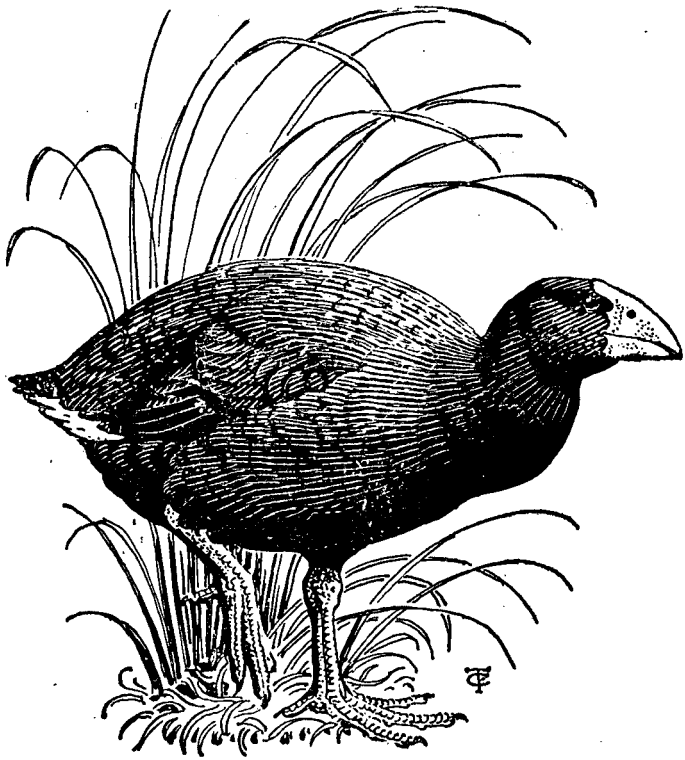
NOTORNIS



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(Incorporated)

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NOTORNIS

In continuation of New Zealand Bird Notes

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Contents of Vol. 12, No. 1: March, 1965

THE KERMADECS EXPEDITION 17 - 25 NOVEMBER, 1964

Narrative: A. T. EDGAR
Ornithological Notes: F. C. KINSKY, G. R. WILLIAMS

When the Ornithological Society of New Zealand decided to mark the 25th Anniversary of its foundation by organising an expedition, it was following an example set by kindred and older Societies overseas. Less usual, perhaps, was the decision that the enterprise should be wholly sponsored and financed by the Society and its members: quite unusual, and perhaps unique in ornithological history, was the abrupt termination of the expedition's activities after only two days of work, by compulsory evacuation of the island base after a volcanic eruption.

We were to have been away for ten weeks, and it was intended to produce a book of the expedition, sale of which would help to recoup some of the Society's outlay. The volcano had been quiet for about ninety years: had it postponed its activities for only nine weeks more it would have made a spectacular ending to a successful project, and a dramatic final chapter for the record. We had the spectacular ending, but it came so soon that the narrative is shortened from book size to little more than a short story. It is, however, a story that should be told, and told in some detail. What we saw in two days confirmed our expectations: there is much valuable work to be done on Raoul and the smaller islands, and it should be done at some not too distant time. It is to be hoped that some at least of the team who suffered the bitter disappointment of 1964 evacuation will be able to return and finish the job. The meagre but useful results of 1964 expedition go on record as a starting point for follow-up work; the summary of preparatory activities may help whoever undertakes the task of organiser: and this account of what we planned to do and what little we were able to achieve may be of interest to the company of kind and helpful people, O.S.N.Z. members and others, to whom we owe a debt of gratitude for advice, encouragement and practical assistance so freely given at all stages of the operation.

The history of 1964 expedition begins in May, 1962, when O.S.N.Z. Council discussed a suggestion that the Society should celebrate its Jubilee by sending an expedition to one of the outlying island groups. These fall into three categories, Subantarctic (Bounty, Snares, Antipodes, Auckland, Campbell and Macquarie), Temperate (Chathams), and Subtropic (Kermadecs).

In March, 1963, Brian D. Bell produced a memorandum in which he outlined the considerations which led him to recommend the Kermadec Group as the best choice, having regard to factors such as the probable season and duration of the expedition, topographical and weather conditions and ornithological value. This recommendation was accepted by Council in May, 1963. Preliminary approaches were made to the Department of Civil Aviation, which is responsible for Administration on Raoul, the main island of the Kermadec Group: and to the Hon. Dean Eyre, Minister for Defence, whose kind co-operation in making H.M.N.Z.S. *Lachlan* available for transport of the team to and from Raoul solved most happily the greatest of our

initial problems. In November, 1963, Messrs. A. Blackburn, B. D. Bell, D. McGrath and Dr. R. A. Falla were appointed by Council to serve as Kermadec Expedition Sub-committee, and in May, 1964, the final stage of active preparation and organisation began, and continued at high pressure until the expedition sailed from Auckland on 17th November.

As anyone who has had experience of organising an expedition will realise, there was quite a lot to do. It was necessary to apply to the Department of Lands & Survey for permission to visit the islands and for authority to make a representative collection of flora and fauna, and to the Department of Internal Affairs for authority to take a limited number of specimens of protected birds. Sailing dates were arranged with the Navy Office, and later on detailed arrangements for embarkation of personnel and stores had to be worked out with the Commanding Officer, Commander W. J. Doole, R.N.Z.N. The project was discussed with officers of the Meteorological Service, and much conference and correspondence was necessary with the Department of Civil Aviation, who were in effect our hosts at the proposed base camp on Raoul Island. A list of stores and equipment had to be prepared, and arrangements made for purchase, packing and storage. A dinghy and outboard motor, plus spare parts, oars, rowlocks, etc., had to be acquired for inter-island transport. These had to be new, as we could not risk the possibility of avoidable breakdowns which might immobilise part of the team: suppliers' current import licence for the type of motor we needed was already fully committed, and this involved an application to the Customs Department for a special import licence. Radio sets for intercommunication between base and fly camps or offshore island parties were considered essential: strenuous and repeated efforts to obtain these on loan were unsuccessful, but in the end the Navy came to our aid. It was decided that team members should insure their own personal effects, but O.S.N.Z. arranged an accident insurance cover of £2000 for single and £4000 for married men.

Civil Aviation required that all members of the team should undergo a Services medical examination, and produce certificates of chest X-ray, dental fitness, anti-tetanus, and a record of blood grouping and next of kin. First aid kits were purchased for use at fly camps: we had no doctor in the party, but the Officer in Charge at Raoul is trained to deal with all normal medical emergencies, and can if necessary obtain advice by radio telephone from the Principal Medical Officer in Wellington. Civil Aviation had kindly agreed to give every assistance and make available its medical facilities to our party, but naturally could not undertake responsibility for payment of costs involved in the event of serious illness or accident requiring evacuation of any member. Raoul Island is many miles off the main shipping lanes: diversion of a ship is an expensive affair and could, we were informed, cost up to £3000. Insurance against this unusual risk was carried by Lloyds.

Raoul Island is uninhabited except for personnel of the Meteorological Station (Officer in Charge, three meteorological officers, radio technician, mechanic, handyman, farm manager and cook). The tour of duty is one year, and in 1964 the servicing vessel, M.V. Holmburn, was scheduled to sail from Wellington on 3rd November and return to Wellington on 11th November, having in the meantime embarked

the 1963/64 Civil Aviation expedition, disembarked the 1964/65 expedition and unloaded its stores and equipment. The sailing date was in fact delayed by one week, and M.V. Holmburn sailed on 10th November.

D.V. Merton and the writer were responsible for working out the list of stores and quipment to be taken to Raoul by O.S.N.Z. (less collecting gear, photographic gear and recording equipment, which were the responsibility of other members). Civil Aviation had offered to supplement our rations with a certain amount of fresh milk and meat from the station farm.

Consideration of the components of the list began in a deliberate fashion, working from a standard quantity schedule used by Wildlife Branch for its island expeditions, with some deductions in view of the estimated quantity of fresh food available, and some additions having regard to the prospect of spending the festive season on Raoul, and the assumption that the O.S.N.Z. party members would not all be quite as tough as Wildlife Officers. There was a lot to think about but plenty of time: we were not sailing till November: most of the bulk stores, accompanied by Don Merton as advance party, were to be shipped by Holmburn, but that, too, was some months ahead. At the end of June Civil Aviation offered to pack and crate O.S.N.Z. stores, provided that these were sent to Parkside Depot, Wellington, by 3rd September. This kind offer was too good to be disregarded, but resulted in a marked acceleration of our planning: the situation was complicated by Don Merton's departmental duties which would take him to inaccessible southern islands for much of the intervening period, and by the absence on holiday of our active Wellington contact, Denis McGrath, during part of July and August. All worked out in the end: the list was completed, the bulk stores were purchased, delivered, and most professionally and meticulously packed and listed by Mr. Tulloch of Civil Aviation Store. As soon as Don Merton was back in Auckland from his island expedition he was busy again, ordering the balance of non-perishable stores and making arrangements for delivery of equipment and perishable stores by sailing date. Mr. Burns, District Officer, Internal Affairs Department, Auckland, most kindly gave permission for use of part of the departmental store as a depot to which our expedition stores could be delivered, and Mr. Paulsen, the storekeeper, could not have been more helpful, both before the expedition sailed and after we returned from Raoul.

Selection of Personnel

In June, 1963, Council invited applications from members of O.S.N.Z. who wished to be considered as participants in the Kermadec Expedition. A number of applications were received, and many more would have applied had the duration of the expedition been less than ten weeks, or had it been possible to participate for part of the period: this of course could not be arranged because no transporting vessel was available. The Navy Office made it clear that lack of facilities in *Lachlan* made it necessary that the party be an all-male one, which proviso debarred consideration of applications from women scientists who would in other circumstances have been welcome and valuable members of the team. It was clear that the value of the expedition would be increased if a botanist and an entomologist were included,

and invitations were extended to scientific bodies to nominate representatives. F. C. Kinsky, Dominion Museum, was invited to join as one of the scientific leaders, and I was invited to join as Administrative leader and scribe, the disadvantage of advanced years and limited physical agility being apparently outbalanced in the minds of the selectors by a generous estimation of my capacity for diligence and ability to keep the records.

The final selection was as follows:—

Administrative Leader & Scribe	— A. T. Edgar (Secretary, O.S.N.Z.)
Scientific Leaders	— F. C. Kinsky (Ornithologist, Dominion Museum, Wellington)
	— G. R. Williams (Zoology Department, Lincoln College, Canterbury)
Stores and Transport	— D. V. Merton (Wildlife Branch, Department of Internal Affairs)
Botanist	— W. R. Sykes (Botany Division, D.S.I.R.)
Entomologist	— O. R. Wilkes (nominated by Bishop Museum, Hawaii)
Ornithological Members	— C. N. Challies (Forest Service)
	— P. Child (Education Department)
	— D. E. Crockett (Education Department)
	— D. G. Dawson (University Student)
	— M. J. Hogg (University Studen)
	— J. A. Peart (Education Department)
	— A. Wright (formerly Lighthouse Service, now Wildlife Branch)

Plan of Work

In September, 1964, Fred Kinsky, Gordon Williams and I conferred with Dr. R. A. Falla in Wellington, the object of the conference being to draw up a broad plan of work and allocate individual study projects and responsibilities.

The main objective was defined as an Ornithological Survey of Raoul Island and as many of the adjacent outliers as could be visited. It had already been arranged with Commander Doole that should weather and sea conditions be favourable, *Lachlan* would return to Raoul about 22nd January, 1965, and thus allow time for small parties to be put ashore on the more distant outliers (Macauley and Curtis Islands) for about 48 hours, before departure from the Kermadec Group on 27th January for return to Auckland on 29th January.

In addition to work planned by the Scientific Leaders, two other members had proposed definite study projects, and most had indicated preference interests. The conference therefore drew up an outline programme listing projects to be undertaken and allocating particular responsibilities to individual members, as follows:—

Wedge-tailed Shearwater — M. J. Hogg.

Allied Shearwater, Kermadec Storm Petrel — D. E. Crockett.

Black-capped Petrel, Phoenix Petrel — F. C. Kinsky, G. R. Williams.

Kermadec Petrel — All hands to provide data on distribution, breeding status and record of colour phases, on Raoul and Meyer; to be recorded and mapped by A. T. Edgar.

Black-winged Petrel — Breeding biology, F. C. Kinsky; status on Raoul — P. Child.

Red-tailed Tropic Bird — Breeding biology, F. C. Kinsky; census, P. Child.

Masked Booby, White-capped Noddy, White Tern, Grey Ternlet — Breeding biology, F. C. Kinsky and G. R. Williams: census of White Tern, P. Child.

Sooty Tern — Population study and breeding biology, C. N. Challies.

Waders and Migrants — P. Child.

Land Birds — Feeding and breeding habits of native land birds, J. Peart: general census and density studies of land birds, breeding and habits of introduced species, D. G. Dawson.

Compilation of a list of species present and general assessment of status was allocated to G. R. Williams, data for this project to be contributed by all hands. It was obvious that each member of the team would in the course of his own investigations gather many items of useful information which would assist the studies of other members: one of my tasks as general recorder was to ensure that all such observations were noted, collated and made available to the individual responsible for study of the particular species concerned.

The allocation of projects as listed above enabled individual members to do the necessary homework, but did not preclude the making of adjustments or alterations to the programme according to circumstances, provided that such changes or additional projects were discussed with and approved by the Scientific and Administrative Leaders. Members working on listed projects were not to be debarred from participating in activities other than those allotted to them; the essence of success was that all should work as a team. Raoul is a rugged island, and to make sure that no one got lost, we intended to make a general rule that no member should go outside the camp or farm area or off the roads without a companion: this meant that ornithological members would have the opportunity from time to time of working with the botanist, the entomologist, or other members of the ornithological team.

G. R. Williams was to make a general study of mammals, and the two Wildlife Officers (D. V. Merton and A. Wright) were to be in charge of such trapping and collecting as was found necessary. They were also to investigate distribution and numbers of goats and cats, the effect of the former on vegetation and the latter on birds and on rats: to determine how many species of rats are present, the distribution and density of each species: to record any evidence of the effect of rats on vegetation or on the bird population: and to study the position as regards pigs — domestic animals which are less controlled by farm fences than are the cattle and sheep.

The co-operation of W. R. Sykes (Botanist) and O. R. Wilkes (Entomologist) was to be of great value in ecological studies. Several minor zoological projects were to be undertaken at the request of interested scientists in New Zealand who had written asking for assist-

ance. Owen Wilkes is an experienced field archaeologist, and it was expected that he might have an opportunity to exercise this talent in his spare time from entomological duties.

Film coverage by Fred Kinsky, with Gordon Williams in charge of the tape recorder, gave promise of a valuable record of the expedition. Practically all members of the team were keen photographers, and the offer of a Wellington member of O.S.N.Z. to help by wholesale purchase of film had been gratefully accepted. All photographic results were to be made available to the Society for inspection and subsequent use if required. All invertebrate material other than that collected for Bishop Museum, and all vertebrate material collected was to be sent to Dominion Museum for registration, after which it would be available for study on application to the Director. The taxidermy team was adequate. Members of the expedition had between them an impressive range of interests and skills: the plan provided for a useful survey of the flora and fauna of the group, as a by-product of its main ornithological purpose: there was enough to do to keep everyone busy for the whole of the ten-week period, and we had no doubt that our work would produce results of considerable interest and value to ornithology, in New Zealand and overseas.

It was going to be good.

Departure

Don Merton had sailed on Holmburn with the bulk stores. The other twelve members of the expedition converged on Auckland on 16th November, bringing with them their personal gear. The pile of expedition equipment and balance of bulk stores had been steadily growing over the past week as items arrived from local suppliers or by rail from other parts of New Zealand. There was a small flurry of last-minute purchases, final checks on arrangements for delivery of dinghy and motor on board *Lachlan* on 16th and perishable stores on the morning of 17th November, but the main job of the day was to load the mass of packages on to a truck at Internal Affairs Store and on to *Lachlan* at Devonport. Some of the members had personal arrangements still to be completed but the loading party of six was fully adequate for the job: the truck driver was helpful and efficient, a party of sailors working with us made short work of the job of stowing our gear and about midday we were back in Auckland, hot and rather thirsty. Alan Wright, one of the loading party, had sensibly decided to work in jeans. When we filed into an hotel lounge to quench our thirst we were momentarily thwarted by the stewards' uncompromising refusal to serve a person so unsuitably dressed. As this was apparently an inflexible rule of the hotel, there was nothing to do but go upstairs to my room, where the offending jeans were replaced by a borrowed pair of corduroys, and Alan rejoined us in the lounge, garbed in an acceptable state of respectability.

At 0900 hours on 17th November the party assembled at Admiralty Steps and at 0930 hours embarked on the Naval launch which Commander Doole had kindly arranged to ferry us across the harbour. Sweethearts and wives, Archie Blackburn and Ross McKenzie (President and Treasurer, O.S.N.Z.), press and photographers came to see us leave. A short launch trip across the harbour and we were boarding *Lachlan* at Devonport. An item in the morning paper was the first intimation that we had a fellow passenger, E. F. Lloyd, of N.Z.

