeing numerous discarded lobster shells in that area.

Friday 6th September at sea.

Vostock Island (lat 10 05's long 152'w)

Arrived off Vostock Island 0830 Saturday 7th September. Proceeded ashore 0930 as Vostock is only 1500 yards round surveyed the reef all round. The reef was fairly wide on the west side on the East side surf was breaking up to the beach. Proceeded ashore 1700 at 2000 started fishing the West side and caught only 4 lobsters, at 2230 decided to survey round the island. On the East side had to leave the reef due the heavy surf breaking which made walking dangerous on the reef, entered the water again at East point and only caught 3 lobsters back to camp. All lobsters were very small due to the size of the Island it is doubtful if it contains a reasonable lobster population.

Very few tuna were caught by the Teraka's crew only Mahoo. At SW point the remains of a Korean fishing vessel was lying ashore in two halves. Several floats were salvaged off this vessel.

## Caroline Island (10 00's long 150 14'W)

Arrived off Caroline Island (South Island) at 0300 Monday 9th September. Proceeded ashore to investigate reef for possibility of lobsters. Reef stretched for 1000 yards in places, was made up of soft coral, very few sand patches on the reef. Proceeded up the lagoon to explore some of the Islets which made up Caroline. Lagoon was very difficult to navigate although it was very deep in places large coral reef extended all the way across. Got as far as the South end of long Island and dropped Dr. Crossman; returned to Teraka at 1000 proceeded ashore and started fishing at 2030 found the reef very difficult to walk on as the coral was so soft was sinking up to the knees in the soft coral, very few lobsters were caught, those were caught in sandy patches. A complete round of South Island was made for 11 lobsters. At 2330 set out to explore to the North across the boat passage. No lobsters were found and not one sand patch the coral was even softer to the North, some times sinking up to the waist in the soft coral. As the Island is made up of several Islets and is over 5 miles long only the South end was explored. At 0700 Tuesday 10th September, Teraka approached South Island Captain Ward indicated he was proceeding to the North of the Island, proceeded North along reef with skiff with two trolling lines only 4 Kingfish were caught, two small yellow fin tuna were caught off long Island. Departed for Flint 2030 10th September.

## Flint Island (lat 11 25's long 151 48'w)

Arrived at Flint Island Wednesday 11th September at 0030 at 0900 proceeded ashore to explore the reef, dressed the Island to the East side and found the reef similar to that on Starbuck. Proceeded ashore at 1000, started fishing at 2000 proceeding South along the west side of the reef towards the East point, results were very dissapointing only 20 lobsters were caught all very small, some would

be undersized altogether over 2½ miles of reef was covered and only the odd lobster was caught. In all the results were very dissappointing overall. Teraka's crew trolling lines over the storm had little results very few fish were caught.

## Apia Western Samoa

A courtesy visit was paid to the Fisheries Department in company of the Minister of Natural Resources and Director of Agriculture, nothing could be learned from this Department as they are not so far advanced as the F.S.U. G.E.I.C. The program they are working on is live bait, which they are having little success. There seems to be plenty of evidence of schooling skipjack off the island.

## Return Voyage Apia - Christmas

Very little signs of Tuna were observed during day light hours, until approaching Christmas Island. From 30 miles SW of Poland to 5 miles off the Island large flocks of birds were observed working on fish, these flocks extended as far as the eye could see, indicating that a large consentration of tuna was feeding in that area. This confirms my previous reports that had the F.S.U. had a larger vessel this area could have been surveyed. This also confirms the findings of the research vessel Townsend Cromwell that an eddy extends from Poland SW 30 miles and was prolific in tuna larvae and feeding.

## Recommendations and Observations

It would be difficult to set up Fisheries stations on any of the islands in this report as there are no anchorages or fresh water available at any of the islands visited. However I would recommend that should any Development take place on Christmas Island, Malden and Starbuck Islands which are within 400 miles from Christmas should be exploited for lobsters. Malden with no roof but a sunken lodge extending in places up to one mile off shore with depths of up 40 fathoms would be a trap fishery.

there is plenty of evidence by empty lobster shells along the beaches. Starbuck by results obtained would support a very lucrative lobster fishery which would be very benificial to the colony. These Islands would have to be worked with a self contained unit which would be the system on Christmas shoyld development take place. The vessel could send the fishing team ashore at night and drift off approach the Island in the morning and pick up the team and produce. This could be processed on board, the vessel drifting all day to give the night fishing team a break. Floating long line and trolling would also be a useful br Japanese and Korean fisherman. The evidence of this is in the vast number of long line floats washed up on the beaches. Two large Japanese long liners were sighted fishing between Malden and Starbuck. The other three islands i.e. Vostock, Caroline and Flint as they are too far from a main base and from survey work in my opinion would not support a fisheries station. Therefore I recommend that Malden and Starbuck Island be exploited if development should take place on Christmas Island.

Acknowledgements

To Captain Ward M.B.E. and Chief Officer Hall-Thompson for their support and co-operation in making this survey possible. Dr. Grossman and his assistant for supplying information on lobster shells on beaches that the F.S.U. team could not visit due to linited time on each island, also to the two F.S.U. staff Korere Betero and Terara Tuno who worked very hard every night spent on the islands without complaint and without their help the results would not have been obtained.

John Watt M.B.E.
Fisheries Development Officer
Line Islands

PRELIMINARY REPORT

Minister of Natural Resources
Hon. Isakala Paeniu
Bairiki, Tarawa.

by Henning & Herma Grossmann

We participated in the Line Island Expedition from 23rd August to 21st October and carried out researches on different topics.

The prior knowledge of the land vertebrate biota of several central and southern line islands is very scant because they are unhabited, more or less isolated in the central Pacific and had been of little economic importance until now and were therefore seldom visited. Previous information on the biota is therefore limited largely to a few (semi-popular) accounts and notes on the birds are very scattered and hard to find except recent reports of the P.O.B.S.P. personell. Because of the brevity of earlier visits and our limited time being ashore a detailed cencus work was precluded but we tried to estimate the total bird population of the recently visited islands. In the following species accounts the numbers in parenthesis following the species name are an estimate of the flying birds (including breeding adults and juveniles). Following this figure is another which gives the counted or estimated number of nests. We are presenting these estimates so far as it has been possible because we agree with Clapp (P.O.B.S.P.) that such estimates, although partly subjective, show relative abundance of the various species better than words such as 'common' or 'numerous'.

I. ANNOTATED CHECK LIST OF BIRDS OBSERVED ON:-

The Northern line Islands:

Washington - was only visited from 0900 on 28th August to 1700 so that we got only a very superficial impression of this island.

(a) Seabirds

Red-tailed Tropic Bird
(Phaethon Rubricauda)

Only 4 birds were seen flying over the lake. Evidently uncommon, but presumably breeds in small numbers.

Red-footed Booby
(Sula sula)

Numerous birds were observed on the atoll and offshore. We found several nesting rookeries on the south east corner. Numerous birds with nestlings of different stages were found in Pisonia about 80 feet above ground. This species seemed to be the most abundant bird on Washington.

Brown Booby
(Sula Leucogaster)

Observed flying about 20 miles due west of Washington and observed in the tall Pisonia. Certainly breeds but the latter needs confirmation.

Great Frigate-Bird
(Fregata Minor)

Observed adults and juveniles flying over the lake, resting in Buka trees and offshore. Breeding is certain but we didn't find any rookeries.

(b) Migratory Shorebirds

Pacific Golden Plover
(Pluvalis Dominica Fulva)

Two were seen at the east bog and one in the west bog.

Bristle-thighed Curlew
(Numenius Tahitiensis)

Only two birds were seen on the east edge of the lake.

Wandering Tattler
(Heteroscelus Incanus)

Several birds in the swampy areas.

Ruddy Turnstone
(Antenaria Interpres)

Two birds on the outer reef flat.

Brown Noddy
(Anous Stolidus)

Common breeder.

Black Noddy
(Anous Minutus)

Common breeder.

Fairy Tern
(Gygis Alba)

Common breeder.

Lorakeet
(Psittacula Kuhli)

Abundant especially in coconut palms.

Reed-Warbler
(Conopoderas Aequinoctialis)

Three couples of this only endemic landbird were observed in the swamply areas, and one couple close to the village.

Fanning: was only visited from 0900 on 29th August to 1700. Observations were made on the north island (vicinity of Cable Station, Naiaroa, Cartwright Point).

(a) Seabirds

White tailed Tropicbird
(Phaethon lepturus)

We saw ten at Naiaroa and flying over the lagoon. No juveniles or nesting places were found nd we didn't see any Red-tailed Tropicbird.

Red-footed Booby
(Sula sula)

abundant offshore and in the visited area. In the nesting rookery close to the Cable station forest numerous birds with nestlings were observed in Pisonia about 70 feet above ground.

Brown Booby
(Sula leucogaster)

Only a few in the crowns of tall Pisonia resting near the Red-footed Booby colony. Four were seen north of Fanning Island as we approached by ship. One take one at the Manager's house.

Great Frigatebird
(Fregata Minor)

Twelve adults and juveniles were seen overhead in the lagoon. Near Napu some resting birds were observed.

Brown Noddy
(Anous Stolidus)

Abundant in coconut palms, some were observed nesting in the tops of Pisonia forest.

Black Noddy
(Anous tenuirostris)

Abundant breeding places in the Tabuku forest (Cable Station) in seperated areas of the Boobys' rookery.

Fairy Tern
(Gygis alba)

Common bird in coconut palms and offshore.

