Return to previous file: Part 1

Science, Weather and War

Dr R.A. Falla's influence on planning of the Cape Expedition has already been mentioned; once the stations were up and running his special contribution was to see that the scientific potential of so much manpower stationed for long periods in the subantarctic was fully realized. This was in any case fully justifiable; there were obvious benefits if, during long isolation and monotonous routine, personnel were encouraged to take an interest in the Aucklands' outstanding wildlife features. There was even a Navy Office Standing Instruction to the effect that, in addition to their regular duties, expedition personnel should be encouraged to 'record general observations on natural phenomena'.

The plan Bob Falla developed was first to encourage personnel to record observations such as seasonal sea lion distribution, sightings of unusual birds and plant flowering seasons, in station or personal diaries. This information would then be collated and placed on record for future reference. Another activity which proved very popular was to collect and preserve scientific specimens such as marine life, insects, or plants in flower. Each station's stores included a generous supply of containers, phials, preservatives and other collecting requirements, and most members contributed items of interest, which were finally sent back to be deposited in New Zealand institutions.

Natural history interests were greatly furthered after 1942 by the new policy of posting one man with a professional background in biology or geology to each station, if such men were available. In addition to any research projects of their own (Bill Dawbin's plankton survey has been mentioned), these men did much to encourage general natural history interests at the stations, and organized more systematic recording and observing programmes.

The first two expedition members to fill this role were Jack Sorensen (No. 3, Campbell Island) and Charles Fleming (No. 2, Carnley Harbour) in 1942. All three stations had naturalists in 1943: Bob Falla as station leader and naturalist and Ron Balham as naturalist and met. observer at No. 1 (Ranui Cove), Bill Dawbin at No. 2 and Jack Sorensen—for a second term—at No. 3. In my year (1944), I was both naturalist and met. observer at No. 1, and Ron Balham and Robin Oliver filled these roles at No.3.

More will be said later of some of individual scientific contributions; the general collecting programme took up most of our spare time. I collected as much general material as I could; and each day specimens came in for bottling, mounting and labelling. I soon found myself spending much of my time between met. schedules out in the tiny 'laboratory' hut catching up on the backlog. Material brought in comprised mainly insects and other terrestrial invertebrates, especially ground- or bark-dwellers, along with miscellaneous plant material, including the extremely abundant mosses and liverworts and any plants found in flower. Fortunately, the hut had its own 'hot dog' stove, which helped to see me through the long sedentary periods required to work on the collections, even in the winter months.

The collecting programme was perhaps something of a throwback to the days of early exploring expeditions when ship's naturalists would bring

The author working on biological material in the 'laboratory'. Photo: E.G. Turbott.

Allan Eden, leader of the survey party, working on the topographical map. Photo E.G. Turbott.

back all the material they could find for examination and description by scientific experts; much of the subantarctic's invertebrate land fauna was still little known and anything available was almost certain to be of interest. In 1944, my own year, the presence of the survey party provided additional opportunities for collecting, which could now be carried out over a much greater portion of the Aucklands than previously. The head surveyor and expedition leader, Allan Eden, was thoroughly convinced that the natural history programme was useful and worthwhile, and actively encouraged his surveyors to collect specimens. I was indebted to him later for my inclusion in the survey team to work in the southern half of the group.

As Allan says in *Islands of Despair*, the constant low cloud and bad weather that plagued the efforts of the surveyors so much often meant a big boost for the collecting programme.

The final outcome of our collecting—and one greatly appreciated by all Cape Expeditioners—was the appearance of published reports by various specialists. Some of the material has been used in general accounts and manuals, but a series of *Bulletins*—27 in all—was also issued by the Cape Expedition research committee, which was set up to oversee the assembling and allocation of collections. The *Bulletins* include papers on the taxonomy of special groups ranging from freshwater fish, starfish, parasitic worms and earthworms to liverworts; and in these the authors recorded the names of expedition collectors—naturalists and others—who contributed material. The efforts of several contributors resulted in the quite unexpected honour of being recognised in the name of a new species. There are now five species in the Auckland Islands invertebrate fauna called *turbotti* (a fly, a weevil, a stonefly, a springtail and a spider), while a tiny beetle, *Pseudhelops eastoni*, bears the name of probably the most assiduous collector of the survey party, George Easton.