Geological Survey, Rotorua, who had joined at short notice because of increased seismic activity on Raoul, believed to be of volcanic origin.

Many telegrams of good wishes arrived before the ship sailed at 1100 hours. Particularly appreciated were three of these messages; one from the Hon. Minister for Defence, without whose sympathetic co-operation the expedition could not have been mounted —

"I wish you and all members of your party a highly successful and enjoyable visit to the Kermadecs. Good Luck.

Dean J. Eyre."

one from Denis McGrath, whose prompt and practical help had so greatly lightened the burden of preliminary organisation —

"Margaret and I send to you and to all members of the expedition our best wishes for its success" and the third —

"Good fortune and good birding to Kermadecs expedition from Southland members."

To them, and to all those others who sent or personally delivered farewell messages of goodwill I would like to express our thanks. They were an additional encouragement to a party which was already in a state of pleasurable anticipation as we filed down the companionway to our quarters to comply with the Navy custom which requires that decks should be cleared except for those on duty when a ship is leaving harbour.

Lieutenant Commander G. B. W. Johnson, R.N.Z.N., the First Lieutenant, had issued an order giving details of our accommodation (forward and after mess decks), arrangements for drawing bedding, times of meals, and procedure if hands were piped to Emergency Stations. Our contact for all queries was Lieutenant B. E. Allpress, R.N.Z.N., who displayed exemplary patience and good humour in his task of instructing a lubbery lot of ornithologists in the layout of *Lachlan* and the dos and donts of Navy ships. We picked up the dos and donts fairly readily, but the layout was for some another matter and required much practice, trial and error before we really found our way around the ship. Alan Wright, whose varied career included service in R.N. and R.N.Z.N., met some old friends in the ship's company and was completely at home in no time at all — a great help to those of us whose sense of direction took some time to develop.

Accommodation on the Mess decks was adequate if not luxurious for their normal complement of sailors, but a dozen passengers took up a lot of room which would normally have been available for the rightful occupants. The sailors could very reasonably have been resentful of this overcrowding of their space, but on the contrary they made us most welcome and were at all times ready with help when we needed it in such matters as fixing bunks and stowing personal gear. "Wets" (drinks), "scram" (food) and "dhoby" (washing) became part of our vocabulary, and we soon learnt the drill of queueing up for the excellent food served in the cafeteria.

When the ship was off Rangitoto we were up on deck again. It was a great moment. The long period of preparation was over, the stores and gear were aboard: if anything had been forgotten, there was nothing whatever we could do about it. Twelve pairs of

binoculars were hanging round twelve necks, virgin notebooks and sharpened pencils were ready for the first record of sighting: a fine day, a calm sea, and a light southwesterly wind.

The rest of that day and the next passed pleasantly: a continuous ornithological watch was kept from dawn till dusk and the results are recorded by F. C. Kinsky and G. R. Williams later in this paper. Commander Doole entertained members in his cabin, the wardroom gave a party, some of us attended the ship's cinema show, and all of us were most conscious of the friendliness and goodwill of officers and ratings.

While the ornithologists scanned the waters and the botanist read a book, Owen Wilkes had a four-hourly duty to perform, tending the four pastel coloured windsocks which he was permitted to fly from the signal halliard. To the casual observer, these collected mainly a mixed bag of soot particles and fragments of air-borne vegetable matter, but no doubt there was also some entomological grain among the chaff: in any case they provided an unusual decorative effect.

At about 0530 hours on 19th November *Lachlan* dropped anchor off Raoul Island: a bright morning, calm sea, whales leisurely surfacing and blowing further out from shore, and flying past the ship a generous selection of the birds we had come to study. At 0730 hours the first boat was lowered and transport of passengers and gear began.

The Kermadec Group

The Kermadec Group is one of several habitable sub-tropic islands which lie across the Pacific around latitude 30°S. Lord Howe and Norfolk (Australia), the Kermadecs (New Zealand) and Juan Fernandez (off the Chilean coast) are stated to share much that is similar in climate, general facies of vegetation and composition of the fauna. Raoul (or Sunday) the largest island of the Kermadec Group (7260 acres) lies 674 miles north-east of Auckland — about half way to Tonga. Lying close to Raoul on the northeast is a group of small islets (Meyer, Napier, Nugent, Dayrell; North, South and East Chanter) known collectively as the Herald Islets: Macauley Island (756 acres) and Haszard Islet (8 acres) lies about 67 miles to the South-South East of Raoul: Curtis Island (128 acres) and Cheesman Island (12 acres) about 20 miles South of Macauley, and L'Esperance Rock (12 acres) about 60 miles South of Curtis. All the islands are of volcanic origin. There have been at least two volcanic eruptions (1814 and 1872) during the recorded history of Raoul, but from 1872 till November 1964 its activity had been limited to a few fumaroles. Curtis has over the same period shown more activity, in the form of boiling mud, sulphur and siliceous sinter. Earthquakes are frequent and ofter severe.

Centuries ago the group was known to Polynesian voyagers, whose stone tools have been found on Raoul. Curtis and Macauley were discovered and named in May 1788 by Lieutenant Watts, R.N., in the *Lady Penrhyn,* which ship was blown off course while on a voyage from Botany Bay to Macao (China). Curtis is said to have been named after the London owners of the *Lady Penrhyn,* and Macauley after an Alderman of the City of London who was a friend of Lieutenant Watts. In 1793 these islands were seen again by the French Rear-Admiral Bruni D' Entrescasteaux, who also discovered the main island and named it Raoul, after his first pilot-master, Joseph Raoul of the *Recherche.* He also named the whole group Kermadec, after the

Captain of the ship *Esperance*. On a Sunday in 1796 Captain Raven, master of a transport ship *Britannia*, sighted Raoul. He was unaware that it had already been named and called it Sunday Island. Both names appear on maps and charts. Captain D'Urville visited the island in the *Astrolabe* in 1827 and reported that it was uninhabited.

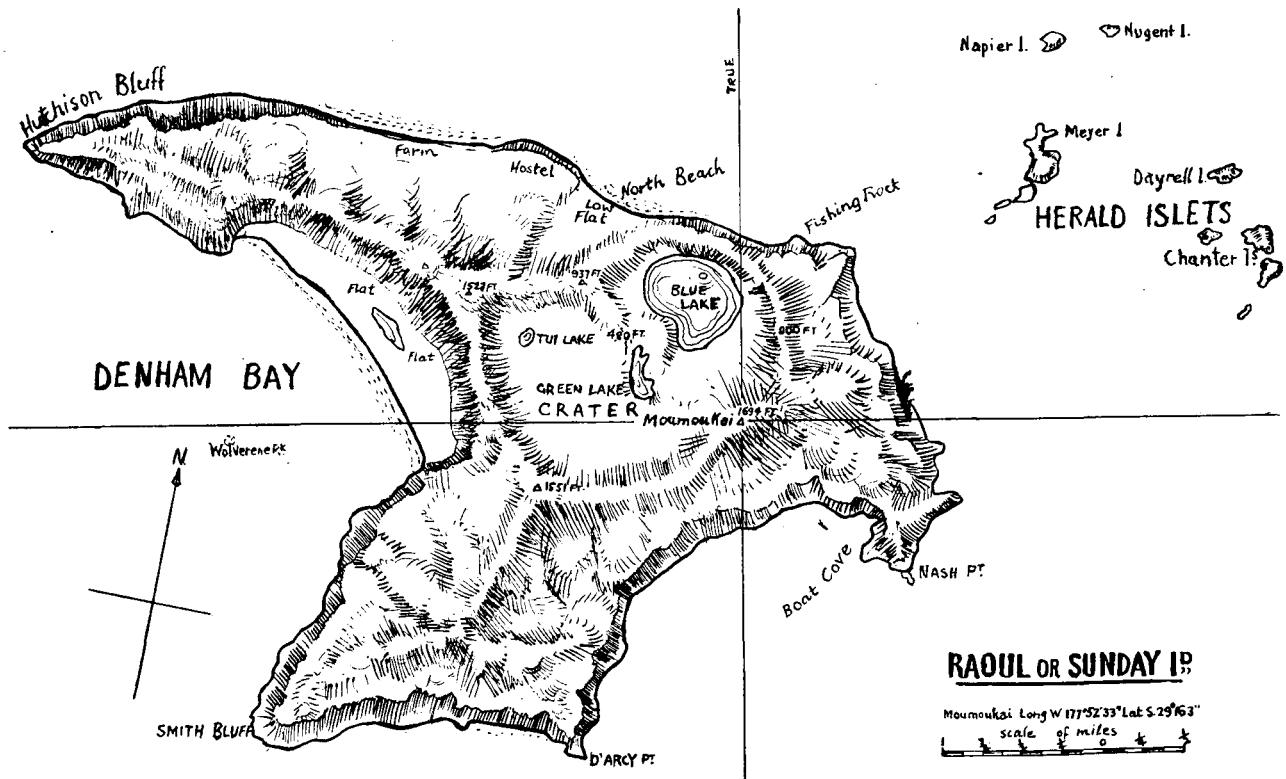
Curtis Island is a barren place, rocky, thermally active and inhospitable except to the birds. The map shows a landing place at Macdonald Cove where one side of the crater has been blown out by a long-past eruption, but Lloyd reports that in November 1964 this was no longer usable, having been infilled by large blocks which had apparently slipped from the crater wall. Macauley has only one landing, and that practicable only in westerly weather: it is overrun by goats, the descendants of those liberated long ago by whalers, and the goats have ravaged the vegetation which when the island was first discovered was described as trees, shrubs and grass. There is no permanent water on Curtis or Macauley: they are small, remote and uninviting to humans, and no settlement has ever been attempted.

Raoul Island

Raoul is a mountainous island, about 6 miles long from its most westerly to its most easterly points, and just under 5 miles from its north-easterly to its south-westerly extremities. A large crater, nearly 2 miles across from east to west and well over a mile from north to south, occupies much of its area. There are three lakes on the crater floor. Blue Lake is the largest, Green Lake much smaller, and Tui Lake a mere pool. The crater walls are steep; the crater rim is only 180 ft. a.s.l. at a point just north of Blue Lake, but rises to 1694 ft. at Mount Moumoukai on the southeast and to over 1500 ft. at two points on its western side. Outside the crater except for a flat area on the northern coast, the terrain is rugged and broken with alternating ravines and spurs which end in sheer cliffs round most of the coast. At the base of some of the cliffs there are boulder beaches; Denham Bay has a gravel beach backed by a flat, part of which is swamp; behind this flat area cliffs rise steeply, making land access no easy matter except on one track. There is a sandy beach along part of the northern coast. Blue Lake was a good water supply, Green Lake strongly mineral, Tui Lake stagnant: there is an alternative supply on the north of the island and some seepages elsewhere, but their flow varies greatly with the season: water can be obtained by digging wells at Denham Bay.

The soil is mainly pumiceous and other tuffs (fragmentary volcanic rock) with a few lava flows. The prevailing wind cycle is said to be west to southwest in winter, east to northeast in summer. Hurricanes occur, but not frequently. Temperatures range from about 47°F. in winter up to 86°F. in summer: humidity is generally high, rainfall usually evenly distributed, but summers can be dry. Most of Raoul's vegetation is forest, pohutukawa being the dominant species: nikau palms are abundant, and a number of other New Zealand shrubs are common, as are tree ferns. Cheeseman and Oliver (1910) considered that the flora includes a preponderance of New Zealand forms but also a strong Polynesian element, and that the islands received their plants by oceanic dispersal.

The waters around Raoul became known as a regular sperm whaling ground in the early part of the nineteenth century, and it is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RAOUL OR SUNDAY I.
Moumoukai Long W 177°52'33" Lat S. 29°16'3"
scale of miles

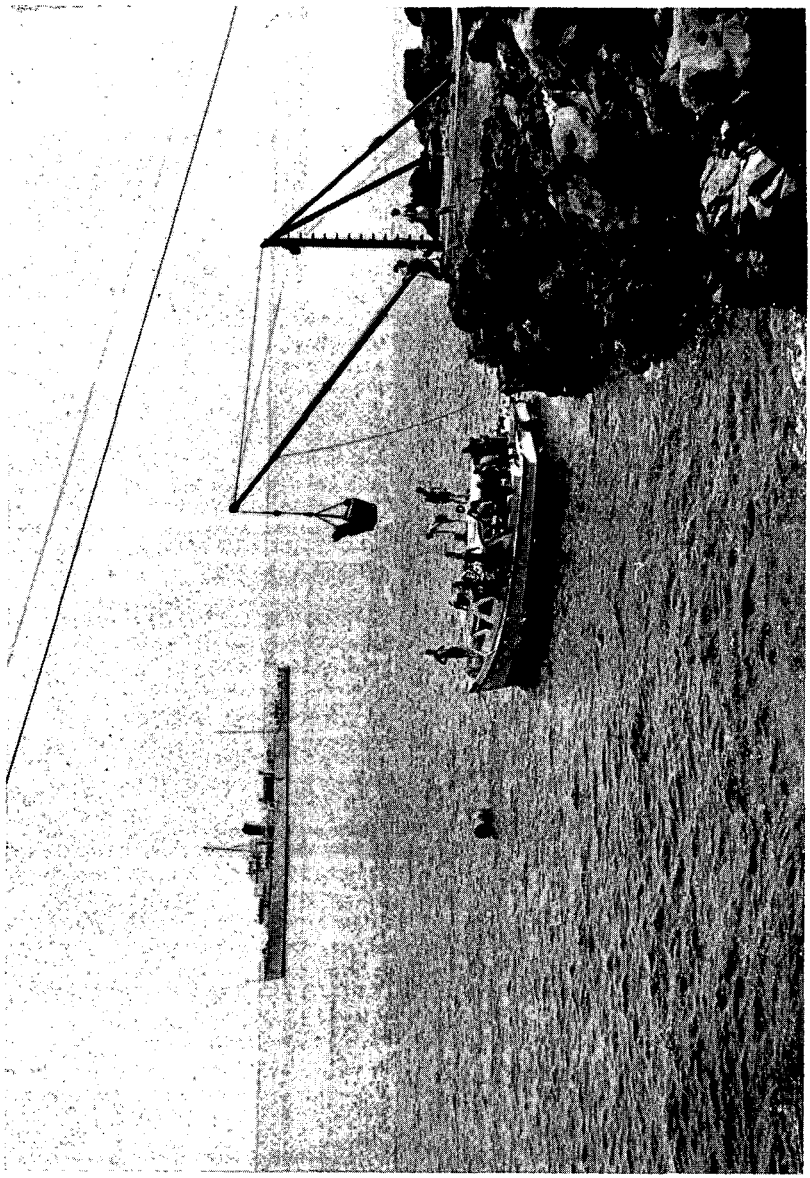
said that during that period the north end of Denham Bay was used as an "ocean post office." Ships from Great Britain and other countries deposited mail for the crews of other vessels working in the Pacific, and homeward-bound ships collected and took with them mails of those remaining on the whaling grounds. In 1837 the first European settlers, Baker and Reid, arrived with their Samoan wives; they raised families, successfully grew bananas and a variety of garden produce, preserved fish and mutton-birds: traded food supplies and water with the whaling ships in exchange for flour, sugar, clothing etc.; introduced goats about 1840, and remained on the island for some years. Reid left before the Bakers, who stayed on Raoul until about 1848 when they left after an alarming series of earthquakes. Other settlers came and went from 1850 to 1872, when severe earthquakes and minor volcanic disturbances which had caused periodic alarms for years culminated in a severe volcanic eruption: the settlers present on Raoul at the time were taken off by a whaling ship.

In 1854 Captain Denham, R.N. *(H.M.S. Herald)* surveyed the island and the neighbouring seas. While Captain Denham was so engaged his son Fleetwood Denham died, and was buried near the lagoon at Denham Bay. Another tragic happening occurred during this period. A disease of typhoid type had broken out on a vessel carrying 200 slaves to Callao: the ship landed the slaves at Raoul and sailed on. All the slaves eventually died, as did about half the settlers and their children: the remainder departed by the first ship which called after the tragedy.

Undeterred by what he may have learnt about this history of disappointment and disaster, and enthusiastic about the possibilities of development on Raoul, Thomas Bell came from Samoa in 1878 and settled on the island with his wife and young children. He planned to grow fruit and crops and raise stock on a large scale, and for a time employed a gang of Niue Islanders: when the decline of whaling in the area reduced the number of his customers he sent the gang away, but he and his family continued to reside on the island: after early hardships and misfortunes they settled down to a period of contented and healthy existence. Like all the previous settlers, the Bell family landed through the surf at Denham Bay, and lived there for a time on the Denham Bay Flat. They had great trouble with rats, and decided to move, first to the low flat at the north beach, and later to the higher flats, where they built a permanent home. In 1883 Bell introduced sheep and some cattle.