(b) Landbirds: No parakeets were seen and the only endemic landbird the reed wobbler, was neither observed nor heard. It may be now extinct on Fanning Island, although it is still common on Washington and Christmas Island. The introduced rats seem to be heavy predators on the parakeets' eggs.

(c) Migration Birds:

Pacific Golden Plover
(Pluvialis Dominica Fulva)

Observed on the outer shore and in the swampy region of Naiaroa.

Wandering Tattler
(Heteroscelus Incanus)

A few birds on the outer reef flat and swampy areas.

Christmas Island: was visited from 0900 on 30th August to 1700 on 31st August and from 1700 on 26th September to 1200 on 10th October.

## Species Accounts

(a) Seabirds

### Phoenix Petrel
(Pterodroma alba)

(1,200 ± 15% - 600 nests ± 15%)

The maximum population seems to occur there in May and December. Motu Tabu and Motu Upua supported nearly similar populations with 300 nests on each. Resting birds were seen on islets in the Manulu Lagoon and on Cook Island.

### Wedge-tailed Shearwater
(Puffinus pacificus)

The flying population is hard to estimate because they usually arrive at dusk. Occupied burrows mainly on Motu Upua (600) and Motu Tabu (500) but at least 800 nests with chicks in small colonies scattered over the mainland and islets of the Manulu and Isle Lagoon.

### Christmas Shearwater
(Puffinus nativitatis)

We estimated about 400 nests with eggs on Motu Tabu and Motu Upua on each and only a few on Cook Island and other islets. No nesting occurs on the mainland.

### Audubon's Shearwater
(Puffinus lherminieri)

Only five birds were seen flying over the Isles Lagoon. No occupied burrows were found.

### White-throated Storm Petrel
(Nesofregetta albigularis)

(9 - 2 incubating birds)

Storm petrels were only seen on Motu Tabu and on islets in the Manulu Lagoon.

### Red-tailed Tropicbird
(Phaethon rubricauda)

(500 ± 75% - 106 nests ± 15%)

Although peak numbers are repeated to occur in July to September only 106 nests were found. The majority of the of the populations' nests are found on three islands (Cook Island, 31: Motu Tabu, 20: Motu Upua, 20) and only 30 on islets in the Manulu Lagoon. Scattered colonies of 30-50 nests must have been in the central portion of the island between Manulu and Isles Lagoon. Piles of Tropicbird remains indicated breeding activities in that area as well.

Blue-faced Booby
(Sula dactylatra)
(80 ± 20% - 40 nests)

Individual nests were found to be very scattered over the mainland, with the greatest number on the plain of the southeast peninsular.

Brown Booby
(sula leucogaster)
(50 ± 15% - 23 nests)

We found small colonies only on isolated areas, like on Manulu Lagoon islets (19) nests) and south of the Isle Lagoon (2).

Red-footed Booby
(Sula sula)
(1,200 - 500 ± 20% nests)

We estimated nearly 500 nests with eggs and young, mainly at the south-east point, central lagoon area and south of Isle Lagoon.

Great Frigatebird
(Fregata minor)
(1000 ± 15% + 500 nests)

Widely scattered colonies in low growing Suriana primarily in central lagoon areas, both on islets and on the main island.

Lesser Frigatebird
(Fregata ariel)
(10 ± 20%)

No nests were found, even south of Isle Lagoon. Only some adults flying overhead were observed in that area.

Sooty Tern
(Sterna Fuscata)
(Millions? )

Sooty Terns are the most abundant seabirds breeding on Christmas Island. Two distinct colonies (Cook Island and S.E. Point) were visited. Innumerable large unfledged chicks and many juveniles were still present in these colonies.

Grey-backed Tern
(Sterna lunata)
(200)

Only on two Islets on the Manulu and on one of the Islets Lagoon adults with a few juveniles were still present. On these and a further two Islets we found quite a lot dead juveniles and rotten eggs.

Crested Tern
(Thalasseus bergii)

(120)

We saw only flocks of 40-60 adult birds flying over Cook Island and the central Lagoon areas coming and going from fishing along the ocean reef.

Blue-grey Noddy
(Procelsterna cerulea)

(2000 ± 10% + 900 nests)

Nesting occurs only on Cook Island (400), Motu Tabu (200) and several islets in the Manulu and Isle Lagoon (300). Many rotten eggs on islets on the Manulu Lagoon.

Brown Noddy
(Anous stolidus)

(350 ± 15% - - 45 nests)

No nesting occured on the mainland. Only little breeding activity on Cook Island (10) Motu Upua (15) and Motu Tabu (30). Only eggs and no chickens were present in this species.

Black Noddy
(Anous tenuirostris)

(550 ± 5% - - 33 nests)

No nesting occurs on the main Island, and only 33 occupied nests were found on Cook Island, Motu Tabu and Motu Upua.

Fairy Tern
(Gygis alba)

(1000 adults - 340 nests)

We estimated 1000 adults, all of them were nesting on Cook Island, Motu Tabu and Motu Upua. No nesting on the main Island.

(b) Migrants

Pacific Golden Plover
(Pluvialis Dominica Fulva)

Abundant on the muddy margins on inland pools and tidal lagoons.

Ruddy Turnstone
(Arenaria Interpres)

Flocks of 4-8 were seen in winter plumage on the lagoon shores.

Bristle-thighed Curlew
(Numenius Tahitiensis)

Small flocks of 3-6 birds were found on the lagoon shores.

Wandering Tattler
(Heteroscelus Incanus)

Singly or in pairs at most ponds beaches and lagoon shores.

Sanderling
(Crocethia Alba)

We made two sightings of this rare species in the Western Pacific at the Isle Lagoon.

(c) Landbirds

Reed Warbler
(Conopoderas Aequinoctialis)

We didn't see any of this only species of landbird indiginous to Christmas Island. But it was still seen several times close to the village.

The Central and Southern Line Islands:

Malden Island - was visited from 0845 on 2nd September to 1700 on 3rd September.

(a) Seabirds

Blue-faced Booby
(Sula dactylatra)
(300 $\pm$ 10% - - 750 nests)

They nested soley. Nests were scattered uniformly over the area covered with Sesuvium portulac..

Brown Booby
(Sula leucogaster)
(10 $\pm$ 5% — 5 nests)

All nests were on the ground on the north and east side of the lagoon near the Blue-faced Boobys' breeding places.

Red-footed Booby
(Sula sula)
(1000 $\pm$ 15% — 340 nests)

The counted 340 nests were found in scattered colonies in stunted Sida fallax, in a dozen stunted Pesonia trees on the north side and on the abondoned barracks.

Lesser Frigatebird
(Fregata ariel)
(4500 $\pm$ 15% )

They were seen in three compact colonies on the east side of the lagoon and scattered on the north-east side.

Red-tailed Tropicbird
(Phaethon Rubricauda)
(70 ± 10% — 30 nests)

They bred only at the north-west point under flat coral stones and close to the stone-faced platforms and graves on the northside.

Sooty Tern
(Sterna Fuscata)
(200 - 300,000?)

Sooty Tern is the most abundant seabird breeding on Malden. We found two large colonies on the north peninsular with large chicks and juveniles. It is therefore impossible to determine exactly the total number.

Grey-backed Tern
(Sterna lunata)
(500 ± 15% — 200 nests)

This species was only in one compact colony at the south side present.

Blue-Grey Noddy
(Procelsterna cerulea)
(120 ± 10% — 60 nests)

Nesting occurs mainly in two colonies on the east side.

Fairy Tern
(Gygis alba)
(12 ± 8 — 6 nests)

We counted only 6 breeding places with eggs laid beams of the barracks or on the walls of the ancient ruins.

(b) Migration birds

Golden Plover
(Pluvialis Dominica Fulva)
(4 ± 10%)

Scarce and we only found them along the outer perimetre of the atoll.

Bristle-thighed Curlew
(Numenius Tahitiensis)
(40 ± 10%)

Small flocks of 4 to 5 birds were seen in the central area of the lagoon.

Wandering Tattler
(Heteroscelus Incanus)
(120 ± 10%)

Two flocks of 40-60 birds still in breeding dress arrived and small flocks of 2 to 4 which were present on the lagoon mud flats.

Ruddy Turnstone
(Arenaria Interpres)

e flock of 12 in winter dress was seen.

buck: was visited from 1100 on 4th September to 1230 on 5th ptember.

) Seabirds

Red-footed Booby
(Sula sula)

saw only a few adults flying round the ship while drifting round the rthside and flying overhead in the central area. Certainly breeds but e latter requires confirmation.

Lesser Frigatebird
(Fregata Ariel)

(10)

ly 6 adults and 4 juveniles were observed resting on stunted Sida llax in the Sooty Tern colony area. Perhaps they were preying on oty Tern chicks. Certainly breeds but the latter requires confirmation.

Sooty Tern
(Sterna Fuscata)

(millions? )

nsely abundant with perhaps millions breeding in the central area rthwest of the small secondary salt lagoon under Sida fallax.

). Migrants

Pacific Golden Plover
(Pluvialis Dominica Fulva)

ly three birds were observed in association with wandering Tattlers ding on the shore at South Point.

Wandering Tattler
(Heteroscelus Incanus)

(8 ± 10%)

ll flocks at the beach and reef flat.

Bristle-thighed Curlew
(Numenius Tahitiensis)

y four were observed, two of them close to edge of the salt lagoon.

ok: Observations were made from 0900 on 7th September to 1700 on September 1974.

Seabirds

Blue-faced Booby
(Sula dactylatra)

(see next page)

continued ....

(180 — 81 nests)

They nested solely on the east side and nests were scattered uniformly over the area. 10 Boobies which were ringed by P.O.B.S.P. personnel from Washington were captured.