What was the climate really like? The exasperation of the Enderby settlers is evident from the accounts in the Diaries: 'incessant rain… the weather our greatest enemy… constant rain and wind… most unpleasant weather';[1] even Charles Enderby opened his typically glowing prospectus on a cautionary note: 'The Auckland Islands are subject to high winds and much rain, but they are exceedingly healthy…'[2]

---

[1] Malone, *Three Years' Cruise*, p. 63.

[2] *The Auckland Islands: a short account of their climate, soils and productions; and the advantages of establishing there a settlement*.... (London Pelham Richardson, 1849) p. 37.

This impression is certainly confirmed by subsequent statistics: at both the Aucklands and Campbell the weather is nearly always (about 95 percent) overcast, with regular low cloud and mist; wind force is strong, often excessive; humidity is high; and rain falls on more than 300 days of the year. Temperatures, on the other hand—at least in areas sheltered from the cold, piercing winds—are quite tolerable: on the Auckland Islands a relatively mild 10–16°C in summer and 4–10°C in winter. Campbell Island temperatures average a little lower, and fall within a narrower range. There are occasional light snowfalls on both the Aucklands and Campbell mainly in winter, but even on the high country where falls are heavier, thick snow never lies for long.

At the station routine simply went ahead, rain (often) or fine. We were, of course, well housed, so rainy periods just meant keeping to indoor tasks, with the occasional slog up the track to the Lookout when necessary; the long shelter porch on the western side of the hut was always stacked with oilskins, sou'westers, boots and gumboots.

Any kind of outdoor activity involving full-time exposure to the weather (think of the Enderby settlers!) was, of course, liable to be a very different story. In our year the survey party's field programme was one of constant and frustrating delays—Allan Eden writes of only the odd good day 'sandwiched between long periods of wet, windy and foggy weather' (p. 45).

In *Islands of Despair* Allan describes two episodes that typify the influence of the Auckland Islands' climate on outdoor life. The first happened at the field camp established on 10 March at Chambres Inlet. Trig signals had been erected ready for the start of observations when a furious gale arose, succeeded after three days by a steady downpour. After three more days the weather was bitterly cold with fierce hailstorms and squalls; nevertheless the party set out for Mt Eden. Allan managed to place his tripod over the trig, but a gust of wind immediately picked it up and dropped it several feet away, fortunately before he had time to install his theodolite. The weather deteriorated to the point where the camp had to be abandoned on 27 March. Observations were completed on a day trip overland from Ranui Cove. Allan also describes an unproductive field camp at Musgrave Inlet in mid-April. Survey operations began in brilliant sunshine, but the day ended in thick fog. Wet, cloudy weather followed, and finally two days of heavy rain. Daily for the next seven days the party toiled for five hours up the track, but cloud stayed low on the tops, making observations impossible.

On the whole Cape Expeditioners—other than the surveyors—could mostly avoid such rigorous conditions; bad weather periods were simply regarded as a fact of life. Then came the fine days when the air was clean, clear and exhilarating; and sometimes the sun even shone. Most of us can, in fact, look back without any serious resentment, and even with some affection, on the weather. We would certainly agree with the old seafarers' guide *Brett's New Zealand and South Pacific Pilot* (1881)—dating back to the time of the government ships servicing the castaway depots—that the Auckland Islands' climate 'though boisterous and subject to much rain, is healthy'.