In 1886 the British flag was formally hoisted on Raoul. In 1887 a proclamation of annexation of the islands to New Zealand was read. Sub-division followed: Bell was eventually allotted a freehold of 275 acres. About 1889 a number of settlers arrived and it is said that there were at one time about 45 people on the island. Amongst them were Mr. and Mrs. Bacon and their son Alfred Bacon. After varying periods most of the settlers left but some of the Bell family stayed on until they were instructed to leave at the outbreak of the 1914/18 war. Raoul was in the news during the war; it was used as a shelter by the German raider *Wolf* and later was the place where the escaping raider Captain Count von Luckner, in the scow *Moa*, was intercepted by a New Zealand ship.

Between the wars there were further attempts at settlement, none of them markedly successful. Some of the settlers were ill-equipped by



[F. C. Kinsky

I — Unloading at Fishing Rock, Raoul Island, with 'Lachlan' offshore.

nature for pioneer adventure: others were more fitted for the task they had set themselves, but in spite of the fertile soil and rapid growth of plants and trees the problems of reliable and rapid transport of produce to markets were insuperable and though Raoul could provide conditions for pleasant living to those who liked and were fitted for that kind of life, and were not unduly dismayed by periodic manifestations of elemental forces it was never, after the decline of the sperm-whaling industry, a commercial proposition.

In 1937 Raoul was visited by a party of technical Government Officers: during the 1939/45 war a radio station and coast-watching unit was maintained on the island. When the 1937 party arrived the few inhabitants included Alfred Bacon who had been on the island as a younster in 1889 and was in 1937 a man of 68 years of age. During the intervening years he had spent several periods on Raoul and now at 93 lives in Kerikeri and still recalls with pleasure and clarity the happy days he spent on the island.

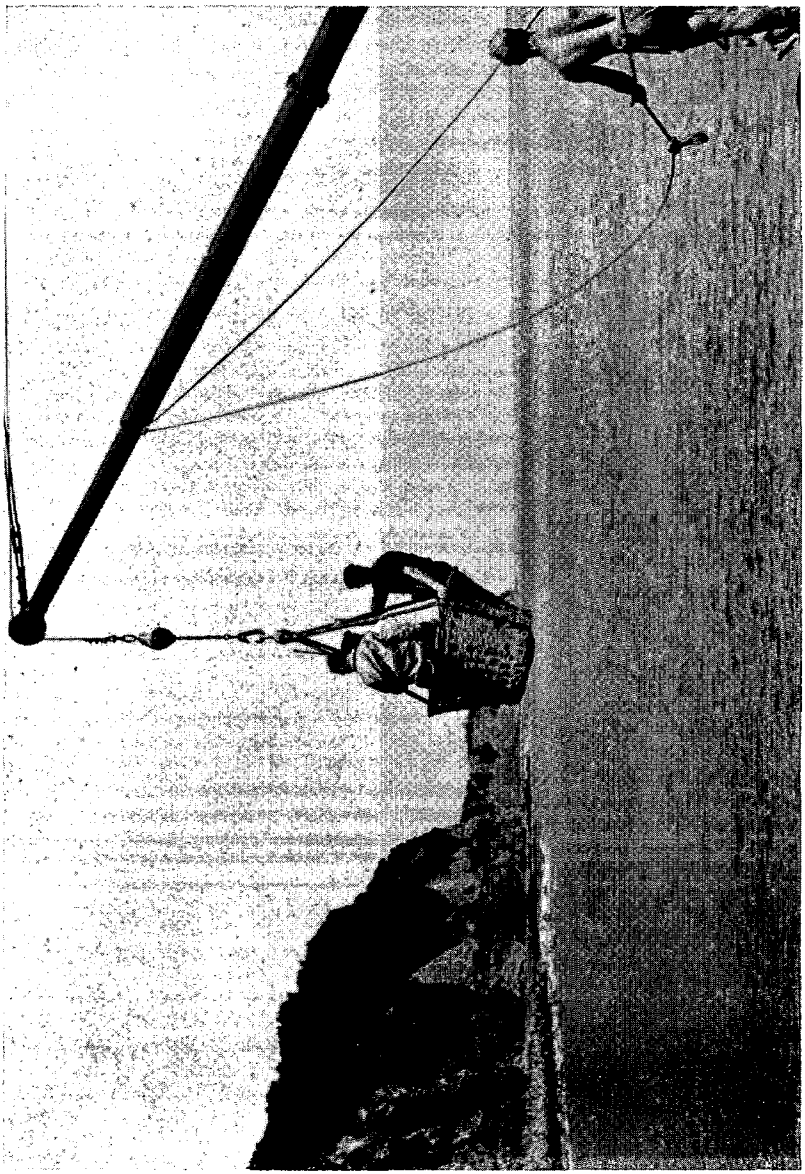
No one, except the personnel of the Meteorological station, has lived on Raoul since the war.

Landing and Making Camp: Start of Work

In the old days all landings had to be made through the surf at Denham Bay or North Beach. Landings are now made at Fishing Rock unless onshore wind and swell make it impossible to bring a boat alongside, in which case an alternative landing at Boat Cove is available. At Fishing Rock a lava flow provides a natural jetty: on this there is a derrick which can be swung round so as to lower a large basket to the boat: personnel and packages are swung back in the basket and lowered on to the rock. Steep cliffs rise from Fishing Rock.

The gear is transported by a "flying fox" from the rock to the cliff top: individuals walk up a steep goat track, just below the top of which some wag has erected a notice: "If you're just about b——— you're just about there" — a timely statement of fact which was a considerable comfort to panting ornithologists who had not had time to develop their Raoul Island wind and legs. With working parties on the rock and at the top of the cliff the shifting of gear went ahead smartly. Clive Phillips, Officer in Charge of the Met. Station, Colin Jensen, the cook, and Bill Crafar, the handyman, had come to meet us and work the winch and derrick: with them was Don Merton of our party. They had brought to the top of the cliff the two station vehicles, a truck and a tractor/trailer. Gear and personnel were transported along the tree-shaded road which runs along the crater rim between Blue Lake and the sea: a truly beautiful road, giving glimpses through the trees of the lake on one side and the sea on the other and leading to the cleared area at Fleetwood Bluff on which stand the Hostel and Met. Station. The same road carries on past the station to the farm, and by-roads lead down to north beach and along a ridge to the cliff top above the alternative landing place at Boat Cove.

We had been allotted a camp site in a paddock opposite the hostel. One tent was already up, and in it were stacked the Holmburn stores. It was not very long before the other tents were pitched, Lachlan stores stacked in the store tent, and members of the party began settling in. Clive Phillips had allotted me a spare room in the hostel, which was to be used as expedition headquarters and in which I could sleep. A number of beds with mattresses were made available,



[F. C. Kinsky

II — Looking N.N.W. from Fishing Rock. North Beach and the Meteorological Station are behind the basket.

one in my room and four per tent. This was an unexpected luxury. We had expected to sleep on camp stretchers and lilos (and would, of course, when we moved out to fly camps) but the happy situation of being able to stow gear under the bed in base camp was an amenity we had not expected.

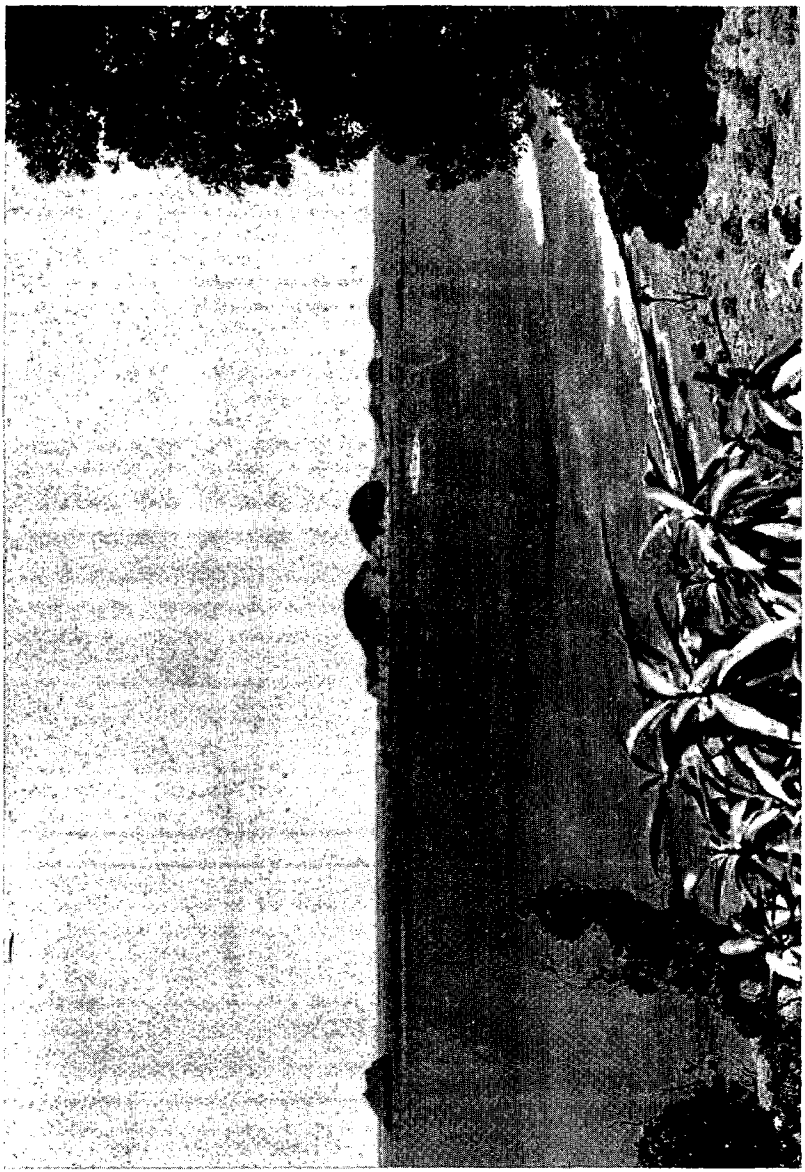
It had been laid down by the Department of Civil Aviation when granting permission for the party to visit Raoul that whilst on Civil Aviation property or when using any facilities of the weather station members would be subject to the direct control of the Officer in Charge.

O. F. Todd, the previous Officer in Charge, had some months ago sent to me through Civil Aviation office a most helpful and informative letter and a map of Raoul on which he had marked road, tracks, water places and some of the areas where we might expect to find birds. He had indicated that in his opinion we should use the station toilet and shower facilities, and that arrangements might be made for base camp personnel to have two meals a day in the hostel dining room, provided that we fed at times which did not clash with the normal meal times of station personnel, and that we washed up and set the tables after our meals. He also said that it could probably be arranged to run a line to our tents so that we could have electric light.

Clive Phillips and his team had only been on Raoul for ten days when we arrived. Taking over the station, unloading, stacking and storing a year's provisions and settling in generally had occupied all their energy: they had done a prodigious amount of work in a short period of time. None of the Met. team except Bill Crafar had been on Raoul before. They had had a great deal to think about and they were all rather tired. If Holmburn had sailed at due date things would have been somewhat easier. As it was, although we were self-supporting and fully prepared to look after ourselves with no trouble to anyone, our arrival and the necessary assistance so readily given at our disembarkation was undoubtedly an additional burden.

Clive laid down certain preliminary conditions which we were asked to observe. We were not to enter Civil Aviation buildings meantime, nor were we to use their vehicles except with Clive's permission and then only when driven by one of his team. We were not to disturb the stock by indiscriminate wandering over the farm paddocks. At this stage it was thought impracticable to arrange messing in the hostel, and we were to make our own arrangements: this was no trouble. We were given free use of the oranges — a very welcome concession, as a really juicy orange was the most welcome of fruits on a hot day. We were to report immediately any ailments or minor injuries. Provision of lighting to our tents was not immediately possible as the technician concerned had too much else to do, but would be gone into later. It was necessary to ensure that our use of toilet and washing amenities did not clash with the requirements of the station personnel: till such time as some sort of roster could be worked out we were asked to use the wash basins only, not the showers: we were asked to see that personnel of each tent used the toilet allotted to that tent and none other: the consequent pilgrimage around the hostel, during which the tent squads were introduced to their privies and shown how to reach them by the most direct route caused much hilarity.

As time went on and as the pressure wore off a host of minor details would have been sorted out. Even in the short time we were



[F. C. Kinsky

III — View from near the Meteorological Station across North Beach to the Herald Islets.

on the island we got to know our hosts, and all looked forward to a period of useful and happy co-operation.

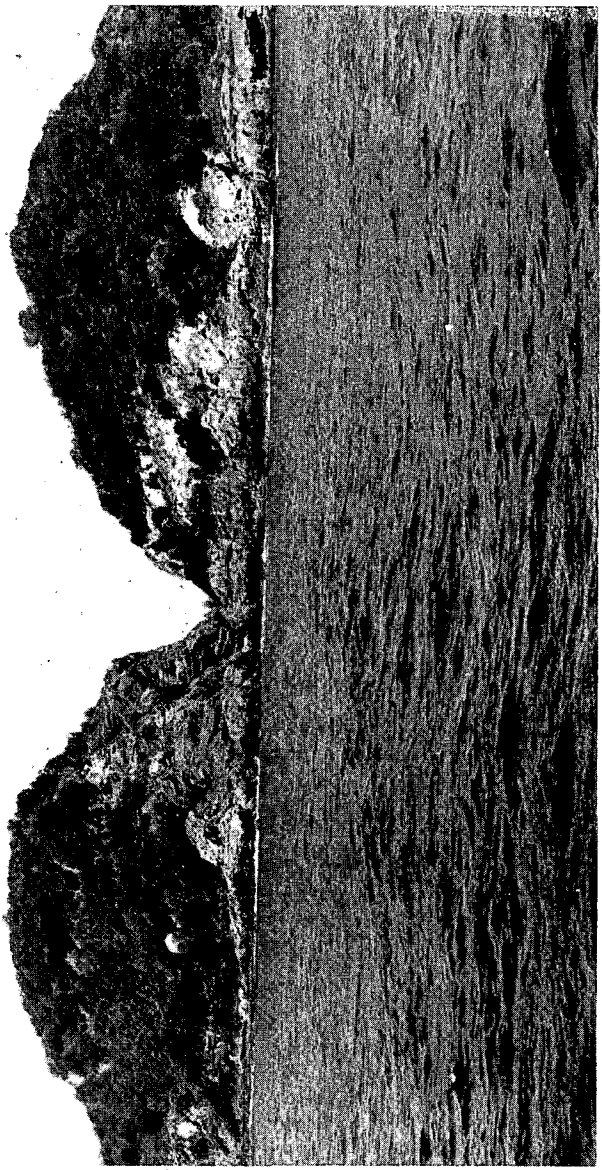
As soon as the tents were up and our first light meal had been eaten the exploration of the island began. Owen Wilkes had already gone to Denham Bay with Bill Crafar and Ted Lloyd, who lost no time in starting his investigations. The others spent the afternoon in getting acquainted with the station and farm area, north beach and the surrounding country. The hostel is a comfortable building with all amenities, set in pleasant grounds with trees, flowering shrubs, and a flourishing vegetable garden on the edge of the paddock in which we had camped, near the fowl run: we had to keep the gate of the paddock closed to avoid invasion by a mob of active piglets which played follw-my-leader around the area: on the road some of our party met a huge lone boar padding silently along the forest edge, and a sow with six young displayed marked animosity to other members who met it on the low flat east of the station. There were plentiful pig rootings in the bush beyond the farm, in the orange grove behind our camp, and at Denham Bay.

The farm covers an area of about 75 acres and carries about 150 ewes, 50 beef cattle, 10 milking cows and three bulls. A tame goat tethered outside my window in the station grounds must have suffered from some throat complaint, as its bleat was off-key and uneasy on the ear. Wild goats were seen in groups at a number of places around the crater rim and on the cliffs, cliff faces and beaches.

Expedition headquarters began to take shape. Clive Phillips had found me a table; boxes served for stools, and an arrangement of orange boxes stacked against the wall made a useful set of shelves for storing stationery, notebooks, files and references. We had an assortment of ornithological books, also sufficient copies of J. H. Sorenson's paper (*Notornis* XI, p. 69) to provide one for each member of our party and for the members of the Met. party. We hoped that some of them might become interested in the work we hoped to do and perhaps continue observations after we had gone. Colin Clark, leader of one of the earlier Met. parties, had sent us a useful report on what he had observed during his stay on the island. Peter Harper had kindly made for us photographic copies of Iredale's paper (1912), and Civil Aviation had given us a number of maps of Raoul on which we hoped to plot our findings. Under the bed were the weapons which we were to use if some collecting became necessary: the cases of spirituous comfort gifted to us by Denis McGrath for purposes of seasonal festivity or special celebration: boxes containing first-aid kits for issue to fly camps, and a denture repair kit just in case of accident.

On the evening of 19th November the party assembled in expedition headquarters to discuss details of a working plan. It was decided that work should start with a general survey of the island and of Meyer Island and that all information collected, ornithological, topographical or otherwise should be pooled for the records and for marking on maps, on which a grid was to be drawn for ease of reference. Just after our meeting broke up there was a small earthquake.