Brown Booby
(Sula Leucogaster)

One nest was found on the south side under the forest canopy.

Red-footed Booby
(Sula sula)

(2000 ± 20% — 600 nests)

Nests were found in Pesonia trees mainly in the small trees on the west side, and in taller trees of the north west forest.

Great Frigatebird
(Fregata minor)

(3500 ± 20% — 1000 nests)

An estimated 1000 nests were distributed over the west side of the forest. Most of them at heights over 10 metres.

Lesser Frigatebird
(Fregata ariel)

(300 ± 15% - 100 nests)

One compact colony consisting of only 100 nests in the tops of a few trees in the western part of the forest.

Sooty Tern
(Sterna Fuscata)

(60-80)

Sooty Terns were only seen flying over the Island in small numbers.

Brown Noddy
(Anous Stolidus)

(300 ± 10% — 28 nests)

On the east and south side about 28 nests in shrubby Pisonias with eggs and young. 200 Noddys were resting on sandflats.

Black Noddy
(Anous Teniurostris)

(  )

Old nests were found throughout the forest. A few birds showed nesting activities after a short rain.

Fairy Terns
(Gygis alba)

(1000 ± 15% — 50 nests)

Common throughout the forest. Only eggs on tree branches were found.

(b) Migration birds

Pacific Golden Plover
(Pluvialis Dominica Fulva)

(15)

Single individuals scattered over the island mainly in the forest.

Bristle-thighed Crulew
(Numenius Tahitiensis)

(5)

We saw birds foraging under the forests canopy.

Wandering Tattler
(Heteroscelus Incanus)

Common at the beach.

Caroline: From 0900 on 9th September to 1700 on 10th September Caroline Atoll was visited. All islands with the exception of the northern two-thirds of Nake Island, South Island and the western islands.

(a) Seabirds

Blue faced Booby
(Sula Dactylatra)

(50 ± 15% — 23 nests)

Mainly on the east side of Long (73) and Nake Island, the nests were found containing eggs and nestlings.

Brown Booby
(Sula leucogaster)

(14 ± 10% — 8 nests)

The nests mainly contained two eggs and were found under the Messerschm. fringe of Long Island.

Redfooted Booby
(Sula sula)

(3000 ± 25% — 2500 nests)

Red-footed Boobies were found nesting on all visited islands. Nests contained eggs and young at nearly all stages.

Great Frigatebird
(Fregata minor)

(5-8000 — 4-6000 nests)

Nests with eggs and young were found on all visited islands in the same habitat utilized by Red-footed Boobies.

Lesser Frigatebird
(Fregata ariel)
(200)

Breeds on Carolino, but no nests were found. Adult and flying immatures were observed flying overhead and resting.

(b) Migrants

Pacific Golden Plover
(Pluvialis Dominica Fulva)

Only three birds were seen foraging on the seaside beach of the Windward islets.

Bristle-thighed Curlew
(Numenius Tahitiensis)

Only four birds on the seaside of the windward islets.

Wandering Tattler
(Heteroscelus Incanus)

(12)

Both at the seaside and at the lagoon area.

Ruddy Turnstone
(Arenaria Interpres)

Only one in winter dress was seen.

(c) Landbirds

Reef Heron
( )
(4)

Two pair of Herons were seen foraging along the interior lagoon. Two of them were white morph and two dark.

Sooty Tern
(Sterna Fuscata)
(200,000 ?)

Sooty terns are the most abundant sea birds breeding on Carolino. Two distinct colonies (South point of Long Island, southern windward islet) were visited and thousands observed rising from the Windward islets. Innumerable large unfledged chicks and juveniles were still present.

Brown Noddy
(Anous Stolidus)
(400 ± 15% — 50 nests)

Only nests with eggs were present.

Black Noddy
(Anous Tenuirostris)

(500 ± 20% — 20 nests)

unoccupied nests of earlier breeding seasons were found on every visited islet. Only 20 fresh nests with eggs were found.

White Tern
(Gygis Alba)

(Hundreds) ?

Breeding birds with eggs on most islets.

Flint: was visited from 0830 on 11th September to 1730 on 12th September.

(a) Seabirds

Red-footed Booby
(Sula sula)

(3000 ± 15% — 1000 nests)

On the west and east side of the island Messeschm. forms a fringe supporting the main population of Red-footed Boobys. More compact colonies were found in tall Pisonia trees in the central area.

Brown Booby
(Sula Leucogaster)

(At least 4 breeding birds)

Only two nests on the Messeschm. were found.

Great Frigatebird
(Fregata minor)

(1000 ± 15% — 100 nests)

An estimated 100 nests, most of them at heights of 20 to 30 metres in tall Pisonia trees, were found in the central area in association with the Lesser Frigatebird and the Red-footed Boobys.

Lesser Frigatebird
(Fregata ariel)

(1500 ± 15% — 200 nests)

Compact colony in the top of a few trees in the central southern area.

Sooty Tern
(Sterna fuscata)

During the two-day survey 30-40 Sooty Terns were flying overhead in Groups of 4 to 8 individuals.

Brown Noddy
(Anous Stolidus)

(500 ± 20% — 100 nests)

Nests were found in tall Pesonia and palm trees in the central area. Nests contained both eggs and young.

Black Noddy
(Anous tenuirostris)

(500 ± 15% — 20 nests)

unoccupied nests in the central area.

Fairy Tern
(Gygis alba)

Throughout the central area. Only a few Fairy Terns were found nesting on Pisonia, palm trees and occupying deserted Noddy nests.

(b) Migrants

Pacific Golden Plover
(Pluvialis Dominica Fulva)

(20 ± 10%)

Common round the brackish water excavations in the central area.

Bristle-thighed Curlew
(Numenius Tahitiensis)

Four curlews were seen foraging along the west and east beach.

Wandering Tattler
(Heteroscelus Incanus)

(8)

Single birds were noted along the beaches.

II NON-AVIAN TERRESTRIAL VERTEBRATE FAUNA

(a) Lizards: were seen on all visited Line Islands except on Starbuck. Some specimens of different islands were collected but not yet identified. We saw the Black Skink (Emoia nigra), Polynesian Geckos, Blue tailed skinks and the Azure tailed skink.

(b) Rats: Mainly Polynesian Rats (Ratus exulans) were seen on all visited line islands, except on Malden. These rats were most abundant throughout the forests on Vostok, Flint and Motu Upua (Christmas Island).

(c) Green turtle: Green turtle (Chelonia mydas) were never seen swimming offshore and only on a few islands we saw signs of their activity. Only on Starbuck, Christmas Island, Flint, Caroline and Sydney, we found a few recent tracks. Fresh nests were only found on Flint and Sydney. Only on Flint seemed to be a good nesting place on the south and south west beach. We found only one large female in the nesting area, but the remains of five recently killed ones. Piles of blanched turtle bones indicated an earlier exploitation.

III TERRESTRIAL CRABS

Three types of crabs were found in the Line Islands. The omniverous hermit crabs (Coenobita sp.) were abundant on all islands and are the main part of the terrestrial fauna, together with birds. The coconut crab (Birgus latro) was only found in great numbers on Vostok, Caroline and Flint. The so-called land crab (Cardiosoma sp.) were found nearly on all islands, but were most numerous on the larger ones, like on Christmas Island, Fanning and Gardener.

IV ECTOPAROSITE FAUNA

Mainly avian ectoparasites were collected from 15 bird species and some from the Polynesian rats. Identifying them would take a long time and I have to contact quite a lot of specialists. Ectoparasites from vertebrates were collected to point out certain host-ectoparasites specificities and to get information on the parasites and their distribution on the Line Islands.

V KERATINOPHILIC FUNGI

Soil samples of different areas of the visited Line Islands were collected to search for Keratinophilic fungi which could effect the human skin and could cause dermatomycosis. Later on I have to cultivate them in a special fungi culture medium and after isolation, to identify them in a Mycological Department. Such activities take quite a long time before getting any available results.

## CONCLUSIONS AND SUGGESTIONS

Christmas Island supports breeding populations of 18 species of seabirds, and a number of ornithologists visited the island because of its great importance to science. Therefore the whole island was already proclaimed a bird sanctuary on 20th December 1960, and remains so today. Before that time the largest islets (Cook Island, Motu Tabu and Motu Upua) have been already declared bird sanctuaries and could be visited only with permission. But what is the situation today? Under the present legislation it is still illegal to kill a bird or to possess any part of them at any time. But at present there is a terrible destruction of some seabirds, sometimes for food and sometimes for fun only. We saw especially on Christmas Island, nearly on every Isle, islet, peninsular, or on the mainland areas, which were supporting seabirds, piles of their remains (skulls, wings, feet) of recently killed birds. Some of them had only broken skulls or wings, and were thrown away. We counted, for example, on Motu Upua (60), Cook Island (30), Motu Tabu (12) and on the mainland (The bridges 40), (Bus Point, 32), Manulu Lagoon, 68 recently killed Red-tailed Tropicbird. That means following our accounts and earlier reports that on Christmas Island nearly half the population of the present breeding birds were killed in a short period and especially on the "sanctuary islets", only one more landing for catching Tropicbirds could extinguish the whole present breeding population for this year. Breeding birds are very tame and could be approached without difficulty. If they were killed, nestlings have to die and the incubated eggs were left as well. Red-footed Boobies, Blue-faced Boobies and Christmas Shearwater (Motu Upua) were killed on Christmas Island as well. Killed Frigates with broken wings can be found all over the mainland.

How is the situation on the southern and central line Islands? Though the islands are not permanently inhabited, and therefore we saw no destruction of birds before the "Line Island Expedition" arrived. But at the same time when we did the bird census work quite a lot of birds were killed. For example on Malden nearly all breeding Tropic birds were taken in a short time and Red-footed Boobies killed as well. On Vostok crew members hunted after nearly every live animal. Blue-faced Boobies, Red-footed Boobies and even the rare Brown Boobies, Noodies and Frigates were taken as well as great numbers of coconut crabs of all stages. All juveniles of the Brown Booby, and over 20 of the breeding masked Boobies were taken.

What should be done? Birds are taken for food now, and have been for a long time in the G.E.I.C. and especially the Red-tailed Tropic bird which has been a delicacy. But because of the total exploitation of quite a lot of ground breeders in G.E.I.C. (for example Tropicbirds, Boobies, Frigate birds) you cannot find at present any rookeries of these birds and they have no chance of recovery because of such heavy predating. The land animal fauna has been always very poor on these atolls because of the isolation and the inconvenient conditions, but it is becoming poorer now because one element, the birds, are so heavily predated that certain species can no longer be observed on many of the Gilbert and Ellice Islands. They were over-killed before long term studies could be done to give us a detailed picture of the life cycle, migration and breeding habits. Even in Australia birds, such as the Muttonbird (Shearwater) are commercially taken for food and have been for a long time. But the Animal and Birds Protection Board supervises the industry and tries to prevent an overkill so that an adequate breeding population is maintained for the future. This is possible because they have a

picture of the life cycle of this bird, based on long-term studies so that they can calculate the optimum number of chicks to take in each seasons' harvest. The loss of seabirds, like the turtles would be more serious than just the loss of a food resource. The birds are not only scientific objects, they are more, because they also have a roll in atoll marine ecology. If tourism, as in Fiji, becomes an important source of income, this requires substantial bird populations. Seabirds are just as integral a part of the mystique of coral islands as palm trees and non-polluted clear water. If you build a hotel on Christmas Island for game fishing as is being discussed, the tourists will not be attracted by the incomplete atoll scenery without birds. Wise conservation action is therefore needed now to ensure the future. What could happen is demonstrated on Tarawa, Sydney and Gardener where the seabirds have not been able to recover at all.

Steps should be taken to conserve the birds first before it is too late. We think it is advisable that Government takes steps towards legislation affecting wildlife. So far I haven't met a Gilbert or Ellice Islander who has any idea of conservation or resource management and the best hope of persuading them that rational, as opposed to total exploitation, is in their own interests by education in the schools. From my own point of view only those conservations actions which are based on a change of awareness by education towards an understanding of their own native animals will be rich in meaning. What happened to Christmas Island is quite a good example. It has already been declared a bird sanctuary in 1960 during the occupation time of the services. But there has been no education towards an understanding of protective legislation. Even permission to visit the islands has sunk into oblivion and I suppose none felt responsible to introduce the newcomers to the local protection rules.

Suggestions: (Bird Protection)

To enforce the conservative legislation on Christmas Island more effectively it is necessary to employ a Conservation Officer, with police power, with one or two helpers. Furthermore it would very profitable to have an ornithologist permanently on the island to carry out some long-term population studies. Cook Island, Motu Upua, and Motu Tabu should only be visited with a special permit. The unhabited, isolated, economically unimportant Vostok Island should be declared as a nature reserve as soon as possible because of the great seabird population there. At some stage in the past Phoenix Island, Birnie and McKean Islands, were declared as bird sanctuaries, but I feel that to ensure their further freedom from habitation, dogs, cats and rats, that further legislation should be made to keep these islands as nature reserves.

Suggestions: (Turtle Protection)

On Flint there seemed to be the only good green turtle nesting place in the visited islands. Six large females had been caught in one week by four Tahitian copra cutters. I suppose not only to supplement their diet but also to sell the shells on Tahiti which is quite lucrative today.

During our brief visits we found out something about the status of sea turtles there. We found, as had been feared by Marine Turtle Specialists that on the Line Islands as well the turtles were reduced to very low numbers. Turtle nesting is now a very rare occurrance. Quite a number of people who we contacted informed us that the turtle population is fairly large, although no information was available on the current status of turtle stocks in the line Islands. Turtles were killed, not only on Flint which is not permanently inhabited, but also on the northern line Islands nearly every turtle coming up to lay is killed by the local people as fast as they come ashore. Turtle meat has long been a delicacy among Gilbertese and Ellice Islanders. Because of over-killing them in nearly the whole of the central Pacific, it is only in outlying areas that they really survive. Thus, little nesting now takes place, and the remnants of the breeding population are still being killed and their eggs taken. Undoubtably this situation has existed for hundreds of years on the Gilbert and Ellice Islands, but the increase in population, combined with greater boating mobility has allowed a higher predation on nesting grounds that were previously visited only rarely.

What should be done?

We think that two things should be done at the same time. Firstly important turtle nesting areas (e.g. Flint Island) should be declared strict turtle sanctuaries at all times of the year, or the present legislation should be modified in this line. Protective legislation under the fisheries act would be excellent. But even this alone would not be sufficient, at the same time the local population must bepersuaded by education that a total exploitation by overkilling cannot be rationa. The loss of turtles would be much more important than the loss of a food resource. Sea turtles are just as integral part of the reef ecology and environment, as algae and corals. Like every animal they have a special function in the Marine ecology. I hope that a teaching in this way will increase awareness of, and interest in, the fauna. Steps should be taken to conserve them first before it is too late. It is a pity that there has been no Marine Turtle Specialist participating inthis "expedition" assessing the populations. We are sure that a request from the Government of G.E.I. C. to the Australian or U.S. Government for a Marine Turtle Specialist, to advise them on resource management and help you to combine protective activities with a controlled exploitation, such as turtle farming, would result in help being provided. It would be worthwhile as well, to contact the Regional Ecological Advisor,

Mr Arthur L. Dahl,
S.P. Commission,
B.P. D-5 Nouméa Cedex,
New Caledonia.

Dr. Henning Grossmann,
2 Hamburg 67
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GILBERT AND ELLICE ISLANDS COLONY

# Sailing Directions for the LINE ISLANDS

Captain E.V. Ward M.B.E., F.R.I.N.
Master Mariner, 1974

Training Ship "TERAKA" October, 1974

The Gilbert and Ellice Islands Colony

# SAILING DIRECTIONS
# FOR THE
# LINE ISLANDS

Captain E.V. Ward M.B.E., F.R.I.N.
Master Mariner.

1974

Training Ship
"Teraaka",
October 1974

# PREFACE

The Line Islands, lying as they do, off the Pacific trade routes, and being of little commercial interest, are rarely visited. Except for occasional naval vessels and yachts, the uninhabited southern islands especially may not be visited for years at a time. Herein lies a peculiar charm, as they are unspoiled sanctuaries for birds, fish, turtles and crabs.

With possible development of fisheries and tourism these islands may lose their isolation, and the hope is expressed that there will be adequate safeguards to protect wildlife.

The Sailing Directions have been compiled by a master mariner of many years experience in working ships and boats among the islands and atolls of the central Pacific, and it is hoped that they may be of use to shipmasters called upon to visit those little known islands.

Some of the information has been gathered over many years, and written up during a voyage of the Colony Training Ship "Teraaka" from August to October 1974, during which time several days were spent at each island, and shore parties landed.

Much of the history and background comes from various British and American publications for which acknowledgement is due.
Throughout the voyage reference was made to the Admiralty Pacific Islands Pilot Vol III and the information therein used, verified, and where necessary brought up to date.

The positions of unsurveyed islands were checked by stellar observations. Distances of outlying reefs etc were measured by radar ranging.

At all islands shore parties under the supervision of Mr Hall-Thompson Training Officer and Mr Lafai Ituaso Training Bosun assisted with soundings and general information.

# THE LINE ISLANDS

## General

The Line Islands consist of eleven islands and atolls extending some 1260 miles from Kingman Reef in the northwest to Flint Island in the southeast. They lie across the equator bounded by the parallels of 6° 28'N and 11°27'S and the meridians of 150° 25'W to 162° 25'W.

The islands are divided into two geographically separated groups. The Northern Line Islands comprise Kingman Reef, Palmyra, Washington, Fanning Christmas and Jarvis, of which Kingman Reef, Palmyra and Jarvis are possessions of the United States. The Southern Line consists of Malden, Starbuck, Vostok, Caroline and Flint. With the exception of the American possessions all are part of the Gilbert and Ellice Islands Colony, and are administered from Tarawa, Gilbert Islands.

Tongareva or Penrhyn Island, although being within the area is excluded as being part of the Northern Cook Group.

The islands lie some 1,500 to 2,000 miles eastward of the Gilbert and Ellice Islands.

Only the British islands are dealt with in these sailing directions.

## Discovery and History

The pre-European history of the area is practically unknown, but stone ruins at Fanning, Malden and Caroline are believed to be temples, house-sites, and graves of early Polynesians, who may have arrived by accidental drift voyages, or used the islands as stopping places on their migrations.

The first known European discoverer was Captain Cook who landed at Christmas Island on Christmas Day 1777; in 1797 Captain Fanning in the American ship "Betsy" discovered Fanning and Washington, the latter being named after the U.S. president. Captain Broughton in H.M. sloop "Providence" discovered Caroline in 1795 naming the island in compliment to the daughter of the then First Lord of the Admiralty.