November 20th was to be our first full day of work. Fred Kinsky, Gordon Williams, Don Merton, Alan Wright and Peter Child went in the dinghy to Meyer Island, spent a few rewarding hours there and on their return pulled the dinghy well up on the beach on



[F. C. Kinsky

IV — Meyer Island, still fortunately free of alien pests.

the flat below camp. Five men was considered to be sufficient load for the dinghy and we had five life jackets.

The station dinghy was a bigger boat which could take nine, but it was kept at the camp, and for launching required use of flying fox, etc. We hoped that unless there was an unusually bad spell of northerly weather we would be able to keep our boat at the flat, so that it could be manhandled into the water at any time when surf conditions and weather forecast permitted its use.

Chris Challies and Owen Wilkes went to Denham Bay with some food and camping gear plus some of Owen's entomological equipment. They were to reconnoitre the area and return to base on 22nd November, after which Chris would return to work on his Sooty Terns, accompanied by such other members as had work to do in the area and probably by a carrying party to stock the fly camp with its requirements.

David Dawson and Bill Sykes went to Green Lake. John Peart, David Crockett and Michael Hogg were mess orderlies for the day: breakfast was over very early and having done some useful camp carpentry and organised the placement of utensils and implements on and around the mess table they left for a quick trip to Denham Bay. There was nothing else for them to do till the afternoon: no one was going to waste time coming back to camp for lunch.

It was just as well that everyone saw as much as they did on the first full day of work; for it was also the last. Fred Kinsky and Gordon Williams have described later in this paper what we recorded during our stay on the island. Their account is a compilation of the combined notes of all observers and for so short a period it is an impressive tally. By the evening of the 20th we had much to discuss, and many fine plans were afoot for what we would do on the next and successive days.

At 0558 hours on November 21st the volcano erupted and to all intents and purposes this was the end of our expedition.

Volcanic Matters

A line of active volcanoes stretches from Raoul Island and Curtis Island through the recently discovered submarine volcano and White Island to the North Island Plateau. The first recorded eruption on Raoul was in March 1814 when Captain Barnes of the *Jefferson* observed from a distance of about 20 miles a high smoke cloud with flames at night. Captain Barnes had sounded in Denham Bay in February that year: two months later he found an island about three miles in circumference over the site where his survey had shown not less than 45 fathoms. When Captain Denham made his 1854 survey this island had disappeared. In 1872 the Green Lake sub-crater erupted and another island appeared in Denham Bay; remnants of this were said to form Wolverene Rock. Late last century Wolverene Rock was submerged by less than six feet and was marked by breaking waves, but its location can no longer be seen from the land and in 1964 the sea bottom at this point was between 60 and 80 ft. below the surface of the water.

Raoul is subject to earthquakes and two large shakes were felt in March 1961 and March 1963. On 10th November 1964 a swarm of earthquakes began, and for four or five days severe shocks were felt. On 12th November when *Holmburn* was off Raoul steam was issuing

[F. C. Kinsky

V — Kermadec Petrel **(P. neglecta)** on open nest on Meyer Island. Burrows are at a premium.

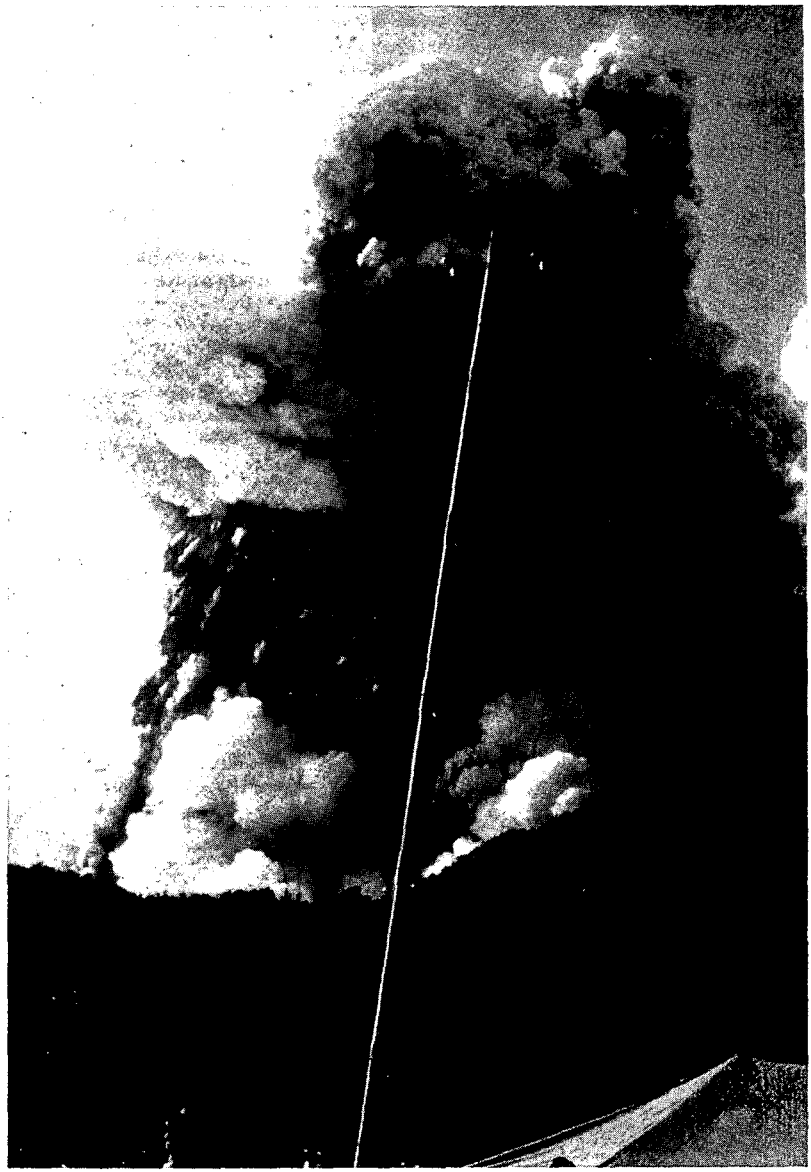
occasionally from the beach at Denham Bay, dust was rising at places where landslips had occurred, and the water for a mile out from shore appeared to be lighter in colour than usual. There was a landslip at Hutcheson Bluff, some slips occurred on the cliffs on the north of the island, and cracks opened up in the ground at a few places on the farm. One shake opened up cracks in the concrete floor of the cowshed. We were told that this series of felt earthquakes put the cows off milking and the hens off laying. On 19th November Ted Lloyd noticed a patch of discoloured water in Denham Bay and when this was investigated by boat on 20th November the discoloration was still apparent and some pumice fragments were floating on the water. It was thought that there may have been a discharge of gas and perhaps hot water through the seabed: the pumice may have been carried up by the disturbance but could also have been new material. The discoloured patch was still visible on the morning of 21st November after the eruption, but had apparently disappeared by the afternoon of that day.

When Bill Crafar knew Green Lake in 1962 the water was cold and bright green in colour; only one small hot spring was then known. On 19th November when he saw it with Ted Lloyd the lake level was estimated at about 20ft. above normal, the water was turbid, new hot springs had broken out, grasses and vegetation were browned on some small areas of warm ground and for 10ft. radius around two new muddy hot sprngs on the lake shore vegetation was mud-spattered and dying. Gas was bubbling up from a great number of points within 200ft. of the shore and this gave the impression that the water was boiling. There was an odour of cooking vegetation.

The next day a raft was constructed from a tractor tube, two 4-gallon drums and saplings lashed together. On this odd craft Lt.-Commander J. L. Harrison, R.N.Z.V.R., embarked to take soundings on the lake. The craft proved difficult to manoeuvre and the operation was less successful than had been hoped, but the captain of this improvised ship can dine out for years on the story of his sail on a lake which erupted only some 20 hours later. Several new hot springs had appeared and in one of them the temperature was 103.8°C. Lake temperatures had not varied much since the previous day (average about 30°C., hot spots up to 52°C.), gas bubbles were still rising, and the area of warm ground (up to 70°C. at 10 cms. depth) appeared to have increased. Green Lake had risen overnight at the rate of half an inch per hour. Blue Lake, which provides the main water supply for the station and farm, is normally about 15ft. maximum depth and was lower than usual: no hydrothermal activity was noted and the water temperature was 23.5°C.

Ted Lloyd left in *Lachlan* later in the afternoon of 20th November, leaving instructions that he was to be kept in touch with the results of routine observations of temperatures, lake level, etc. It was expected that initial stages of expected future activity would take the form of geyser-like eruptions. We arranged to detail one member of our party each day from 22nd November to accompany the station officer who would be making the routine inspection, the object of this arrangement being to assist Clive Phillips by reducing demand on his limited personnel for this extra duty.

At 0558 hours on 21st November I was sitting at my table drawing lines on maps when there was the loud rumbling sound of a big



[D. V. Merton

VI — Eruption at 6 a.m., 21st November, 1964

landslide: the noise seemed to change to a sharper rending sound and as I looked out of the window a great cloud of steam appeared over the hill. Don Merton, one of the mess orderlies for the day, was about his task in the camp and had the same view of the start of the eruption. Btween us we alerted the remainder of both parties and in a matter of seconds everyone was outside, most of us with cameras. The volume of cloud increased rapidly till it seemed to fill half the sky and another roaring noise heralded the appearance of a great column of black mud which shot up to 2500-3000ft. in the centre of the cloud, with rocks flying out of the column and falling back into the crater. It was an awesome but impressive sight. The early morning sunlight lit up the outer rounded edges of the mounting, spreading steam cloud and glinted on the surface of solid objects ejected from the pillar of mud. We had plenty of time to observe: the first volume of the eruption lasted only a few minutes but for about half an hour black material continued to erupt to lesser heights, and steam clouds billowed up from the crater. Some excellent photographs were obtained: our sympathy goes out to the poor fellow who used up nearly a whole film on what would have been a magnificent series of pictures and then discovered that in his haste he had omitted to remove the cover from his lens. We were in no danger during the eruption, the centre of which was roughly a mile from the camp over the crater rim; the wind was blowing the ash away from us towards the southeast. We felt anxiety about Chris and Owen at Denham Bay. Otherwise there was no feeling of alarm, but I think all of us felt uneasy about what might happen next, or what might be the consequences of this unexpected hazard.

Clive Phillips could not contact *Lachlan* direct but got through to the Navy Office and Civil Aviation and reported events. Navy Office later contacted *Lachlan* which had then just left the vicinity of Curtis Island and was instructed to return to Raoul. Direct radio communication with *Lachlan* was made about 1100 hrs. and Clive spoke to Ted Lloyd. A few people had had a look at the crater area from the road shortly after the eruption subsided, but later in the morning we were confined to the camp and station area to await arrival of *Lachlan*.

Emergency restrictions were placed on the use of water as it was thought that the Blue Lake supply would have been contaminated. The station boat, which was in the shed at camp, was made ready for emergency evacuation if necessary. Our boat was at North Beach and we organised a party to take down a supply of water, food and fuel. This party was being detailed on the "you, you and you" basis and it so happened that David Dawson, one of whose expedition responsibilities was study of the exotic birds, happened to be handy at the time and was detailed. He begged to be excused, indicating that the job could be equally well done by someone working on terns or petrels — he himself was very busy investigating starling nests. This example of scientific detachment from mundane disturbances did David much credit, and gave me the first good laugh I had had since the eruption cast its cloud of doubt and foreboding.

Chris and Owen were still as far as we knew at Denham Bay. We expected that they would be fully aware of what had happened in the crater and that they would make their way back to camp. If they had not arrived we were going to send a party to find them.

There were some doubts as to whether the normal track would be passable as it ran fairly close to the eruption area. We had just organised a party with radio sets, etc., to go and bring them in via the longer but supposedly more usable "mutton bird" track when a signal from *Lachlan* instructed us to stay in camp, as the ship would look for them at Denham Bay and embark them there. This we had to do but the enforced inaction was not pleasant. We had been scanning the sky at intervals after the eruption to see if any abnormal number of Sooty Terns flying over the hills might indicate that the colony had been disturbed by what had happened, but saw nothing unusual. At about 1400 hrs. the two men walked into camp, to our great relief. Screened from events by the near-perpendicular wall of cliff, they had known nothing of the eruption. They had noticed that there was much more cloud than usual but it was not till they walked along to the eastern end of the bay and found that they were under a light rain of grey mud that they realised something was amiss, and came home to camp via the normal track which though covered with a grey layer of ash was still quite passable.

About noon *Lachlan* had radioed to the effect that our party was requested to spend the night on board, as a precautionary measure. The ship was due off Fishing Rock at about 1500 hrs. We had little option, but planned to delay our move till about 1700 hrs. by which time Ted Lloyd would have had a chance to assess the situation: his findings would affect the degree of packing which would be desirable — if we were only going aboard for the night there was no point in packing all our gear. However, at 1445 hrs. Clive explained that we must be ready to move in half an hour when the truck left camp to collect Ted from Fishing Rock, as there could be no guarantee that a vehicle would be available to transport us after that trip. Though all of us were in and around the camp area it took a little time to collect the party and only night gear and valuable articles were taken aboard by the eleven who left camp at 1515 hours. Fred Kinsky and I stayed ashore for a few hours, intending to sleep in camp, but later learnt that station personnel were also to go aboard *Lachlan* for the night as Ted Lloyd's report was unfavourable. We eventually embarked in the dark with the station party, which had had much work to do. The wind was stronger and the swell had increased. When all others had been loaded by basket Clive and Bill Crafar made fast the derrick and swam out to the launch.

Ted Lloyd had found that the level of Green Lake had risen by about 50ft. Two small islands had appeared in the northern arm of the lake, the water was dirty brown with vapour swirling over its surface and there was water discharging into Blue Lake. The main seat of the eruption had left a chasm-like pit extending south of west from the western shore of the northern arm of the lake, and open towards the lake. Steam was rising from a second eruption centre in the lake and vapour was rising from three other locations. East-north-east of the main eruption centre and extending to Blue Lake an area of pohutukawa forest had been devastated. In the centre of this the trees had been felled as if by blast, and over the whole affected area there was a thick layer of grey dust, mud and rock. Vapour was rising amongst the bush along the eastern shore of Blue Lake.

Mr. J. Healy, Principal Scientific Officer of N.Z. Geological Survey, flew from Rotorua to Auckland and thence to Raoul in an

[F. C. Kinsky

VII — The Blue Lake on Raoul at 6.30 a.m., about half an hour after the first eruption.

R.N.Z.A.F. Bristol freighter. The plane was over Raoul about 1745 hrs. and Mr. Healy made an aerial inspection of the crater area. By that time clouds formed a ceiling over most of the island at about 800ft., the top of the cloud bank about 2500 - 3000ft. above sea level. Mr. Healy was in radio communication with Ted Lloyd on shore: his inspection continued until light failed and the plane departed to return to Whenuapai.

On 22nd November the wind was northerly and the Fishing Rock landing could not safely be used. *Lachlan* proceeded to Boat Cove where Ted Lloyd and the Met. party were loaded. Commander Doole was not prepared to permit an O.S.N.Z. party to land until he had a report on conditions from Ted Lloyd, so we stayed on board.

We were concerned lest a decision might be made in Wellington to evacuate our party but leave the station party on Raoul. Commander Doole was aware of our concern, and kindly permitted the following signal to be sent to Civil Aviation, Wildlife Branch, Dr. Falla and Denis McGrath:—

"Please advise all ministries and departments concerned that O.S.N.Z. party unanimously desire continue work on Raoul so long as circumstances do not require general evacuation."

The enforced landing at Boat Cove had delayed the start of the day's inspection: it involved a steep climb to the top of the cliff above Boat Cove, and a walk to the top of the Fishing Rock flying fox where the station vehicles had been left the night before. *Lachlan* left Boat Cove after the party had been landed and lay off-shore from Fishing Rock to await radio report from the shore party.

Ted Lloyd found that activity in the Green Lake eruption area was much the same as on the previous day but that five extra steam vents had opened west of Green Lake towards Tui Lake. While he and his party were in the area there were geyser-like eruptions from one of the locations which the day before had been emitting steam; one of these threw black material and rocks 500ft. into the air. Thermal activity was increasing at Blue Lake: the lake level was rising at the rate of about one inch per hour, and the water temperature had risen by 5.5°C. The seismograph record showed that shocks were still being registered at more than 100 per day. The indications were that eruption might be expected in Blue Lake.

We had hoped to get ashore in the afternoon and be back by 1800 hours but Commander Doole, while fully appreciating the urgency of our request, decided against it. *Lachlan* had to lie off Fishing Rock till 1530 hours and intended to pick up the shore party at Boat Cove at 1600 hours: there would not be time for us to get to camp, collect belongings and get back to Boat Cove where the flying fox was apparently not usable and everything would have to be carried down the steep goat track.