Bellingshausen, leader of a Russian expedition, discovered Vostok in 1820 naming the island after his ship. Starbuck, the American master of the British ship "L'Aigle", discovered that island in 1823 and Captain Lord Byron in H.M.S. "Blonde" discovered Malden in 1825 naming it after Lieutenant Malden who landed there. Jarvis is believed to have been discovered by Captain Brown of the British ship "Eliza Francis" in 1821. There appears to be no record of the discoverer of Flint Island but it was sighted about 1801. Flint and several other of the islands had their positions fixed by the U.S. Brig "Porpoise" of the United States Exploring Expedition of 1839-41.

In 1866 Commodore Swinburn in H.M.S. "Mutine" took possession of Starbuck for Great Britain and in 1868 Captain Nares in H.M.S. "Encounter" similarly took possession of Caroline. Christmas and Fanning were annexed to Great Britain by Captain Sir W. Wiseman in 1888 and Washington by Commander Nicholls H.M.S. "Cormorant" in 1889.

Christmas, Fanning and Washington were included in the Gilbert and Ellice Islands Colony by Order in Council in 1916.

The early part of the nineteenth century was a very active period of whaling in the central Pacific and British and American whalers were familiar with the area. Difficulty in accurately ascertaining longitude and some advantage in not revealing their discoveries to their rivals render it difficult to identify the islands they sighted. Exploitation for guano and phosphate followed, and continued in some cases until 1927. Later harvesting of copra for the coconut oil industry continued in some islands until 1934.

Copra remains a profitable crop and is harvested at Washington, Fanning and Christmas, while small parties of itinerant copra cutters from Tahiti ship small amounts of copra from Flint and Caroline.

The Islands

The islands are of coral formation, bordered by fringing reefs. Fanning and Caroline are typical atolls, with the narrow strip of land enclosing a lagoon, broken in places by passages.

Malden, Starbuck, Vostok and Flint are reef islands with no lagoon although Malden and Starbuck have shallow salt lagoons with no access from the sea. The small brackish ponds at Flint are the filled up diggings of earlier phosphate excavations. Christmas Island, one of the largest atolls in the world, has a large shallow lagoon open to the sea with numerous shallow lakes and pools some of which are brackish or fresh. Washington is unlike any other reef island in that it has a large freshwater lake in the eastern part and two bogs in the western part.

The islands are all low and flat with an average height of 10 to 20 feet although sand dunes at Christmas reach a height of about 40 feet. Malden is the highest island with an elevation of 25 to 30 feet. In most cases the highest land is around the outer edge of the island which rises fairly abrupty to form a beach crest, behind which the land slopes down to a shallow depression.

The islands generally have no elevated prominent features and in some cases no trees. Lying as they do, in an area of strong and variable currents, they are very dangerous to shipping.

Landing by boat is often difficult, and even where passages have been blasted, the weather often precludes their use. In the prevailing easterly winds, landing is best found by eye along the lee side of the island.

Administration

The islands are administered from Tarawa, Gilbert Islands, where reside the Governor and a Chief Minister. A District Officer is stationed at Christmas Island, which is a Port of Entry and has a resident Customs Officer, Doctor and Wireless Operator.

Charts

Charts of the area vary from the recent surveys of Washington, Christmas, and Malden, to those of Caroline, Flint, Starbuck and Vostok made by the very remarkable Mr John Arundel around 1882-3. All are adequate for navigation and the position of those not surveyed have been verified by subsequent navigators.

At English Harbour, Fanning Island the entrance has silted up since the H.M.S. "Penguin" survey of 1897, there being in 1974 a least depth of 19ft.

Weather

The area lies within the trade winds with predominant winds from between north-east and south-east force 3 to 5, occasionally 6. In this area of the Pacific there are no doldrums between the N.E. and S.E. Trades, their place being taken by an almost constant easterly air stream.

Barometric pressure is almost constant around 1010 mb. with a diurnal range of 2 to 3 mb. Temperature varies little between seasons and is about 85° F. by day and 71° F. by night, although at unshaded islands like Malden and Starbuck the temperature at midday is around 90° F. The average sea temperature is around 82° F.

From the scant records available it would appear that rainfall is variable both between islands and from year to year. Fanning and Washington have a rainfall around 100 inches per year while Malden and Starbuck have only 25 inches. Christmas, Vostok, Caroline and Flint probably come in between those amounts. In all islands the rainfall seems to be mostly between January and June.

The area is generally out of the hurricane zone, but it is recorded that in 1878 a hurricane destroyed many trees at Caroline Island.

Vegetation

Washington, Fanning, Caroline and Flint are well wooded with coconut trees. Vostok is thickly covered with pisonia trees. Malden and Starbuck support only bunch-grass, saltbush, purselane and vine-like herbs. It may be worth noting that on waterless islands, the juicy leaves of the portulaca plant (Gilbertese "te boi") will sustain life in extremity.

At Christmas Island some 10,000 acres of coconut palms have been planted but the vegetation generally is saltbush, scrub, vines and low trees.

Fauna

There are no animals, but bird life abounds. Golden plover, frigate birds, tropic birds, sooty terns and many other land and sea birds breed and exist in countless numbers. At Washington and Fanning pintail duck and other migratory birds arrive from time to time.

Currents

The islands generally lie within the influence of the South Equatorial Current with west to north-westerly sets of ½ to 2 knots, occasionally 3.

From September to December the Equatorial Counter Current with easterly sets of up to 3 knots may be expected around Washington Island area.

The currents vary in rate and direction from day to day and when navigating in these areas mariners should lose no opportunity to fix the ships position by observation. Ships not fitted with radar should not approach the vicinity of the islands by night.

Tides

The tidal range is small, about 2.3ft (.7M) with little difference between springs and neaps. This small range however causes strong currents at Fanning Island which has only the one lagoon entrance. At full flood and ebb the current in the passage at English Harbour exceeds 6 knots.

Time

The inhabited islands of Christmas, Fanning and Washington keep a standard time of G.M.T. - 10 hours.

Supplies

At Christmas Island there are limited stocks of light diesel fuel, petrol and kerosene available in emergency. Twenty tons of fuel, is available, can be loaded in a day, in drums by boat.

There is a small general store catering for the local needs and small quantities of dry goods are available at the discretion of the Plantation Manager. Fresh well water, suitable for drinking can be loaded at the rate of 20 tons per day by boat.

At Fanning and Washington very small supplies of foodstuffs are available in emergency. Similarly small quantities of fresh water are available but owing to the difficulty of loading, especially at Washington, can only be recommended in dire necessity.

Facilities

At Christmas there is a small machine shop where minor turning and welding etc can be accomplished. At Port London the slipway can haul craft of up to 4 feet draught.

Stationed at Christmas are four launches, one of 100 B.H.P. and 6 boats. At Fanning are four launches and five boats.

There are no other facilities in the Group.

Communications

At Christmas Island there is a W/T, R/T station in communication with Tarawa and Honolulu. There is also a local link with Fanning and Washington Islands. The station does not keep a marine guard watch but schedules can be arranged through Tarawa or Honolulu.

At Christmas and Fanning are low-powered non-directional air navigation beacons which can be arranged through Christmas Island Radio.

Ships of the Bank Line call at Christmas, Fanning and Washington about twice a year to collect copra and land supplies. About three Gilbert and Ellice Islands Colony ships a year visit the islands from Tarawa. Various other ships and yachts call on unofficial visits.

There are good airstrips at Christmas and Fanning and service aircraft, particularly U.S. Coastguards call occasionally. There is an airstrip at Malden in apparently good condition and a U.S. Coastguard plane landed there in 1969.

There is no regular communication with the other islands. About twice a year a small ship from Papeete calls at Caroline and Flint to land or embark copra cutters and load copra.

Produce and Trade

Washington Island exports about 1,000 tons of copra a year and imports supplies for local consumption. Fanning exports 500 tons of copra a year and also imports supplies. Christmas exports up to 1000 tons of copra a year and imports 500 tons of consumer goods. The copra is shipped by Bank Line ships to Europe.

A small amount of copra is shipped from Caroline and Flint to Tahiti.

Inhabitants

Although small numbers of Polynesians once inhabited some of the islands there are now no indigenous people. The Greig family at Fanning descendants of the Scotsman William Greig who landed thre about 1860 are the oldest inhabitants.

About 1,500 Gilbert and Ellice islanders are employed in Washington, Fanning and Christmas, and many have settled in these islands and regard them as home. There are 6 Europeans in the Group.

Missions

The Gilbert Islands Protestant Church, and the Roman Catholic Sacred Heart Mission have resident pastors at Christmas, Fanning and Washington Islands.

Fish

All the islands abound in game fish, reef fish, crabs, coconut crabs, rock lobsters and turtles. Most game fish including tuna, kingfish, wahoo, trevally, marlin and sailfish can be eaten with impunity as can crabs and rock lobsters. Very large barracuda and some species of shark are sometimes poisonous. On reef fish local advice should be sought, but as this is not available at the uninhabited islands any brightly coloured bottom fish should be treated with caution. The imperor cod, or red schnapper is certainly very poisonous in Washington, Fanning, Christmas, and Malden. In 1968 a yachts crew were taken seriously ill at Malden after eating the emperor cod and some died. Eels, puffer fish, and hawksbill turtles should never be eaten without local advice.

## CAUTION

1. In these directions, when the three figure notation is used i.e. 000° to 359°, it refers to the true compass.

2. Where compass points are used, the reference is to the magnetic compass (local variation 1974 approx. 10° E).

3. All bearings are given from seaward, but the direction and extent of outlying reefs and shoal water are given from the land.

4. A cable is assumed to be 100 fathoms (600 feet)

5. Where reference is made to swinging room at anchorages etc. a "medium sized ship" denotes a ship of 212 feet in length, with a draft of 16 feet, riding to a normal scope of cable.

WASHINGTON (New York Island, Prospect Island)

Position western extremity Lat. 4°43'N Long. 160°25. 8'W
Charts 702,2867, 3405.

Washington Island, the northernmost of the British Line Islands, is a low coral island 3½ miles long east and west by 1¼ miles wide north and south. The island contains a freshwater lake 1¼ miles long by ½ mile wide and two peat bogs. Canals, used for transporting copra, connect the lake with the settlement at the western end. The lake level between 3 and 10 feet rises during heavy rains and can be lowered by sluices constructed through the beach crest.

The island is from 10 to 16 feet high and being thickly wooded is visible from aloft at a distance of about 14 miles.

The fringing reef extends from the shore for from 3 to 5 cables except at the eastern end where it extends 7 cables to seaward. At the western end there is a coral bank extending 2½ miles to the westward giving depths of from 14 fathoms to shoal water 3½ cables off the land.

In light weather with the prevailing easterly winds this bank affords a good anchorage for large ships in depths of 14 to 7 fathoms and in about 4 to 5 fathoms for smaller ships. At times, however, strong currents sweep across this bank and when anchoring it is well to make sure the ship is not being set in towards the land. Between September and December the Equatorial Counter Current often sets to the eastward. There is often a heavy swell over the bank making anchorage uncomfortable. The coral bottom is uneven and several vessels have lost anchors in chasms. A sandy bottom should be selected.

The plan on chart 2867 portrays the anchorage and ships should anchor as prevailing wind and current permit. A good anchorage for medium sized vessels is with the northern and southern extremities of the land bearing 075° and 121°, 5 cables from the land in 5 to 6 fathoms, sandy bottom.

It is possible to proceed further in and anchor 3 cables westward of the landing but there is often a confused swell thereabouts.

H.M.S. "Wild Swan" and "Icarus" have reported the anchorage uncomfortable owing to heavy swells.

At the western settlement close to the beach is the conspicuous managers house. Fifty yards to the northwards of the house is a 70 foot mast on which a light is exhibited when ships are expected.

Opposite the mast is the boat passage blasted through the shore reef. When ships are expected a buoy is laid about half-a-cable westward from the mast, beyond the surf, and a grass rope from the buoy is belayed at the foot of the mast. Boats should approach the buoy from a cable to seaward, then keep the rope close to starboard. There is almost always a heavy confused swell in this area and boat coxens should choose a comparative smooth between swells, to run the boat smartly into the beach. The beach rises steeply and there is nearly always a surge on the landing. Shore hands standing-by will seize the boat and hold it in the surf. A powered boat should stop engine about 5 yards from the beach. Boats should be lightly loaded. The passage and landing is not recommended at night.

Off the south-western end of the island is the remains of the wreck of M.V. "Southbank" and four cables south-east of this is a small passage through the reef often workable when the main landing is too rough. A road connects this landing with the settlement. On the northern coast about 1½ miles eastward of the western end is a passage through which passengers and light cargo can be landed in strong southerly winds.

Except for two small launches and some punts used on the canals, there are no craft stationed at Washington. Ships loading copra bring surfboats and launches from Fanning Island. These boats are constructed with heavy wide fairleads at each end over which the buoy-shore rope is passed, thus leading the boats through the surf into the beach landing.

There are no facilities of any kind and as all stores are imported by the twice yearly copra loading ship, supplies are understandably limited. Fresh water and a few supplies could be obtained in an emergency, but the landing being usually so difficult even this cannot be recommended.

Washington was first occupied around 1860 by Captain Fanning and later in 1870 by Greig and Bicknell who worked the island for copra using at first Tahitian and later Manihikian labourers. The island is at present owned by the Fanning Island Plantations Ltd. of Sydney and is managed by a European manager. It is administered by the District Officer, Line Islands at Christmas Island who occasionally visits the island in Colony ships from the Gilbert Islands. Government staff consists of a policeman and two schoolteachers. Fanning Island Plantations maintain a local dresser.

Fish, coconut crabs, and crabs abound but the red emperor cod, or schnapper is said to be poisonous.

Many seabirds breed on the island, and migratory birds land there. The colourful scaly-breasted lorikeet probably introduced from the Phillipines thrives there.

During the late war, flying boats used the lake as a landing area.

FANNING

Position English Harbour Lat. 3° 51 N. Long 159° 22'W.
Charts 782, 3405, 2971.

Fanning Island lies 76 miles SE x E of Washington and is a coral atoll 10 miles long north-west to south-east and 6 miles wide. It encloses a shallow lagoon through which there is one ship passage on the western side.

The land is about 10 to 12 feet high and thickly wooded with coconut palms

to a height of around 80 feet. The island is visible from aloft at a distance of 14 miles.

The fringing reef is generally about one cable wide and is steep-to. Off Whaler Anchorage in the N.W. however the reef extends four cables offshore and provides a fair anchorage with swinging room in 10 to 14 fathoms.

The cable station was closed down in 1964 and the northern settlement is now deserted. In 1974 the marks marking the anchorage have largely disappeared or been overgrown. The remains of the old pier are visible and vessels can anchor off here by eye. Except for the possibility of fouling an old cable, the caution concerning prohibited anchorage on chart 2971 no longer applies. The best approach to the anchorage is with Bicknell point ahead bearing S x E as this stems the prevailing wind and drift.

About 1 mile south of Bicknell Point is the wreck (1974) of a Korean fishing boat.

English Harbour which is entered between Danger and Weston Points is the only ship passage into the lagoon. In 1974 the least depth was 19 feet. There are now no beacons on or near Danger Point on the northern side of the entrance. A conspicuous gravel crest exists here formed by the stranding of M.V. "Nessbank" some years ago. Small vessels may anchor to the westward and north-westward of Danger Point in 18 fathoms but there is not swinging room and although the wind rarely if ever blows from the west, in 1974 with a fresh wind from SSE the anchorage was felt unsafe. There are reports that large ships have anchored here, but this would only be possible in settled easterly weather and cannot be recommended.

The tidal streams in the passage are strong and set straight through. Ships should only attempt to enter and leave at slack water and as this is affected by the strength and direction of the wind it is best judged by eye. A reliable pilot will board from the settlement south of Weston Point by request. The anchorage is just to the eastward of the stone beacon marking the spit north-east of Weston Point.

A ship lies out of the main stream but can be exposed to strong easterly squalls which tend to blow the ship into the tidal stream. Both anchors should be used and the pilot usually requires a stern kedge. It is possible for small vessels to proceed to the eastern and south-eastern parts of the lagoon, with better anchorage, but there are no marks and the ship should be conned from aloft.

It is inadvisable for any vessel to anchor or moor in the entrance to the harbour. During flood tide there is a strong indraught off the entrance to the harbour and vessels when standing on and off should beware of this when standing in.

The island was first settled in 1848 by the British firm of Collie and Lucett trading out of Tahiti, and later by Captain Fanning who employed Manihiki labourers. Around 1856 William Greig, a Scotsman, arrived and later married the sister of the high chief of Manihiki. Some of his descendants still live on the island.

The island is now owned by Fanning Island Plantations of Sydney and is managed by a European manager.

In 1974 there was a population of 384 Gilbert and Ellice islanders and 2 Europeans.

The island is administered by the District Officer, Line Islands from Christmas Island who visits when opportunity occurs. A wireless operator, dresser, policeman and school teachers comprise the government establishment.

A government radio station maintains schedules with Christmas and through there to Tarawa and Honolulu. No guard watch is kept. There is also a private R/T link with Christmas and Washington.

There are two usable airfields and a low powered non-directional airnavy beacon can be activated by arrangement through Christmas.

About 500 tons of copra a year is exported to Europe by Bank Line ships which call twice a year.

There are no facilities. Four small launches and five whaleboats are stationed at English Harbour for use in working vessels. There are no fuel supplies but small quantities of fresh water can be supplied by drum and boat.

Fish and cocanut crabs abound, but many bottom fish, especially the red emperor cod, or schnapper are poisonous.

Remains of enclosures of dressed stone similar to Tonga and Tongareva indicate earlier presence of Polynesians.

CHRISTMAS ISLAND

Position Cook Island Lat. 1° 57. 6'N; Long. 157° 29.1'W.
Charts 702, 3405, 2993, 2995, 2367.

Christmas Island lying 150 miles SE x E of Fanning is one of the largest islands of purely coral formation. It is 29 miles long and 17 miles across at its wides part. The island is low and flat except for occasional sand dunes rising to 40 to 50 feet. On the northern and western sides oil tanks buildings and masts give good radar echoes to about 10 miles and the land is visible from aloft at about 12 miles.

The island was charted by H.M.S. "Lachlan" in 1956.

Since the evacuation of British forces in 1964 the buildings and installations have largely fallen into ruin. The airstrips are still useable, the main Christmas or Cassidy airfield being in very good condition, and occasionally used by U.S.A. and British service aircraft. A low powered non-directional airnavy beacon is available on request. The roads are in good condition and it is possible to motor around the island from London to Paris.

Of the mooring buoys charted, only "C" off Cook Island is still afloat. This looks in good condition but is probably a doubtful mooring. There are no lights exhibited and no marker buoys exist in the port area. Soundings in 1974 indicate that Cook Island Passage and London Passage are as charted. The sandspit off the eastern end of Port London has extended a

further cable into the lagoon. A channel with a least depth of 5 feet leading around the sandspit and into the wharf at Port London has been marked by five beacons, two with red can topmarks to port and three with triangular black topmarks to starboard. In this area the sand bars move from time to time and the passage alters accordingly.