Ted Lloyd reported to Mr. Healy by radio telephone at 1600 hours. Mr. Healy considered that as *Lachlan* had to leave in approximately 24 hours the risk of leaving the party could not be undertaken. He therefore recommended evacuation of the island. Civil Aviation accepted the recommendation and instructions were issued that final operations prior to evacuation would be carried out on the morning of 23rd November, after which *Lachlan* would embark all personnel and said for Auckland. At 2100 hours a signal was received from Denis McGrath —

"Have kept in touch with position decision inevitable all here share your disappointment."

Several weighty matters influenced consideration of the problem of whether or not to evacuate the island. The isolation of Raoul was a main factor: if a major emergency was to occur it would be two days before help could arrive from New Zealand. The earthquakes were believed to be of volcanic origin, and the indications were that a further eruption was likely. The rise of water level in Blue Lake was viewed with alarm: if an eruption occurred in the Blue Lake, access from the station to Fishing Rock and Boat Cove could be destroyed. *These were indeed valid reasons for the decision* to evacuate the island temporarily until future eruption trends could be determined. A further factor was that of water supply. Blue Lake, the main water supply on the island, was polluted. Alternative supplies were dependent on season and considered by the station staff to be barely sufficient for the running of the station and farm, especially with the possibility of dry summer conditions. The water situation might in other circumstances have been adduced as a good reason for evacuating O.S.N.Z. party while the station personnel remained on the island but the validity of this would have been open to question. The fresh water requirements of the ornithological party under difficult conditions were minimal. Those who had had experience of water shortage in New Zealand and even in the tropics were aware that a supply of two gallons per head per day is adequate at a pinch: daily use of 26 gallons of water would not have seriously affected the situation.

On 23rd November Fishing Rock was still not usable and a landing was made at Boat Cove. Ted Lloyd had to go ashore to continue his observations, the station personnel had a full day's work securing equipment, greasing and oiling machinery, attending to stock, disposing of perishable stores and recovering records and personal gear. Commander Doole limited the size of our shore party to six. We discussed the night before what would be the order of priority for recovery of such gear and stores as could be moved by a small party in a limited time without benefit of flying fox, and decided —

(1) Personal gear

(2) Our stock of liquor (because it had a sale value and was relatively easy to transport

(3) Tents (except food tent)

(4) Dinghy and motor (if possible).

There was no hope of recovering our food, fuel, etc., or the gear left at Denham Bay. What we planned was to reduce personal loss to the minimum and to bring off gear which was readily saleable and would help to reduce the loss to the Society.

In the early morning Gordon Williams led a party (Chris Challies, Michael Hogg, Don Merton, Owen Wilkes and Alan Wright) to carry out the task.

Everyone would have liked to go ashore and give a hand, but those not selected accepted the situation without question. Our shore party did a fine job. Climbing the steep track from Boat Cove to *the top of the cliff was one thing: carrying packs, kitbags, tents and* cartons down the steep slope was considerably less easy. A party of sailors and some of our members landed when a launch became available

and gave a hand. Don Merton and Alan Wright brought the dinghy round from North Beach to Boat Cove. The northerly wind was still blowing, there was a heavy surf, and it took all the available effort of the shore party and one of the Naval Officers to get the dinghy away: it was a difficult and dangerous operation, undertaken with determination and skill. The safe arrival of the dinghy alongside *Lachlan* evoked a spontaneous demonstration of our relief that the task had been successfully accomplished.

While all this was going on some of the sailors were hauling a good catch of big fish out of the waters of Boat Cove. Ted Lloyd was again at his task of inspecting the crater. The water of Blue Lake was now quite discoloured and its mineral content was increasing: the water level had risen 18 inches. In Green Lake area several of the new steam vents noticed on the previous day were active. At about 0800 hours, watching from the ship, we had seen a big steam cloud rise. Ted recorded two eruptions of black mud and falling stones in the afternoon, one to a height of 500 and the other to 1000ft.

All were aboard by late afternoon and shortly afterwards *Lachlan* sailed. A thermal cloud hung low over the island and blanketed all but the lower slopes and the cliffs. We had had two rather dismal days, but they had not been entirely wasted: our shore party had recovered more gear than had at one time been thought possible, there had been time and opportunity for long-range observation of the Herald Islets as *Lachlan* sailed from Fishing Rock or from its night anchorage to Boat Cove: those of us who had not seen Denham Bay from the land had an opportunity to look at it from the sea, and we had got on with the collection of information from members' notebooks, David Dawson doing land birds and I the other species. All these notes when collected were handed to Fred Kinsky who also organised the collection of information for compilation of the sea bird log for the return voyage.

Return to New Zealand

Our friends in New Zealand had not been idle. We had three cables while we were at sea on 24th November, one from the President—

"Authorised arrange board as necessary expedition expense"

one from my wife —

"Tentative accommodation booked for party and equipment. Cable if not required"

and another from the President —

"Ross will make any necessary cash advances members on arrival."

We were alongside Devonport wharf early on the morning of 25th November. Press and N.Z.B.C. representatives were there to greet us. The Navy had most kindly arranged launch transport for our party and its gear to Admiralty Steps. Ross and Hetty McKenzie were there, Ross with his cheque book: sweethearts and wives converged on Auckland to welcome us back, as they had done to speed us on our journey: Mr. Paulsen accepted calmly this unexpectedly early demand on his kind and practical co-operation in storing what we had recovered from the island. We were news for a day. We had planned something more lasting, but had failed to achieve it through circumstances beyond our control. His Excellency the Governor-General had given the expedition his Patronage, and had invited us to meet him on our return from ten weeks on Raoul. We had looked forward to

being able to do so and to telling him what we had done to justify his confidence in the value of our expedition and the honour he had done us, but we had to return too soon.

The Met. party returned to Raoul on 6th December accompanied by a number of geologists. We had two volunteers standing by to go with them and collect the balance of our stores, but unfortunately it was not found possible to accommodate them on the ship: however Civil Aviation took over a considerable amount of our non-perishable stores, and most of the balance was shipped back to Auckland by Clive Philips, to be disposed of as opportunity occurs.

It remains to place on record the gratitude of the expedition members and my own personal thanks to the Hon. the Minister for Defence, to officers of Civil Aviation Department for their co-operation and tolerance: to Commander Doole, R.N.Z.N., and his Ship's Company for hospitality, kindness and practical help: to Clive Phillips and his party for all the trouble they took on our behalf: to the members of the Expedition Committee, especially Archie Blackburn and Denis McGrath, for ready help in so many ways during the planning period: to Don Merton, whose task as Stores Officer was a heavy one, and who was at all times a tower of strength: and to all those, too numerous to mention individually, who helped by advice, correspondence and practical assistance.

Ted Lloyd has written "to a disappointed band of ornithologists I wish to extend my thanks for assistance rendered during the investigations and for their philosophical approach to the evacuation decision. They were perhaps the hardest hit personally but did not complain." Everyone on Raoul was impressed by Ted's energy, courage and devotion to duty: he was a good companion.

To the members of the party I can only say that it was a privilege to serve with a body of men who, with so rich a diversity of skills and individualities, were yet willing and eager to work as a team. Their enthusiasm, co-operation and steadiness in adversity were an encouragement and support in a task which was not without its difficult moments, and remain a pleasant memory of the days we spent together.

LIST OF BIRDS SEEN ON THE KERMADEC ISLANDS

WANDERING ALBATROSS *(Diomedea e. exulans)*

Only one bird was seen in close vicinity of the Kermadec Islands on 22nd November, from H.M.N.Z.S. 'Lachlan' when the ship was changing anchorage from Fishing Rock to Boat Cove. At 11.55 one adult appeared in the wake just north of Napier Rock, and stayed with the ship for about 15 minutes.

WEDGE-TAILED SHEARWATER *(Puffinus p. pacificus)*

Very common at sea in the immediate vicinity of the Kermadec Islands, and breeding in large numbers on Raoul and on Meyer Island.

On Raoul Island a large breeding colony was located spread out along the ridge leading up from just behind the station building to the eastern edge of the crater rim. Birds were observed coming in to this colony in numbers during the early evenings of the 19th and 20th of November the first to land at the foot of the the ridge at 18.05 on the 19th still during full daylight. Several fresh, apparently

cat-eaten corpses were found at the lower end of the ridge and in the orange grove on all three days of our stay on the island.

A second colony was located on a steep slope just east of Fishing Rock and several birds landed there between 18.15 and 19.30 hrs. on 21st November.

On Meyer Island burrows were found mainly on the scrub-covered western slope from sea level up to the summit, wherever sufficient top soil for burrowing was available. During the short visit to this island birds were coming in and going out during daytime (9.00 - 11.00 hrs.) and several birds were encountered on the ground outside their burrows and were seen entering and leaving burrows. Fresh earth accumulated outside burrow entrances indicated that the birds were busy clearing out their burrows in preparation for the forthcoming nesting season. Although there was some 'growling' underground, all birds returning to the colonies and leaving for the sea were absolutely silent. Only one deep-throated call resembling that of a Sooty Shearwater *(Puffinus griseus)* was heard during the evening on 21st November, 1964.

Shortly before coming in to land in the evenings birds assembled in small rafts off-shore, and two such rafts containing c.30 and c.70 birds respectively were seen from H.M.N.Z.S. 'Lachlan' at 16.20 hrs. on 22nd November, 1964.

Although Sorensen (1964) only notes Wedge-tailed Shearwaters as breeding on Raoul Island, Iredale (1910) mentions Sunday and Meyer Islands as breeding places.

KERMADEC ALLIED SHEARWATER *(Puffinus assimilis kermadecensis)*

No live birds of this species were seen, but Iredale (1910), Oliver (1955) and Sorensen (1964), as well as other authors, mention that Allied Shearwaters breed on Meyer Island in fairly large numbers but do not breed on Raoul Island.

However, one of the staff members of the Meteorological station who had spent the whole of the previous year on the island, reported having located a colony of small black and white petrels breeding on the higher parts of the ridge (already mentioned with the preceding species) above the camp during the winter months. There was no possibility of confirming this report but remnants of fresh corpses of two Allied Shearwaters evidently eaten by cats were found close to the camp site during our stay as follows:

One pair of wings was found well above high tide mark on the sandy beach just below the station flagpoles, and another pair of wings together with some remnants of the tail and some uneaten portions of the body were found in the high grass of the so-called Low Flat just to the east of the station. The feathers of these two pairs of wings were fresh and showed no sign of wear and their measurements were 158 mm. and 161 mm. respectively. (Comparative wing measurements of birds all collected by Mr. J. H. Sorenson during August-November 1944 on Meyer Island and now in the collections of the Dominion Museum are as follows:

6 adult males max. 193 mm. min. 183 mm. Average 187.7 mm.
2 adult females max. 191 mm. min. 182 mm. Average 186.5 mm.
and 1 juv. female, fully fledged (collected 16/11/64, with a wing measurement of 163 mm.).

From the measurements it is evident that the wings found were from juveniles which probably crash-landed on their first flight from

the colony on the Low Flat which is in the direct flight line between the ridge and the sea. They were then caught and eaten by cats in the high grass. This circumstantial evidence together with the report of one of the meteorological station's staff members indicates that Allied Shearwaters may now be nesting on Raoul Island in addition to Meyer Island. Nevertheless this hypothesis needs confirmation.

KERMADEC PETREL *(Pterodroma neglecta)*

Oliver (1955), Iredale (1910) and Sorensen (1964) all describe this species as a summer breeder on Raoul Island (egg laying from October to December) and as a winter breeder on Meyer Island (egg laying from late February to April).

During this expedition's stay on the Kermadecs Islands these petrels were encountered only on Meyer Island. The island was visited on 20th November and during the very short period (about two hours between 09.00 and 11.00 hrs.) spent there three nests of this species were found. The first bird seen was a light-phased specimen sitting on a fairly substantial empty nest constructed of green plant material in a patch of lush green growth at the foot of a vertical rock wall close to sea level. The other two nests were situated a little higher up on the western scrub-covered slope and one of these was partly hidden under a clump of sedges (*Cyperus* sp.) and occupied by a bird of intermediate colour phase incubating one fresh egg. The nesting material consisted of dry leaves of the sedge. The third nest was found close to the second and contained a bird that had been dead for about a week, of intermediate colour phase, and one fresh egg. Several (3-4) birds were observed coming in from the sea and landing about half-way up the western slope of the island.

These observations make it clear that *Pterodroma neglecta* breeds on Meyer Island more or less all the year round, with a peak breeding period during the winter months.

BLACK-WINGED PETREL *(Pterodroma hypoleuca nigripennis)*

This is very common and numbers were seen daily.

On 19th November in the early afternoon three were seen coming in from the sea, crossing the farm paddocks and flying up to the pohutukawa-covered slopes behind the camp; others were seen above the camp area later during the evening coming in from the sea.

On Meyer Island several landed on the upper reaches of the western scrub-covered slope, where they were later seen on the ground among burrows into which they retreated when approached. Several birds at a time were continuously passing Meyer Island at close range, and others were circling around the top of Napier Rock.

KERMADEC STORM PETREL *(Pelagodroma marina albiclunis)*

A very good view of two specimens of this species was obtained from H.M.N.Z.S. 'Lachlan' on 22nd November at 16.30 hrs. off Napier Rock.

RED-TAILED TROPIC BIRD *(Phaeton rubricauda roseotincta)*

Several of these magnificently coloured birds were seen; the largest number (up to 6 at a time) soaring around Meyer Island's cliff faces and flying into and out of rocky gullies as if investigating nest sites. They were also observed along the northern cliff faces of Raoul Island and at Denham Bay.

MASKED (BLUE-FACED) BOOBY *(Sula dactylatra personata)*

Although observed daily around Raoul Island and the Herald Islets, they, in most cases, were single birds fishing close inshore. Counts were made only of birds seen roosting or sitting in scattered groups on the Chanter Islands. On the morning of 22nd November H.M.N.Z.S. 'Lachlan' passed the Herald Islands on their eastern side and eight and nine birds respectively were counted on the northern and southern Chanter. Some or possibly all of these could have been breeding but the distance from which they were seen was too great to enable one to be sure. On the same day in the late afternoon the Chanter Islands were passed again but this time on their western side and numerous boobies were seen coming in to land (roost?). On the western slopes and cliff faces the following were counted: Northern Chanter, 12; Western Rock, 10; Southern Chanter, 7. The total population of this species on the Kermadecs (except for Curtis and Macauley) was estimated as c.50 birds.

FRIGATE BIRDS *(Fregata sp.)*

Two birds, both females (described as being white below, with irregular light areas on upper wing coverts) were seen from the cliff tops above Denham Bay on 20th November.

GREY DUCK *(Anas s. superciliosa)*

One was swimming on Blue Lake on the 19th and two birds on Green Lake on 20th November.

SPOTLESS CRAKE *(Porzana tabuensis plumbea)*

Three of this species were seen about half way up the western slope of north Meyer Island in an area of sparse ground cover of ferns under a canopy of pohutukawas. They seemed fairly tame and were searching for food on the forest floor. One was seen to walk a short way up a leaning trunk of pohutukawa.

PUKEKO *(Porphyrio porphyrio ssp.)*

One bird was heard calling at the south end of Blue Lake on the 20th and one was seen in the reeds at the north end of the same crater lake on 21st November, after the eruption.

PACIFIC GOLDEN PLOVER *(Charadrius dominicus fulvus)*

During a walk along the flat west of the station in the afternoon of 19th November, quite a large number of Golden Plovers was sighted on the grass-covered farm paddocks. They were either single or in small flocks, the largest of which contained 21 birds. A total of 36 was counted that afternoon. Twenty-one (17 + 4) were seen on the same paddocks the next day, and small numbers (up to 5) visited our 'camp paddock' daily and were seen feeding in the high grass and on a freshly ploughed area of the paddock.

ASIATIC WHIMBREL *(Numenius phaeopus variegatus)*

One whimbrel was seen in flight near the boat landing on northern Meyer Island on 20th November.

EASTERN BAR-TAILED GODWIT *(Limosa lapponica baueri)*

Only one was observed together with a small flock of 5 Golden Plovers on the farm paddocks on Raoul Island on 19th November.

TURNSTONE *(Arenaria i. interpres)*

One was seen on rocks at the water's edge near the landing place on north Meyer Island on 20th November.

This species has not previously been reported from the Kermadec Islands.

[M. J. Hogg

VIII — Colony of Sooty (Wideawake) Terns at Denham Bay.

ARCTIC SKUA *(Stercorarius parasiticus)*

It is rather surprising that no skuas have been recorded by earlier parties. However, a dark phased (or juvenile) bird was seen flying close above the surface of the sea just south of Denham Bay at 17.10 hrs. on 23rd November.

SOOTY TERN *(Sterna fuscata)*

These were very common around the islands and in the surrounding seas and were observed daily crossing Raoul Island from one side to the other. They were also seen circling the crater area and on 21st November after the eruption, 50-60 were seen circling around two large plumes of steam above the crater. On 20th November fairly large numbers (300-400) were found roosting on bare rock ledges and around the cliff tops of southern Meyer Island.