A good anchorage with swinging room is to the westward of Bridges Point in 18 to 10 fathoms, sandy bottom. A ship anchored here is out of the tide rip from London Passage and the sea is calmer than if anchored further to the southward. The jetty in the middle of the bay on the south side of Port London, is useful for landing and embarking passengers. Cargo is worked from the wharf to the eastward of the port where there is a depth alongside of 5 fathoms and a crane. A slipway to the north of the wharf can haul vessels of up to 4 feet draught.

The wind hardly ever blows from the westward at Christmas Island and large passenger ships may anchor off Bridges Point in normal weather.

A reliable pilot will come off from the settlement on request.

The island has been worked as a coconut plantation by various concerns since about 1882. In 1914 Father Emmanuel Rougier, a French priest from Fiji settled there and did much to develop its resources. At present the plantations are managed by Christmas Island Plantations under a European manager. An agricultural officer and a fisheries development officer are also stationed on the island. In 1974 there was a population of around 700 Gilbert and Ellice islanders and 3 Europeans.

Up to 1000 tons of copra is exported by Bank Line vessels to Europe and around 500 tons of stores is imported.

Christmas Island is the Port of Entry for the Line Islands and the District Officer Line Islands is stationed there. There is also a doctor, customs officer, policemen, and a wireless operator who also acts as postman.

The government wireless station is in daily contact with Tarawa, Honolulu and Fanning Island and while able to work ships does not keep a guard watch.

About two Bank Line ships and three Colony ships from Tarawa visit the island a year.

Small quantities of diesel fuel, petrol and kerosene can usually be supplied on application to the Plantation manager. Fresh water is available and can be loaded at 20 tons per day by drum and boat.

There are four launches, one of 100 B.H.P., and 6 boats stationed there. A workshop can undertake small repairs, turning and welding etc.

Fish, rock lobsters, coconut crabs, crabs and turtles abound. The red emperor cod or schnapper is known to be poisonous.

The island is rich in bird life and two colonies of sooty tern breed in June and December, one near North West Point and the other near South West Point.

Between 1804 and 1924 the island was fished for pearl shell.

From 1956 to 1964 the island was a base for British Forces engaged in nuclear testing.

A current of from 1 to 3 knots setting between West and North-West is almost always experienced in the vicinity of Christmas Island.

MALDEN ISLAND

Position N.W. Point Lat. 3° 59. 6'S; Long 154° 58. 3'W.
Charts 703,102.

Malden Island lying 392 miles SE x S of Christmas Island is roughly triangular in shape being 4½ miles long on the northern side and 3¼ miles from north to south. It is about 30 feet high at the north-western end sloping to 15 feet towards the south-east, and is visible from aloft at a distance of 14 miles. A wooden tower 27 feet high erected at the western end, and the remains of several dwellings and iron frame huts, extends the

radar range to about 22 miles.

There is a good chart made from an uncontrolled aerial mosaic, and the north-western side and anchorage area was charted by H.M.S. "Lachlan" in 1956.

The aforementioned tower is situated a little to the southward of midway between North West Point and South West Point and is about 400 feet inland from the beach crest. A single mast about 40 feet high stands about 2 cables eastward of North West Point.

The beacons marking the landing, the stone cairns, the conspicuous tree, and the bench mark are no longer visible and could not be located by a shore party.

The island generally is steep-to with a fringing reef about $\frac{1}{2}$ cable wide but off North West and South East Points spurs of reef extend $1\frac{1}{2}$ to 2 cables to seaward. The island has a steep beach crest around the margin, the interior being lower and flat. Extensive salt lagoons in which there are said to be fish are situated in the middle of the island. The vegetation consists of low salt bush, weeds, vines and portulaca. Large colonies of golden plover, frigate birds, boobies and sooty tern breed on the island. In 1974 except for two cats no animals were sighted. No fresh water was found.

The best landing was found to be in the middle of the western bay, just to the southward of the tower. The beach rises steeply and there is a heavy surge close inshore but no great difficulty was experienced working boats during moderate to fresh SSE winds.

The anchorage off South West Point was found untenable in September 1974 with SSE winds as a strong current set across the anchorage with cross swells. It was also considered unwise to attempt to anchor off North West Point although the sea and swell here was calmer. The beacons erected by H.M.S. "Lachlan" to mark the anchorage off South West Point are no longer standing.

Nothing remains of provisions and fresh water for shipwrecked mariners, (left by H.M.S. "Lachlan") in 1974. The well near the buildings and another about three cables northward of the tower were dry.

From about 1860 until 1927 the island was worked for phosphate by the Melbourne firm of Grice Sumner and Co., later Malden Island Proprietary Ltd. and the remains of the old settlement and the tramway still exist. There are several settlers graves nearby.

From 1956 to 1964 the island was used as a base for British forces during nuclear tests at Christmas Island. In 1974 there were no inhabitants.

The island is of archaeological interest by reason of remains of Polynesian structures consistent with the occupation of the island by a small population in ancient times.

There is excellent fishing for tuna, barracuda, kingfish, wahoo and trevally. The red emperor cod or red schnapper is known to be very poisonous.

At the north-western end of the island oriented north-south is an airstrip in useable condition.

In September 1974 a black drum with the work "Teraaka" in white letters was left on the beach opposite the landing.

In the vicinity of Malden the currents are strong and variable setting between west and north-west at 1 to 2 knots. (September 1974)

STARBUCK

Position western extremity Lat. 5°37'S; Long. 155° 56'W.
Charts 783,979.

Starbuck Island, situated 112 miles S.S.W. of Malden, is roughly a shallow triangle 6 miles long east and west and 2 miles across at its widest part. The island is about 15 feet high at the western and eastern ends and slightly lower in the middle. There are no trees and the vegetation is sparse saltbush, scrub, vines and creepers.

The island is visible from aloft at a distance of 8 miles. The remains of stone buildings at the western end give a radar range of 12 miles.

In the middle of the island are three small brackish lakes not open to the sea. Dense colonies of sooty tern, boobies and other sea and land birds cover the island. Some rats and three cats were observed in 1974.

The ruins of several stone buildings at the western end of the island mark the site of the old settlement. On the north-western point is a stone cairn 6 feet high which is probably the base of the beacon sighted by H.M.S. "Achilles" in July 1937. There is no fresh water on the island, but the remains of a well, dry in September 1974 would seem to indicate that a water lens may exist. The remains of a distilling plant at the settlement indicate that water was evidently always a problem. The portulace plant abounds and the juicy leaves could well be a means of sustaining life in extremity.

At the western end of the island the reef extends 2 to 3 cables offshore and there may be a precarious anchorage there. There is no shelter however and heavy cross swells meet over the shallows. In September 1974 with moderate SE weather the landing here was impracticable owing to the heavy swell. Off the southernmost point of the island the reef extends 2 cables southward and there are heavy tide rips in the vacinity. Off the eastern end the reef extends 7 cables to the eastward. Apart from these extensions the fringing reef is steep-to and a ship of any draught can steam around the island at a distance of two cables from the shore. There is no outlying reef and the caution accompanying the chartlet on chart 979 does not apply.

The drawing of the island on chart 979 by Mr John Arundel in 1832 gives a fair enough idea of the shape and orientation of the land and reefs. The position of the western end is apparently correct.

In September 1974 with moderate weather from SE to ESE landing was made several times on the northern coast 2 miles eastward of the western end of the island. There was little swell and boats could land between spurs of the fringing reef.

A black painted drum marked "Teraaka" was left on top of the beach crest opposite this landing. Landing was also made about two cables eastward of the western end of the island, opposite the easternmost stone ruins.

The currents hereabouts are strong, variable and unpredictable and no opportunity should be lost of fixing the ships position by observation. There is evidence of many wrecks off the southern coast.

From 1970 to 1890 the island was worked for phosphate by Mr John Arundel with about 100 native labourers. The land was later planted with coconut palms but none of these survived. In 1974 the island was uninhabited.

There is excellent fishing and rock lobsters are abundant on the tidal reefs. There is no information regarding poisonous fish.

VOSTOCK ISLAND

Position Lat. 10° 06'S. Long 152° 23'W.
Charts 703,979.

Vostok Island, lying 342 miles SE of Starbuck, is a small triangular coral island about 3½ cables across north and south. The drawing on chart 979 by Mr John Arundel in 1883 gives a fair idea of the shape of the island and outlying reefs, and the position is apparently correct.

From the northern, south-western and south-eastern corners of the island sunken reefs which break heavily extend 2½ cables to seaward. A sandy beach crest rises sharply from sea level to about 15 feet all around the island except for the eastern side where it is composed of gravel. The interior of the island is slightly lower. There is no lagoon. The soil is rich in humus and most and although there is no fresh water the profuse vegetation would seem to indicate a lens not far below the surface.

The island is thickly wooded with pisonia trees to a height of about 30 feet and is visible from aloft at a distance of 14 miles. There are no buildings of any sort on the island.

On the western side, in the bight formed by the horns of the northern and southwestern reefs is a good landing in easterly weather. The boat passage is a little to the southward of the middle of the bight and can be easily seen. In September 1974 a pole and drum marked "Teraaka" were left on the beach crest giving a transit lead through the passage.

A cable to the southward of the passage, on the northern side of the south- ..ern reef is the recent wreck (1974) of the fisherman "Horng Shyang".

The island abounds in coconut crabs and provides excellent fishing. There is no information regarding poisonous fish.

An interesting colony of boobies nest and hatch on the eastern side of the island.

Although an occupation license was issued to Arundel in 1874 the island does not appear to have been worked by him. In 1922 a New Zealand firm planted coconut seedlings but there is no sign of these having survived. In 1974 there were no inhabitants.