Sooty Terns were settled on the Denham Bay beach in one concentrated area which was adjacent to the lagoon near the centre of the bay. This site consisted of a thin sandy strip along storm high water mark, and was bordered inland by an area of cutty grass *(Mariscus ustulatus)* c.30 yards in width with small patches of grass and scattered scrubs extending to the forest edge. Eggs were found along the sandy seaward strip and in small groups over the rest of the colony, especially where the vegetation was least. Adults were settled on much of the intervening ground, avoiding only the densest patches of cutty grass. The impression gained was that egg laying had begun only a few days earlier.

More than 50 Sooty Tern corpses were strewn along the length of sandy beach. The freshest of these had their heads severed and breast muscles and part of the contents of the abdomen, especially the liver, removed. This is probably cat predation, and fresh cat tracks were found in the area.

A small sub-colony containing four single eggs was found 2-300 yards distant from the main colony near the western end of Denham Bay.

WHITE-CAPPED NODDY *(Anous tenuirostris minutus)*

White-capped Noddies are very common around the islands and were observed daily either singly or in small flocks feeding from the surface of the sea and only occasionally dipping into the water.

They breed on Meyer Island in fairly large numbers and build their small shallow nests in trees and shrubs approximately 6 - 10 ft. above ground level. Nests, small platform-like structures built of small sticks and what appeared to be dry seaweed, were found on pohutukawa and ngaio scrub and many of these contained a single egg being incubated by one adult bird. The few eggs investigated appeared to be in an advanced stage of incubation. No chicks were seen and many nests were still empty.

Three birds were observed landing on the very small sandy beach on Meyer Island, and collecting and swallowing small white objects which were not identified but which might have been grit.

WHITE TERN *(Gygis alba royana)*

The only birds of this species seen on Raoul Island were four flying along the steep pohutukawa-covered slopes close to Fishing Rock on 19th November and five observed near the north-west end of the lagoon in Denham Bay on the same day.

[M. J. Hogg

IX — Sooty Tern **(S. fuscata)** at nest.

On Meyer Island six were seen near the extreme north end of north Meyer Island.

GREY TERNLET *(Procelsterna cerulea albivitta)*

The Grey Ternlet is very common around Raoul Island, and can be seen above the sea or crossing over the island at any time of the day. The largest concentrations, flocks containing up to 300-500 birds, were observed feeding from the surface of the sea close inshore near Meyer Island and Napier Rock, on both of which they breed in large numbers. Most preferred as nesting sites are round, weathered, shallow holes of varying sizes in vertical rock faces, but Grey Ternlets also seem to breed on ledges in large caves in cliff faces, in and out of which they regularly fly. Other, rather unexpected sites are chosen. The breeding season seems to be a fairly extended one, as during our short visit to north Meyer Island on 20th November, fledged chicks and nests with eggs were found.

Flying chicks were easily recognisable by their comparatively short tails and erratic flight; and many of them not yet quite ready to fly had small remnants of down at the back of their heads and necks. Four nests were investigated closely and were found in the following situations: Two, one containing a small chick and the other a single egg, were situated in small shallow hôles in rock faces; whereas the other two were at ground level, one deep inside (or under) a clump of sedges *(Cyperus sp.)* and the other about 3 - 4 ft. inside a very small cave with a triangular entrance at the foot of a cliff. Except in the hollow containing the small chick, all other nests contained substantial amounts of dry sedge stalks as nesting material.

KERMADEC PARAKEET *(Cyanoramphus novaezelandiae cyanurus)*

This species was encountered only on north Meyer Island, where it is quite common. Eight birds were seen and the familiar chattering of others was heard. Two were seen leaving possible nests, one in a tree and the other a hole in a cliff face. They seem comparatively tame and the blue colouring on the primaries and primary wing coverts is much more conspicuous than in the nominate race.

NEW ZEALAND KINGFISHER *(Halcyon sancta vagans)*

Common residents on Raoul Island and particularly plentiful along bush edges and on farmland, Kingfishers were also encountered in the deep bush and were heard calling in the crater. Old and fresh nesting tunnels occurred in every bank along the road, and chicks were heard calling from one nest in a bank east of the meteorological station on 19th November. Males in particular seem much brighter in colour than New Zealand mainland birds.

SKYLARK *(Alauda arvensis)*

One was seen on 18th November on Raoul Island not far from the Meteorological Station.

SONG-THRUSH *(Turdus ericetorum)*

This thrush was very plentiful on Raoul Island and was common around the farm and any other open places, but was also heard singing deep in the bush. Around the camp, the crater lakes and Fishing Rock, thrush song could be heard more or less all day long. Freshly fledged young were common in such places as the farm area, the orange grove, the road and in Denham Bay.

BLACKBIRD *(Turdus merula)*

The Blackbird was also very common on Raoul and opinions of members of the party varied as to which of the two was the more

plentiful. It was seen and heard throughout all parts of the island visited, its song being the dominant one, particularly in the forest. Some were feeding on grassed areas and in the meteorological station's garden. Non-flying young and those just fledged were encountered at several places. A nest containing three eggs was found.

NEW ZEALAND PIPIT *(Anthus n. novaeseelandiae)*

Two birds seen at the north-western side of Blue Lake on the crater rim on 21st November were tentatively identified as Pipits (greyish back and white tail edging noted). This record is considered doubtful and the presence of this species should be checked at the next opportunity.

TUI *(Prosthemadera novaeseelandiae)*

Possibly the most plentiful land birds on Raoul Island and very conspicuous and fairly tame throughout the pohutukawa/ngaio forest and at forest edges, Tuis were observed feeding on pohutukawa blossom, among aroids carrying large insects and searching for food on pohutukawa trunks and on the ground. One was seen feeding on an orange on the tree and feeding signs were noticed on many other oranges. Others were observed bathing in and drinking from a trough at the farm and at Tui Lake. There was very little song and members of the party commented on how surprisingly quiet Tuis were on Raoul Island. Imitations of parakeet chatter and of a pet goat were noted. One bird regularly dive-bombed people at the kitchen tent which was pitched under large pohutukawa trees.

Well fledged young were seen at the western end of the farm flats on 19th November and at Boat Cove on 23rd November.

GREENFINCH *(Chloris chloris)*

Greenfinches were observed only in small numbers around the camp area, and two were seen at one time near the fowl run. Single birds occurred at the same place at other times and one near the meteorological building. Calls were heard.

Greenfinches were not previously reported from the Kermadec Islands and must therefore be fairly recent immigrants. Later checks will show if they will establish themselves successfully.

LESSER REDPOLL *(Carduelis flammea)*

'Flight' calls attributed to Redpolls were heard twice in the vicinity of the meteorological station.

YELLOWHAMMER *(Embergia citrinella)*

This species is now well established on Raoul Island and is fairly common in open areas mainly around the farm and in orange groves, where many were seen and heard singing daily. They were also noted within the crater area, on the cliffs above Denham Bay and in the vicinity of Fishing Rock. They were observed feeding in the station garden, on tilled land and in the station's fowl-run.

STARLING *(Sturnus vulgaris)*

Starlings are very common on Raoul, especially in open farm country and along the island's cliff faces. In addition they are also plentiful in the crater area and right through the pohutukawa forest. One was seen on Meyer Island and two on Napier Rock. Flocks of 20-30 birds on the farm area were a common sight and one flock of c.300 birds was seen. They were feeding mainly on open ground (grassed and tilled) apparently eating nikau berries and some were seen among tidal debris at Denham Bay. One was heard mimicking

a parakeet's chatter; but on the whole there was little singing but plenty of hoarse calls from parents and from young. Nests were found under the eaves of nearly all station and farm buildings, in pohutukawas and one nest with five eggs was found in a concrete structure near the camp. There were a few flying young.

NOTE: A large white heron on Meyer Island, and a Red-billed (Silver) Gull on Raoul Island seen during September 1964 and December 1963 respectively, were reported by staff members of the departing meteorological party.

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SEA-BIRD LOGS BETWEEN NEW ZEALAND AND THE KERMADEC ISLANDS

Observations were made from H.M.N.Z.S. 'Lachlan.' Continuous watches were held throughout daylight hours and observations and notes made by different members of the expedition are combined and summarised in the following log. Species and approximate numbers are listed for one or two hour intervals.

I. AUCKLAND TO RAOUL ISLAND: 17th/19 November, 1964

17th November

Left Devonport at 11.00 hrs. Observations started off Rangitoto Island.

11.00 - 12.00 hrs.

Three Giant Petrels were following the ship when observations began, and the same three, apparently, followed in the wake until late in the evening. Up to 25-30 Black-backed Gulls accompanied the ship, and more, from Rangitoto Island, attached themselves for some time. All were either adults or immatures in their second year; only one first year bird was seen and that at 11.45 hrs. Three Red-billed Gulls briefly followed the ship. One Northern Blue Penguin was passed at 11.30 hrs., one light-phased Arctic Skua at 11.50 hrs., and during the hour several single Fluttering Shearwaters and Flesh-footed Shearwaters were observed.

12.00 - 13.00 hrs.

Fluttering and Flesh-footed Shearwaters increased in abundance up to 12.45 hrs. when their numbers suddenly decreased just east of Tiritiri Island. The first Australian Gannet appeared at 12.15 hrs. and four more were seen during the hour. Other observations include two small flocks (5 + 7) of White-fronted Terns heading towards Tiritiri Island, three Arctic Skuas (2 dark and 1 light phase) and one Pomarine Skua — a light phased bird with prominent white underwing patches.

13.00 - 16.00 hrs.

Except for the three Giant Petrels in the ship's wake and numerous Black-backed Gulls still in attendance, hardly any birds were seen until at 13.30 hrs. when, passing Kawau Island, a large mixed raft of shearwaters was encountered comprising c.500 Fluttering Shearwaters and c.50 Flesh-footed Shearwaters. During a refuelling exercise with H.M.N.Z.S. 'Endeavour' south of Little Barrier Island three to four Giant Petrels and numerous (c.30) Black-backed Gulls circled both

ships. Other birds observed from 14.00 to 16.00 hrs. were a few scattered Flesh-footed and Fluttering Shearwaters, and one Cook's Petrel.

16.00 - 18.00 hrs.

At 16.00 hrs., the refuelling exercise complete, H.M.N.Z.S. 'Lachlan' resumed her course in a general northerly direction. While passing Little Barrier and Mokohinau Islands the number of birds increased considerably. Four Giant Petrels and up to fourteen Black-backed Gulls were still in the wake, and about the ship were a few scattered Flesh-footed Shearwaters, up to eight Buller's Shearwaters and several Prions. Large numbers of Cook's Petrels were spread out and milling around, probably assembling for their late evening return to the breeding grounds on Little Barrier Island. One Grey-faced Petrel, one White-faced Storm Petrel, two Diving Petrels and several single Fluttering Shearwaters were observed. We counted thirteen Gannets and seven White-fronted Terns, and some distance N.W. of Little Barrier, ten Red-billed Gulls briefly joined the ship, the last one being seen at 18.30 hrs.

18.00 - 19.30 hrs.

Birds decreased in abundance again and only the following were noted: At 18.30 hrs. one Flesh-footed Shearwater and several White-faced Storm Petrels, the last at 18.40 hrs. Eight to ten Black-backed Gulls and two Giant Petrels were still following the ship at 18.45 hrs. but the Black-backs were dropping behind rapidly, the last having left by 19.10 hrs. At 19.10 hrs. we saw the last Gannet and Buller's Shearwater for the day and two minutes earlier, the last Cook's Petrel. One Giant Petrel was still astern at 19.30 hrs. when observations ceased because of fading light.

At 20.00 hrs. "Lachlan's" position was 35°11'S., 175°48'E., the wind 20 knots from the S.W., air temperature 65°F. and the sea 63°F.

18th November

The weather was fine and the sea calm, with only a slight swell. Only forty-four birds of seven species were recorded throughout this day.

04.30 - 05.00 hrs.

No birds.

05.00 - 07.00 hrs.

The only Gannet of the day appeared at 05.15 hrs. and three Grey-faced Petrels were noted between 05.05 and 05.15 hrs. The first Black-winged Petrel approached at 06.00 hrs. and two more were observed somewhat later. At 07.00 hrs. one Flesh-footed Shearwater passed the ship at close range.

07.00 - 09.00 hrs.

08.00 hrs. 32°46'S - 177°44'E. Wind 10 knots S.W. Air 71°F. Water 66°F. No birds were seen but flying fishes seemed to be increasing in numbers, the first was reported at 06.40 hrs.

09.00 - 11.00 hrs.

At 09.10 hrs. one dark phased Arctic Skua was about the ship and at 09.20 hrs. a Wedge-tailed Shearwater. Two more were observed later in this period. One Flesh-footed Shearwater appeared at 10.55 hrs. and four Black-winged Petrels.

11.00 - 13.00 hrs.

12.00 hrs. 32°01'S - 179°10'E. Wind 13 knots W.S.W. Air 71°F.

Water 61°F. At 11.40 hrs. one Giant Petrel was astern but followed the ship for only 15 minutes. Three Wedge-tailed Shearwaters and five Black-winged Petrels made up the tally for this two-hour period.

13.00 - 19.00 hrs.

From 13.00 hrs. onwards no birds other than Black-winged Petrels were noted and a total of fifteen were counted (five in each two-hour period), the last was observed at 18.05 hrs.

20.00 hrs. 30°27′S - 179°20′W. Wind 8 knots W.S.W. Air 65°F. Water 64°F.

19th November

H.M.N.Z.S. 'Lachlan' anchored off the north coast of Raoul Island at 04.30 hrs. and birds seen before going ashore are included in the Kermadec list.

II. RAOUL ISLAND TO AUCKLAND: 23rd/25th November, 1964

23rd November

'Lachlan' left Denham Bay and Raoul Island at 17.00 hrs. Observations were made until darkness at 18.50 hrs. and comprised the following: Wedge-tailed Shearwaters: Occurred singly at first but increased to large numbers at c.18.00 hrs. Black-winged Petrels: Only a few were recorded close to Raoul Island but like the previous species, they increased in abundance later. Sooty Terns: Appeared singly or in small flocks, all heading towards Raoul Island. The last flock of twenty passed at 18.30 hrs. (i.e. 1½ hrs. sailing from Raoul) and several were heard calling close to the ship at 20.30 hrs. (i.e. 3½ hrs. from Raoul Island).

20.00 hrs. 29°54′S - 178°30′W. Wind 13 knots S.E. Air 71°F. Sea 70°F.

24th November

The weather was partly cloudy, the sea choppy at first but becoming calmer during the day. Although the ship's course passed through much the same area as on 18th November, the numbers of birds seen during this passage were considerably greater, a total of over 300 birds in six species was recorded. The 08.00 hrs. and 12.00 hrs. position and other observations were respectively 32°21′S - 178°52′E. Wind 20 knots S.E. Air 64°F. Water 63°F., and 33°13′S - 177°58′E. Wind 18 knots E. Air 66°F. Water 64°F. At 07.00 hrs. the first Wandering Albatross appeared astern, and up to three accompanied the ship throughout the morning. In the early afternoon more appeared, and at 15.15 hrs. when 'Lachlan' was due east of North Cape, five were following and three were still with us at 19.00 hrs. One Black-browed Mollymawk was following far astern at 10.40 hrs. and remained there until 11.00 hrs. Wedge-tailed Shearwaters were about the ship in varying numbers (but mainly singly) from early morning, the last one was noted at 15.10 hrs. A Flesh-footed Shearwater was observed at 15.15 hrs, and small numbers were seen during the rest of the day. Black-winged Petrels, by far the most numerous species, were very common throughout the morning but slowly became scarcer during the afternoon until the last disappeared at 18.50 hrs. Small groups of Grey-faced Petrels were encountered between 09.40 and 12.20 hrs.

The relative abundance of birds observed during the day is obvious from the following table, in which times and actual numbers of birds observed in each two-hour period are listed.

Observation Time	*Wandering Albatross*	*Black-browed Mollymawk*	*Wedge-tailed Shearwater*	*Flesh-footed Shearwater*	*Grey-faced Petrel*	*Black-winged Petrel*
05.00 - 07.00 hrs.	1		12			53
07.00 - 09.00 hrs.	2		2			76
09.00 - 11.00 hrs.	2	1	2		4	66
11.00 - 13.00 hrs.	3		7		6	29
13.00 - 15.00 hrs.	4		5			21
15.00 - 17.00 hrs.	5		1	6		12
17.00 - 19.00 hrs.	3			2		2
TOTAL max.	5	1	29	8	10	259

25th November

H.M.N.Z.S. 'Lachlan' berthed at Devonport at 05.00 hrs.

List of Birds Observed at Sea in Systematic Order

Northern Blue Penguin	*Eudyptula minor novaehollandiae*
Wandering Albatross	*Diomedes e. exulans*
Black-browed Mollymawk	*Diomedea m. melanophris*
Giant Petrel	*Macronectes giganteus*
Fairy Prion	*Pachyptila turtur*
Flesh-footd Shearwater	*Puffinus carneipes hullianus*
Wedge-tailed Shearwater	*Puffinus p. pacificus*
Buller's Shearwater	*Puffinus bulleri*
Fluttering Shearwater	*Puffinus g. gavia*
Grey-faced Petrel	*Pterodroma macroptera gouldi*
Cook's Petrel	*Pterodroma c. cooki*
Black-winged Petrel	*Pterodroma hypoleuca nigripennis*
White-faced Storm Petrel	*Pelagodroma marina maoriana*
Northern Diving Petrel	*Pelecanoides u. urinatrix*
Pomarine Skua	*Stercorarius pomarinus*
Arctic Skua	*Stercorarius parasiticus*
Southern Black-backed Gull	*Larus dominicanus*
Red-billed Gull	*Larus novaehollandiae scopulinus*
White-fronted Tern	*Sterna striata*
Sooty Tern	*Sterna fuscata*

THE GREENSHANK IN MANUKAU HARBOUR

By R. B. SIBSON

When the Checklist was published in June, 1953, there were only two acceptable records of the Greenshank *(Tringa nebularia)* in New Zealand. On 20/9/53 D. A. Urquhart found and immediately reported three Greenshanks which had arrived on the Karaka coast of Manukau Harbour at the same time as there had been a big influx of Bar-tailed Godwits *(L. lapponica)*. Since then there have been enough occurrences of this distinctive palaearctic wader near Auckland alone to justify a review of its status as a New Zealand bird.

Granted a little experience, the Greenshank is an easy wader to identify, especially in New Zealand where its size and flight-pattern make it unique. Moreover, it has a loud ringing call which it frequently, though not invariably, utters when it is flushed. This call is a valuable aid to identification. In fact as often as not, the experienced observer locates and identifies a Greenshank by ear, before it is seen. When three Greenshanks, not improbably D.A.U.'s trio of the previous September, flew over Puketutu Island on 24/5/54, a calm sunny day, it was calculated that their calls were audible up to one and a quarter miles.

Study of the listed occurrences shows that the part of Manukau Harbour most favoured by Greenshanks lies between Weymouth and Seagrove, where some six miles of still comparatively secluded shoreline offer a wide range of feeding grounds and a choice of roosts and loafing-places. For central Manukau in the vicinity of Puketutu Island and Ihumatao, there are only four sightings. No Greenshanks have yet been reported from Upper Manukau above Mangere Bridge, although it has been under continual surveillance because of the large numbers, often thousands, of Pied Stilts *(H. leucocephalus)* and Godwits which in their seasons feed over its two square miles of soft nutritious ooze.

In Manukau Harbour the association of Greenshanks with Pied Stilts has been most marked. Nearly all the Greenshanks found have been among or near Stilts at full tide. When Greenshanks arrive in the southern spring, they readily link up with the flocks of non-breeding Stilts, which year after year pass the summer in certain favoured creeks on the Karaka coast. Among resting Stilts a Greenshank is fairly effectively concealed. When tides are very big, Greenshanks will accompany parties of Stilts into pastureland.

Feeding habits have been seldom observed. For the most part Greenshanks seem to feed along the muddy channels and runnels of the wide creeks. Twice in Kidd's Bay they have been found feeding along the tideline; once soon after the ebb set in with a small party of Stilts, on the other occasion when the tide was much further out, among thinly scattered Stilts and Godwits. Near Puketutu a Greenshank has been flushed as it fed along one of the circulation channels of the A.M.D.B.

SIGHTINGS OF GREENSHANKS IN MANUKAU HARBOUR

Date	*Observer(s)*	*Place*	*Number and Association*
20/9/1953	D. A. Urquhart	Kidd's Bay, Karaka	3 with non-breeding Stilts
21/9/1953	H. R. McKenzie	Kidd's Bay, Karaka	3 with non-breeding Stilts
27/9/1953	J. C. Davenport, R.B.S.	Kidd's Bay, Karaka	3 with non-breeding Stilts
14/10/1953	B. & S. Chambers, R.B.S. et al.	On a mud island Hihi Creek, Karaka	3 with a Little Egret and c.40 Stilts at full tide
24/5/1954	P. C. Bull, R.B.S.	Over Puketutu Is.	3 alone in flight
25/2/1956	H.R.McK.	Karaka shellbank	1
17/3/1957	R.B.S.	Higham's marsh, Karaka	1 flew in with Stilts during a flood tide
10/3/1959	H.R.McK.	Kidd's Bay, Karaka	1 jostled by Godwits, took refuge among stilts
Jan. 1960	D.A.U.	Up in paddocks beside Pahurehure Inlet	1 with Stilts, several times during big tides
13/8/1961	R.B.S.	Outside Higham's sluice	1 on tideline among c.20 Stilts
16/8/1961	A. Blackburn, H.R.McK.	Kidd's Bay, Karaka	1
12/10/1962	Many, including	Kidd's Bay, Karaka	1 on five occasions
-23/6/1963	O.S.N.Z. field-trip and census	Kidd's Bay, Karaka	1
31/12/1963	R. H. Sibson, R.B.S.	On old airstrip beside No. 1 pond, Puketutu	1 sheltering from wind and rain with 6 Stilts
14/6/1964	Miss A. J. Goodwin	Seagrove	1 with Stilts
25/6/1964	B. D. Bell	Ihumatao	1 in swamp beside regular wader-roost, with Stilts
11/8/1964	R. Denham & A.J.G.	Kidd's Bay, Karaka	1 in flight near wader-roost
4/12/1964	R.B.S.	In a bed of *Cotula*, Yates' dam	1 dozing near Stilts and Sharp-tailed Sandpipers
6/1/1965	J.C.D., R.B.S.	No. 1 pond, Puketutu	1 feeding along circulation channel

Although Greenshanks may fly with Godwits on their long oceanic crossings, they seem to avoid the big packs of Godwits when they assemble at their high-tide roosts. In Manukau Harbour I have seen Greenshanks on several occasions flying with Stilts but never with Godwits. On 14/10/53 three Greenshanks shared a small mud island in Hihi Creek with a Little Egret *(E. garzetta)* and c.40 Stilts, surely a unique consortium for New Zealand.

During the winters of at least four years since 1953 Greenshanks are known to have been present in Manukau Harbour, significant dates being 24/5/54, 13/8/61, 23/6/63, 14/6/64. There can be little doubt that these over-winterers are generally non-breeding sub-adults; and their presence during the southern winter is not surprising if we can assume that a fair proportion, if not most, of the Greenshanks which reach New Zealand are young birds on their first long southward migration; i.e. they are only three or four months old when they arrive; and at the earliest they will not breed till near the completion of their second year; so they can profitably spend a year and a half 'loafing' and growing up before facing the rigours of the long trek to sub-arctic breeding grounds. (If, of course, they are not sexually mature till near the end of their third year, their first stay in the southern hemisphere could well last 2½ years.) Greenshanks regularly overwinter in Tasmania and elsewhere in south-east Australia.

Because some Greenshanks stay over the winter, it is impossible to determine exactly how many birds have been involved in the score or so of sightings, some of which have clearly been of the same bird or birds. Greenshanks tend to move about a good deal; and do not, like some waders, return to the same high-tide roost day after day, so that a Greenshank seen one day on one side of Manukau at Yates' dam may well be the same as seen at Puketutu on the other side of the harbour a few days later. Even so it is hardly likely that less than eight individuals have visited Manukau Harbour in the last twelve years.

It is worth noting that in some years, viz. 1956, 1957, 1959, the only Greenshanks which were recorded in our area appeared in autumn, were seen once, and were not located again. At this season large numbers of arctic waders pause in Manukau on their way north. Thus Greenshanks sighted here only in autumn may have summered elsewhere in New Zealand, e.g. the Southland lagoons and Farewell Spit, whence have come recent reports of at least three sightings.

It is curious that while Greenshanks now seem to be occurring with some frequency in Manukau Harbour, none has yet been reported from the Firth of Thames or Kaipara Harbour. The Firth of Thames coast from Kaiaua to Waitakaruru has received almost as much attention from local ornithologists, nor has Kaipara Harbour been neglected. Nevertheless when to the Manukau records are added those from elsewhere in New Zealand, there is enough evidence to suggest that the Greenshank should be considered not as a very occasional straggler to New Zealand, but as a scarce but probably regular migrant.

THE SMALL BITTERN AT MEREMERE

By P. J. HOWARD and H. R. McKENZIE

The identity of the bird, described in *Notornis* 10, p. 317, as Little Bittern *(Ixobrychus minutus novaezelandiae)* is now considered to be doubt. In *Notornis* 10, p. 412, Dr. R. A. Falla, Director of the Dominion Museum, Wellington, has made some comments on New Zealand bitterns. These have led us to a close review of the sightings of the Meremere bird, and, for purposes of comparison, to a study of the Australian Bittern *(Botaurus stellaris poiciloptilus)*, common to Australia and New Zealand and perhaps better known as the Brown Bittern. Museum specimens and much literature have been studied. It is now deemed best to tabulate the evidence "For" and "Against" which will explain our taking the bird to be a Little Bittern and at the same time help with any further investigation.

EVIDENCE FOR

(1) *Size:*

The seven men who saw it closely are agreed that it was about half the size of a Brown Bittern. In the first edition of Oliver, "New Zealand Birds," p. 367, the measurements are, with those of Brown Bittern in parenthesis: length 38 (76); bill 5.5 (7); wing 15.8 (37); tail 5 (13); tarsus 5.3 (10). Except for the bill it seemed by these measurements to indicate to us at the time that the estimate of half size should be about correct. At Easter, 1964, Brian and Mrs. V. Adams, of Redhill, Papakura, saw near Whata Whata, Waikato, an adult Brown Bittern leading four young across the road in front of their car. The young were a little more than half grown and looked very awkward, being "all legs and feet" so to speak, a description very different from that of our trim small bird.

(2) *Colour and Feather Pattern:*

See *Notornis* 10, p.p. 318-319, and note report by R. T. Adams on p. 319. The overall colour was lighter than as described by Oliver for the Little Bittern so it was thought that it was perhaps a young female. It was later found that the female of *Ixobrychus cinnamomeus* is described by G. M. Henry in "A Guide to the Birds of Ceylon" as: "Slightly larger than the last *(I. sinensis)* . . . the plate shows the male; the female is browner, mottled with buff on the wing coverts and streaked with dark brown on the under parts; a dark, broken streak down the centre of the throat, neck and breast." This is close to a skin of *sinensis* from Fiji in the Dominion Museum and to Miss Gina Blanshard's drawing of it. However we still have the problem of the lack of the throat stripe on our bird, though the Fijian skin and Miss Blanshard's drawing of it show the streak to be more diffuse and less definitely coloured than in the other species.

(3) *Leg Colour:*

On p. 317 this is described by P.J.H. as yellowish green; but it is recorded that the light was failing. When seen on 17/9/63 (p. 319) in full light by John Kendrick, H. R. McKenzie and P. J. Howard the leg colour was a bright green with no tinge of yellow. This green was another of the features given by Oliver which led to the belief that the bird was a Little Bittern.

(4) *Tameness:*

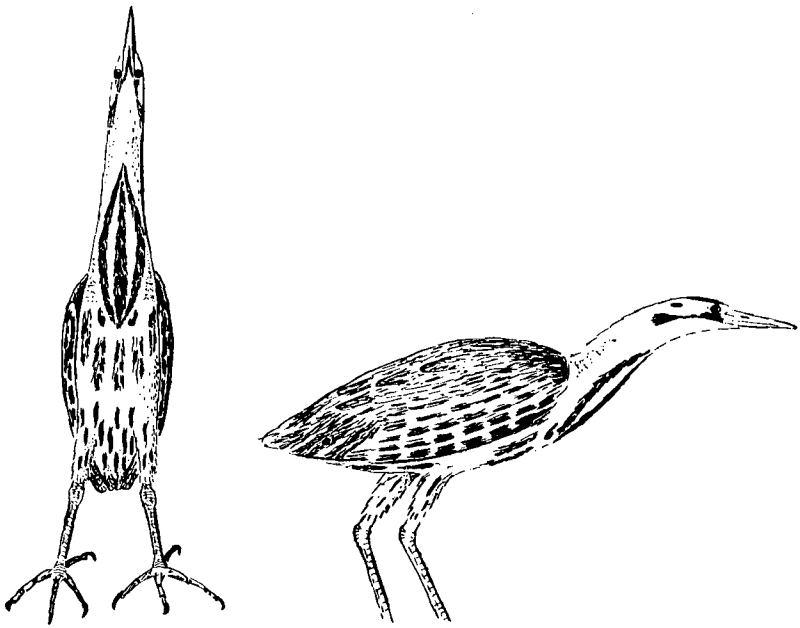
(a) When seen from a dinghy by G. Whitburn in the first week of May, 1963, it was standing on a log about three feet above water level and was in the erect "freeze" stance, side-on. Although only ten yards away, it stood its ground, then moved slowly into undergrowth. This latter action would not be expected of a Brown Bittern. (b) Seen five weeks later by P.J.H., it was only fifteen yards from his car which was alongside the road fence. It did not fly or walk away. (c) It was mid-June also when it was seen by T. Clark and two other men at about twenty yards in the same swampy strip which runs parallel to the road. Taking it for a Kiwi *(Apteryx australis)* the driver stopped the car and backed. The party climbed the fence with the bird still twenty yards from them. It ran as they approached, gaining on them and was about twenty-five yards away when it flew. A Brown Bittern would be expected to fly at once. (d) On 17/9/63 it was again observed from a car by the road fence which is along a bank about seven feet above the swamp. At thirty yards it "froze," then relaxed. The car was then moved closer. It moved towards the car to within fifteen yards in full view and fished unconcernedly, with J.L.K., P.J.H. and H.R.McK. moving about in the car. Tameness is emphasised by Oliver.

(5) *Locality*

In New Zealand, Little Bitterns have been found mostly along the timbered edges of streams, and, presumably, lakes. G. Whitburn's sighting was well back under willow trees on the bank of the Waikato River. All of the seven observers in this case are well acquainted with the habits of the Brown Bittern and none recollect seeing one in such a place. The other sightings were all at the base of tree growth on the edge of the swampy lagoon by the road. In such a locality a Brown Bittern would not ordinarily move into cover when disturbed at close range, but would take flight in a blind panic.

(6) *Comparison with immature Brown Bittern*

(a) When it was known that Dr. R. A. Falla, on our description, considered the Meremere bird to be more likely a young Brown Bittern (his opinion being published in *Notornis* 10, p. 412), it was decided that we make a study of the young Brown Bittern. P.J.H. found a parent and two young, the young being respectively about 90 and 80% of the size of the adult, the larger lighter than it and the smaller darker. H.R.McK. found a similar trio, the young being nearer the size of the adult and again a light and a dark one. P.J.H. photographed an injured young one and examined another brought to him. These young birds had no definite front pattern, being flecked and short-streaked with dark markings somewhat resembling those of the front of a Morepork *(Ninox novaeseelandiae)* with buff areas only on the upper sides of the throat and heavy markings forming a broad throat line. (b) The Meremere bird had the clear "canoe" pattern on the lower throat and definitely no brown stripe extending to the chin (see sketches). There is a further difference in that throat and breast patterns of adults of both Brown and Little Bitterns have blurred edges to the pattern lines, whereas the "canoe" lines on the Meremere bird were clear cut.



The Small Bittern at Meremere, as sketched by P. J. Howard

(7) *Date and Association*

The first week in May would be a late date for a half-grown Brown Bittern and it is noteworthy that no change in either size or plumage from then until 17/9/63 was observed. Recent limited studies of Brown Bitterns indicate that at least one parent remains closely associated with the young until they are fully grown or practically so, while this bird was absolutely alone at all times seen; and yet was only about half the size of a Brown Bittern.

(8) *Habit of Being Alone:*

The New Zealand specimens have apparently all been found alone. The Meremere bird was never seen when any big Brown Bitterns were present.

(9) *Pattern*

Many of the pictures in the literature are of birds side-on or partly so and the artists may have used colour for the neck outline, thus showing a central throat stripe where no colour should be. If this should have happened two of the Chinese Little Bittern *(I. s. sinensis)* in Dr. Kuroda's "Birds in Life Colours," Vol. 2, plate 78, No. 579 would come very close in pattern to our bird. A New Zealand Little Bittern skin in the Dominion Museum, No. D.M. 4779, drawn by Miss Gina Blanshard, shows a large three-stripe pattern on the front, somewhat like the "canoe" pattern of our bird but with the marking blurred. It is not much like our bird otherwise and is different from the other Little Bitterns there. There is perhaps room for considerably more variation than has been found so far.

EVIDENCE AGAINST

(1) *Size:*

Comparative size is difficult to estimate at a distance. The Meremere observers estimated half size of a Brown Bittern and Oliver's measurements for New Zealand skins largely bear this out, but the skin specimens of Little Bittern do look smaller, Dr. Falla, *Notornis* 10, p. 412, going so far as to say that body size, except when the neck is stretched, is not larger than in a Californian Quail *(Lophortyx californica)*. If in appearance it should look so small as this in the field, it would indicate that this Meremere bird was too large to be a Little Bittern. Eastern skins of *I. minutus* examined in the Auckland War Memorial Museum appeared even smaller than those from New Zealand in the Dominion Museum.