CAROLINE ISLAND

Position south end Lat. 10° 01'S. Long. 150° 14'W.
Charts 783,979.

Caroline Island lies about 126 miles E x N of Vostok. It is a narrow crescent shaped atoll consisting of numerous islets surrounding a shallow lagoon. The island measures just over 6 miles long north and south and is about 1 mile wide. The land is about 15 to 20 feet above sea level, and thickly wooded to about 30 feet with coconut palms and pisonia trees giving it a visibility from aloft of about 14 miles.

Off the southern end of the atoll the reef extends four cables to the southward. Apart from this extension the fringing reef is about two cables wide and is steep-to. The reef is clearly seen in daylight and a ship of any draught can steam around the island at a distance of one cable from the reef.

The tidal range is about 1.5ft and the reef is never entirely dry but at low water it is possible to walk around the atoll.

There is no anchorage and no ship passage into the lagoon.

At the southern end of the atoll, off the northern end of South Island is a shallow boat passage into the lagoon. This is marked at the outer edge by the stock and ring of an anchor, awash at high water, but clearly visible. The passage to the northward of the anchor leads in a south-easterly direction into the northern end of the land, where it skirts the coast into the lagoon. It is easily discernable by eye in daylight. At high water boats drawing 2 feet can negotiate the passage, but at low water boats can only enter the mouth of the passage where landing can be made on the reef. The ebb current is strong over the reef and the boats are best walked in. Small sharks abound around the passage and over the reef, and a sharp look out should be kept for them. They are easily deterred with a stick or by throwing stones.

At high water, light draught boats can land over the reef opposite the middle of the western side of South Island.

Off Nake Islet at the northern end of the atoll, landing conditions are good in normal easterly weather. There is no surf and boats can work onto the fringing reef almost anywhere with ease. There is no boat passage into the lagoon here.

In September 1974 there was no sign of the flagstaff or settlement at South Island and no sign of any copra cutting activity. A few clearings are all that remains of the old settlement. At Nake Islet however there was a small barely furnished thatched hut and a stack of about three tons of copra on a raised platform covered by a tarpaulin. A three fathom canoe of Polynesian construction lay alongside.

Later investigation found these to have been left by a small party of copra cutters from Tahiti.

In 1846 the British firm of Collie & Lucott established an agricultural settlement at South Island, which was still flourishing in 1868. From 1873 to 1895 the island was worked for phosphate by Mr John Arundel who later planted coconut seedlings. The island was worked off and on for copra until 1936. The island is at present leased to a Captain Omar Darr of Moorea, Tahiti who from time to time lands labourers there to cut copra. In September 1974 there were no inhabitants.

At South Island in May 1883 a party from U.S.S. "Hartford" observed the eclipse and installed a marble slab marking the spot. In September 1974 a shore party were unable to find this, although it may exist in the overgrown vegetation.

Fishing is good and large coconut crabs abound. The islets are thickly populated by flocks of sea birds. There is no information regarding poisonous fish.

There are ancient Polynesian graves at Long Island and Niko Islet.

FLINT ISLAND

Position north end Lat 11° 25'S. Long. 151° 48'W.
Charts 703,979.

Flint is a reef island lying 125 miles S.W. x S of Caroline Atoll. The island has a high beach crest rising to 20 feet and is densely wooded with coconut and pandanus trees to a height of around 80 feet. The island is visible from aloft at a distance of 14 miles.

The island is just over 2 miles long north-west and south-east, and ½ mile wide at its widest part. There is no lagoon but earlier excavations for phosphate have left several small brackish ponds and swamps. The drawing by Mr John Arundel in 1882 on chart 979 is fairly accurate.

The fringing coral reef which dries at low water, is steep-to, and extends generally for half a cable offshore.

Off the northern end of the island a narrow reef extends in direction 335° for 7.5 cables and breaks heavily for about 4 cables offshore. Further to seaward a strong tide rip exists off the end of the reef. Off the southern end of the island the reef extends 2½ cables to the east-south-east.

Four cables southward of the northern end of the island is a white stone beacon dated 1927, surmounted by a flagstaff. Opposite this is a good blasted boat passage about 100 feet long by 30 feet wide with a depth of 8 to 10 feet. There is little rise and fall and the passage is workable at all states of the tide. A strong current sometimes sets across the mouth of the passage, and boats should approach uptide of the entrance. Two cables south of the passage the shore reef juts out about a cable offshore. Between this reef and the northern one the bight is sheltered in easterly weather and the landing is calm. In this bight, opposite the landing, between the two horns of the reef, a ship can approach to within one cable of the shore reef.

There could possibly be an anchorage off the end of the northern reef, but this would only be tenable in calm and settled weather. Between 1872 and 1890 the island was worked for phosphate and the tramway used still exists. The island was later planted with coconut palms and worked for copra by the New Zealand firm of S.R. Maxwell & Co. until 1934.

At present the island is leased by a Captain Omar Darr of Moorea, Tahiti and in September 1974 there were five copra cutters on the island and about thirty tons of copra awaiting shipment to Papeete.

In 1908 the British Eclipse Expedition from Lick Observatory visited the island.

Fish and coconut crabs are plentiful but there is no information regarding poisonous fish.

## APPENDIX I

### Charts required for navigation in the Line Islands

| | | |
|---|---|---|
| Admiralty | Chart | 2603 Pacific Ocean |
| " | " | 732 " " North East Sheet |
| " | " | 733 " " South East " |
| " | " | 3405 Enderbury Is. to Christmas Island |
| " | " | 2067 Plans in the Pacific (Washington Palmyra) |
| " | " | 2971 Fanning Island |
| " | " | 2993 Plans in Christmas Island. |
| " | " | 2995 Approaches to Port London, Christmas Island |
| " | " | 102 Malden Island |
| " | " | 979 Islands between 168° East & 150° West. (Vostok, Starbuck, Caroline, Flint) |

Pacific Islands Pilot Vol III

Admiralty Tide Tables Vol III Pacific Ocean

## APPENDIX II

TABLE OF NAVIGABLE DISTANCES IN THE BRITISH LINE ISLANDS

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Tarawa | Tarawa | | | | | | | |
| Washington | 1624 | Washington | | | | | | |
| Fanning | 1604 | 76 | Fanning | | | | | |
| Christmas | 1792 | 240 | 150 | Christmas | | | | |
| Malden | 1970 | 615 | 540 | 392 | Malden | | | |
| Starbuck | 1931 | 671 | 605 | 470 | 103 | Starbuck | | |
| Vostok | 2203 | 993 | 910 | 795 | 391 | 340 | Vostok | |
| Caroline | 2324 | 1050 | 971 | 830 | 452 | 428 | 126 | Caroline |
| Flint | 2259 | 1092 | 1010 | 865 | 475 | 418 | 83 | 125 Flint |

Christmas Is. to Honolulu 1165 miles
" " Papeete 1263 "
" " Panama 4770 "
" " Southampton 9760 "

APPENDIX III

NAVIGATIONAL NOTES - PHOENIX GROUP & JARVIS ISLAND

Jarvis Island 25/9/74

Stopped off lee side for 1½ hours in evening, but did not land. Old lighthouse white with red horizontal stripes stands out well and gives radar range of 14 miles. Island visible from aloft 10 miles. Ruins of old buildings on western side. No inhabitants.
Current setting WNW 1 knot.

Phoenix Island 13/10/74

Called late afternoon and landed shore party. Landing bad on steep beach with high beach-crest on western side of island. Best landing just southward of large boulder on reef. USN observation stone and plinth of old flagstaff still visible from seaward. Lagoon dry.

Radar range 8 miles, visible from aloft 6 miles. Very dangerous island to approach in dark or poor visibility. Current setting westward 1½ knots. Plentiful bird life. No inhabitants. Left drum marked "Teraaka on beach crest opposite landing.
Current setting westward 1 knot.

Sydney Island 14/10/74

Radar range 16 miles, visible from aloft 12 miles. Anchored in 8 fathoms one cable from reef off western point of island and shore party landed. Obelisk and topmark marking anchorage in position but obscured from seaward by vegetation. Landing through blasted passage just north of anchorage opposite plinth of old flagstaff. USN observation stone visible just further northward. Two cement freshwater cisterns full. Wreck of unidentified crashed aircraft in village.

Hull Island 15/10/74

Radar range 22 miles visible from aloft 12 miles. Landed shore party with permission of U.S. civilian caretaker personnel. At NE end of main islet said to be in position lat. 4°.32'S long 172°14'W lattice radar tower white with red horizontal stripes 100ft high. Other buildings south of tower and two helicopter pads SW. Two other 70 to 80 foot pole-masts in middle of SW side of island and at SE corner. U.S. Forces "splashdown" radar. Weekly helicopter service with Canton.

Off western corner of atoll, wreck of Japanese fisherman. Just southward of wreck good blasted boat passage through reef with turning basin at shore end. Passage marked by four beacons on beach.
Concrete fresh water cistern in village empty.

Two U.S. forces personnel live on island.
During stay ship "buzzed" by two U.S. helicopters from Canton Island who also landed investigating party.

Current setting W x N 1 knot

Gardner Island 17/10/74

Radar range 16 miles visible from aloft 11 miles. Pole mast about 50ft high with reflector at eastern end of island. Conspicuous wreck off north-western end as marked on chart 184. Good blasted passage opposite white stone beacon on beach, visible from seaward.
No inhabitants.
Current setting W x S 1½ knots.

Charts B.A. 1830,184.
U.S.H.O. 0124

Capt. E.V. Ward
"Teraaka"