(2) *Colour:*

The available skins and mounted specimens of New Zealand and overseas Little Bitterns and herons, together with the illustrations and descriptions which we have since been able to study, do not throw any light on the identity of the Meremere bird. In general colour it is light, much the same as an adult Brown Bittern. The general difference between it and the N.Z. Little Bittern could perhaps be said to approach the difference between a hen and a cock pheasant. If it is not a female Little Bittern it may be a female Cinnamon Bittern *(Ixobrychus cinnamomeus)* or it may be a freak.

(3) *Pattern:*

A search of some of the literature of Europe, North America, Asia (particularly Japan), Australia and New Zealand does not indicate any bittern with the "canoe" pattern on the front and the all-buff or creamy white from the top of the pattern up to the chin with no dark mid-line whatever. All illustrations seem to show at least one brown line up to the chin.

DISCUSSION

The bird, with its well proportioned form and clear markings gave the impression of its being full-grown, even if not adult.

It may have been a vagrant in an unusual or transient form of plumage. After further details were submitted to him, Dr. Falla suggested that it may be an immature Green Bittern or Little Green Heron *(Butorides striatus)*.

If a New Zealand Little Bittern, it would be at a stage not hitherto encountered. which, in view of the very few occurrences, may by a faint possibility be the case.

It is therefore considered that the identity of this bird must remain unconfirmed until further evidence is obtained, either in the field or in the literature.

Sincere thanks are proffered to Dr. R. A. Falla, Director of the Dominion Museum, Wellington, and Mr. E. G. Turbott, Asst. Director of Canterbury Museum and latterly Director of the Auckland War Memorial Museum, for generous assistance and to Miss Gina Blanshard of Little Barrier Island for several excellent and most useful drawings of study skins at the Dominion Museum.

NOTE ON WELCOME SWALLOWS IN NORTHLAND

*By J. E. C. FLUX and P. R. WILSON**

From 19 to 22 February, 1965, we looked for nests of Welcome Swallows *(Hirundo neoxena)* under all bridges on 230 miles of main road between Hikurangi and Cape Reinga, North Auckland. The aim was to duplicate and extend the swallow survey reported by Skegg (1962), in the hope that the number of nests under road bridges might be useful as an index of population changes at the centre of this newly established species' breeding range; so often only the advancing front of an expanding distribution is mapped. Even a rough estimate of the breeding density of swallows at various times during their spread would be of great interest. Viewing conditions were good, and only a few bridges are so long or complex that they cannot be examined completely. Table 1 summarises the information collected.

TABLE 1

Route	*Mileage*	*No. Bridges*	*Swallows Seen*	*Intact Nests*	*Broken Nests*
Cape Reinga-Awanui	67	18	19	5	0
Awanui-Kaeo-Pakaraka	67	29	20	1	6
Awanui-Kaitaia-Ohaeawai	56	17	13	1	0
Kaikohe-Ohaeawai-Hikurangi	40	31	13	5	15
Total	230	95	65	12	21

Of the eight intact nests we could reach, two contained single eggs and one a clutch of three. One nest was built flat on top of a horizontal steel girder, four miles north of where a similar type of nest was found by Skegg at Houhora in 1962: the others were on vertical faces with no support below. Only three bridges had more than two nests, the maximum being nine broken nests on the first bridge south of Waiomio. The swallows were in groups of 13, 11 and 5, four groups of 3 and nine of 2; six single birds were also seen. Four-fifths of the birds were observed during stops at bridges.

Since the first two pairs were recorded breeding in New Zealand in 1958 (Michie, 1959) swallows have increased in numbers and range rapidly. Ross (1962) reported flocks of up to about 100 birds at Kaikohe by February, 1962, and isolated nesting has occurred at Lake Ellesmere and Hawke's Bay (Hankins, 1963). In a fortnight's tour of known swallow haunts in February, 1961, Edgar (1962) saw only 28 birds, compared with the 65 which we saw in the same district on our rapid three-day visit. However, the number of nests on the route Paua-Awanui-Kaeo has not increased much in the past three years, although the number of birds seen has trebled, as shown in Table 2.

* Animal Ecology Division, D.S.I.R., Lower Hutt

TABLE 2

Author	*Date*	*No. Bridges*	*Swallows Seen*	*Whole Nests*	*Broken Nests*	*Nests per Bridge*
Skegg (1962)	24-26/1/62	43	11	4	4	0.19
Present survey	19-22/2/65	36	37	5	4	0.25

Nests which Skegg stated were on side roads have been omitted in this comparison, but the discrepancy in the number of bridges examined may indicate that some are still included, or that we missed a few on our survey.

We would like to thank Dr. P. C. Bull, Mr. B. M. Fitzgerald and Dr. K. Wodzicki for helpful comments.

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SHORT NOTES

FLEDGING OF SILVEREYES

On 9/2/65, restlessness was observed in the two nestlings in the nest of Silvereyes *(Zosterops lateralis)* situated in the tip of the lowest pendent branch of a melaleuca tree, a few feet from the window of my home. Accordingly I watched the nest next morning, and at 6.55 a.m. one young bird was noted to be very active, and occasionally moving on to the rim of the nest. At 7 a.m. it moved 6 ins. from the nest, and began preening, scratching, and wing-stretching. Two minutes later the second followed on to a twig close by. Preening went on until 7.35 a.m., except for brief intervals when both fledglings sat close together and rested. During most of this time, one parent bird sat in the empty nest, or occasionally on the edge of it, watching the young birds; and the other parent brought food once and probably fed one of them, but I could not be sure. At 7.35 a.m. the first bird to leave the nest moved a few feet up the almost vertical branch, and flew without hesitation about 15 ft. into a nearby mahoe tree. Within 30 secs. it was followed by the other young bird. Close and sustained interest in the proceeding was seemingly taken by some House Sparrows, and also briefly by a Fantail.

— A. BLACKBURN

IS THE SOUTH ISLAND PIOPIO EXTINCT?

In view of the implied rarity of the South Island Piopio *(Turnagra c. capensis)* in recent references, the following rather sketchy glimpse may be of interest. On 24/5/63, while on a tramping trip, I caught a brief view of a totally strange bird in the heavy bush at the lower end of Lake Wilmot (Pyke Valley, West Otago). It was raining lightly at the time and identification was very unsatisfactory, but the bird was certainly about the size of the common Song Thrush, brownish above, and (what struck me most) with markedly yellowish underparts and flanks. It was perched momentarily on a beech branch about ten feet up, and then flew off into the dark forest. On consulting the literature I came to the conclusion that it could only have been the Piopio.

— PETER CHILD

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AN INATTENTIVE BLACKBIRD

"Attentiveness" is the term used to refer to the time a bird spends on the nest, and for different species this ranges from less than 50 to 100 per cent. of the total incubation period (van Tyne and Berger in "Fundamentals of Ornithology," p. 295). The hen Blackbird is commonly regarded as being a most attentive bird, and during incubation is seldom observed off the nest, except during brief periods for feeding. Therefore the following observations showing inattentiveness as a marked individual characteristic in a hen Blackbird *(T. merula)* may be of interest.

This bird had its nest in a grape-vine close to the back door of my home, and on the morning of 22/10/64 laid the last of its clutch of three eggs. I was absent until the evening of 28/10/64, and at 6 a.m. on the following day the bird was on the nest. At 1 p.m. the nest appeared deserted, and an examination of the eggs showed that they were stone cold. I naturally attributed the desertion to the sudden increase of human activity in the vicinity of the nest. However, at 4 p.m. she was sitting again, and was still there next morning. By 1 p.m. the nest had again been vacated for some time, and the eggs were once more completely cold. By 3 p.m. she was back on the nest.

This pattern continued. Each day between noon and 1 p.m. the eggs would be found quite cold, and between 3 p.m. and 4 p.m. the bird would be back on the nest, until at 2 p.m. on 5/11/64 the first egg hatched, followed by another at 5 p.m., and the third some time after nightfall.

The subsequent history of this nest shows that the young disappeared at intervals without trace, the first on 13/11/64, the next on 20/11/64, and the last on 22/11/64.

Attentiveness is probably of high selective value to the species, for the risk of predation, already high, would be increased greatly by long periods of absence. The young appeared to me particularly vigorous and healthy on hatching, so that the hen's inattentiveness did not cause any lack of vitality; and the eggs hatched in 13½ days, the normal period for Blackbirds' eggs being 13 to 14 days. But her lack of attention during brooding was certainly carried on to the nestling stage, for there were long periods when no food was taken to the nest. The young did not prosper, and so paid the penalty for the parent's being a variant from type. At no time subsequent to laying was a male bird seen in the vicinity of the nest.

— A. BLACKBURN

ANOTHER RECORD OF THE GULL-BILLED TERN NEAR INVERCARGILL

On 19/12/64, with R. R. Sutton and his son, Peter, I was studying the large and varied population of waders which can be found on the shell-banks and mud-flats near Woodend in the Invercargill Estuary. We had tramped in to the area at half-tide. After making a routine check of a nesting colony of c.100 Caspian Tern *(H. caspia)* on one of the shell-banks, we sat down nearby to have some lunch and wait for the tide (and the waders) to come in. We soon saw above us a tern which was new to us. We watched this bird for a considerable time, both in flight and at rest, in a good light. Field notes are as follows:

Head: White. Crown: Pale grey. Neck: White. Chin: White. Eye: Dark. A dark, almost circular eye-patch through, above and behind eye; not reaching to bill. Bill: Dark, heavy, pointed at tip. Nape: Grey. Upper surface: Dark pearly grey; darker at wing-tips. Under surface: Pale greyish-white; dark grey at wing-tips. Tail: Slightly bifurcated. Legs: Black. Size: Two-thirds size of Caspian Tern. Flight: Wavering and swooping. At rest, shows dark tips of primaries.

R.R.S. remarked that the flight of this tern was very similar to that of the Black-billed Gulls *(L. bulleri)* in the vicinity, but the head movements were those of a tern. The slight fork in the tail was similar, in proportion, to that of the Little Tern *(S. albifrons)*. The tern obligingly circled us three or four times; then landed with a loose group of Black-billed Gulls from which it was easily distinguished by its heavy bill and dark eye-patch. The comparative leg length was not noted at the time. We watched this bird with binoculars and a 15x telescope, but many of its features could be discerned with the naked eye; and in fact, when it was first seen and noted as an oddity, we were not using binoculars.

We provisionally identified the bird as a Gull-billed Tern, although we remembered that the two birds of this species seen by H. R. McKenzie and others at Invercargill airport in 1954 had black caps (v. *Notornis* 6, 163).

Upon returning to the car we found that the bird agreed very well with the illustration of a Gull-billed Tern in winter plumage in Plate 41 of "A Field Guide to the Birds of Britain and Europe" by Peterson, Mountfort and Hollom; but the Woodend bird had a grey, not a striped, nape.

On 21/12/64 the writer visited the area again, accompanied by L. E. Henderson, when it was hoped to check the colouring and marking of the nape, and the leg length. The bird was soon located not far from the Caspian Tern colony, but was seen in flight only, and these points could not be checked. L.E.H. had no hesitation in confirming the details originally noted of flight pattern, bill and eye-patch, and in fact it was he, and not the writer, who located the bird on this occasion.

— MAIDA L. BARLOW

BROAD-BILLED SANDPIPER IN THE FIRTH OF THAMES IN WINTER

A Broad-billed Sandpiper *(Limicola falcinellus)* spent most of 1964 in association with other small waders, especially Wrybills *(A. frontalis)* on the western shore of the Firth of Thames, where it was watched at close quarters on at least seven occasions by numerous observers between early May and the end of December. On May 2 Mr. F. C. Kinsky sighted at a range of about 20 yards an unusual wader which was later proved to be a Broad-billed Sandpiper. It was consorting with Wrybills near Kairito Creek. On May 17, when a winter census of shore-birds in the Firth of Thames was taken, it was found again; and two days later its identity was confirmed by H.R.McK., who noted that its moult into breeding dress was well advanced. Its breast showed much more intensive spotting than that of the first example recorded along the same shore between January and March, 1960. (v.*Notornis* 8, 233-235).

The next sighting was on October 13, when it was found by H.R.McK. some miles to the north-west near White Bridge. Here in summer the shellbanks are regularly used as high-tide roosts by non-breeding Wrybills; and they are sometimes joined by the smaller arctic migratory waders, especially Red-necked Stints *(C. ruficollis)*. The Broad-billed Sandpiper was easily picked out among them. It was noted that by now it had moulted into winter plumage.

On this rather more shelly stretch of coast, there is an alternative summer roost for Wrybills near the old lime-works at the mouth of Pukorokoro Creek. It was here that the Broad-billed Sandpiper was located on Nov. 23, Dec. 13 and Dec. 22. Dec. 13 was wet and blowy. While most of the other waders continued to rest for some time after the ebb set in, a dozen Red-necked Stints and the Broad-billed Sandpiper were feeding busily on a comparaticely sheltered pocket of exposed mud, which lay among the shell-banks. However, on Dec. 22, which was hot and still the Broad-billed Sandpiper spent some hours during a very big tide resting on a sun-baked mud-cum-shell patch in a mixed flock of small waders which included more than a hundred Wrybills, 18 Red-necked Stints, about a dozen Curlew Sandpipers *(C. testacea)*, three Large Sand Dotterels *(C. leschenaulti)* and a Terek Sandpiper *(T. terek)*. Though it was often dozing with its head reversed and its bill tucked under its scapulars, the striped crown was a sure pointer to its identity.

It is doubtful if this should be claimed as the third record of this rare visitor to New Zealand; for the Broad-billed Sandpiper here described may well be the same bird as seen and reported at Kidd's Bay, Karaka on 1/12/63 (v. *Notornis* 10, 411), and never found there again, despite frequent searches. It is not a long flight, less than thirty miles, over the Hunua Ranges or Bombay Hills from Karaka to Miranda; but so far there is little evidence of bird traffic between Manukau Harbour and the Firth of Thames nor have any regular flightlines for waders between these two well-known feeding grounds been observed. Among those who were able to study this Broad-billed Sandpiper at close range, were Mr. and Mrs. J. A. Brown, Mr. and Mrs. J. B. Trollope, Miss A. J. Goodwin, Messrs. B. D. Bell, A. M. C. Davis, F. C. Kinsky, D. V. Merton, J. F. O'Brien, S. Payne, A. Wright and the writers.

— H. R. McKENZIE
— R. B. SIBSON

NOTICES

A Labour Day Week-end Field Outing will be held this year at Wanganui. Full details will be announced in the next issue.

XIV INTERNATIONAL ORNITHOLOGICAL CONGRESS GREAT BRITAIN, 1966

The dates for the Congress have been fixed as follows:
Scottish Study Cruise: 16 - 23 July, 1966 (inclusive).
Scientific Meeting in Oxford: 24 - 30 July, 1966 (inclusive).

The Congress is open to all ornithologists over the age of 18 years.

The Study Cruise, on the 12,800 ton liner *"Devonia,"* of the British India Steamship Company, will leave from Glasgow, sail round the North of Scotland and its seabird islands, and end in Edinburgh. Parties will be landed on some of the islands. Accommodation on board will be in a limited number of 1-, 2-, 3-, and 4-berth cabins, and in dormitories. A special night train will convey members from Edinburgh to Oxford, where they will arrive during the course of the Sunday morning, 24th July.

Accommodation in Oxford will be arranged in University Colleges, or, if desired, a list of hotels will be supplied. After a formal opening on the Sunday evening, 24 July, the rest of the week will be devoted to scientific meetings. These will consist of Plenary Sessions in the mornings, at which invited speakers will review recent advances in selected fields of ornithology, and of sectional sessions in the afternoons, at which short, offered papers will be read. In addition there will be exhibits, a whole day excursion, film shows, and a Social Centre for informal contacts.

Members may apply for either: both the Oxford meeting and the Study Cruise, or: the Oxford meeting only. Application forms, with full details, can be obtained from:

The Secretary-General,
International Ornithological Congress,
C/o Department of Zoology,
Parks Road,
Oxford, England.

(Applications for the Study Cruise will be dealt with in the order in which they arrive.)

The costs of the Congress are as follows:

CONGRESS FEE:

Full Members: £10. This entitles members to attend all functions and to receive the Proceedings.

Associate Members: £7. Wives or husbands of full members can register as Associate Members at this reduced fee, which entitles them to attend all functions, but not to receive the Proceedings.

CRUISE:

From approximately £30 for dormitory passengers.
To approximately £75 for 1-berth cabin accommodation.
(The train fare from Edinburgh to Oxford will be an additional cost.)

ACCOMMODATION IN OXFORD:

The cost, to be paid by individual members, will be approximately 50/- per day for full board in the Colleges. Hotels are, in general, more expensive.

N. TINBERGEN, Secretary-General