We learnt to treat with the greatest respect the violent squalls, which followed periods of gales and rain, when the weather had apparently

cleared. When we were out in the dinghy squalls could roll down from the tops with little warning, and it paid to be constantly on the alert. Such squalls have always been a special hazard on Campbell Island's Perseverance Harbour; most of us had been told of the fate of the island's discoverer, Captain Frederick Hasselborough of the sealer *Perseverance*, who drowned in the harbour in 1821 when his small boat was capsized in a squall.

The weather patterns we experienced are nowadays familiar from TV and newspaper weather maps; few can fail to have noticed how the succession of cold fronts radiating like the spokes of a wheel from the great cyclonic storms to the south sweep across southern New Zealand, affecting the whole of our region's weather. The cyclonic centre may be far to the south, even halfway to Antarctica—but it is often directly over the Aucklands or Campbell. It is only to be expected that with the centre of the depression so close the passage of successive fronts will be rapid: as many as four fronts can pass over the islands in just 24 hours. Highly active cumulonimbus clouds accompany and often follow a front, bringing squalls during and after its passage.

After the first year of the Cape Expedition it became obvious that weather reports from the subantarctic stations would greatly help the New Zealand Meteorological Service. So in 1942 arrangements were made for the radio operator to record and transmit one daily met. report; and from 1943 onwards each party included one man responsible for met. observing. Early in the war the weather office was incorporated into the Air Force as the RNZAF Meteorological Branch; the met. observers chosen in 1943 and 1944 included both trained air force observers and civilians who received a brief basic training at a weather office. I joined the RNZAF in 1943, and on being selected for the expedition was posted to the Auckland office, then in temporary quarters in the old teachers' training college, for preliminary training.

The basic requirement in weather reporting—in addition to understanding barometers and thermometers and being able to identify clouds—was to become familiar with the numerical International Weather Code. The office received weather observations from the whole reporting network in New Zealand and the South Pacific in this code; the reports came in by phone or teleprinter and were transferred as groups of figures and symbols to the current synoptic weather chart. These charts were the forecasters' main tools: four charts were prepared every 24 hours, and from them forecasters had to produce weather briefings for military and commercial airline flights, as well as general weather information. At the Auckland office the rapidly expanding trans-Tasman flying-boat service also needed special briefing.

I found that in the Auckland Islands, like others in the network, I would be just a number—weather station 791. I would be reporting five times daily at three-hourly intervals, and compiling a detailed record for climatological purposes at 9.30 a.m. (This allowed for the year-round half-hour advance of clocks observed as a New Zealand wartime measure, thus corresponding to the 9 a.m. New Zealand Mean Time standard climatology report).

The International Code, consisting of five basic groups each of five figures, allows all the information required by the forecasters to be transmitted. The main items are cloud type, height and quantity; state of the present weather, including any precipitation or fog; wind direction and force; visibility based on known distances to landmarks; and atmospheric pressure, temperature and humidity, based on instrument readings. An additional figure group can be added to encode the rainfall in the previous 24 hours for the 9 a.m. report.

After a few weeks' learning, my brief training proved adequate and the met. reports became routine. The process of compiling a report began at 10 minutes to the hour: transmission to Radio Awarua was at 6 a.m., 9 a.m., noon, 3 p.m. and 6 p.m. It would have been ideal if all observations could have been made from the wider field of view obtainable at the Lookout. This, however, was 20 minutes away and now that coastwatching was so much reduced reports were not available at all times as they had been previously. Until I became familiar with directions, distances and heights, I had to make frequent trips myself to the Lookout. Later I was able to make an adequate set of observations from 'Fort Dorset', the clifftop lookout a couple of minutes from the station; if a coastwatcher was on duty my observations were supplemented by a phoned report from the Lookout.

'Fort Dorset' gave a clear view over the sea eastwards and a reasonable sweep of sky towards the hills in the west; the thermometer screen and several other climatological instruments were handily situated in a clearing nearby. My routine began with observations of cloud, followed by wind, and finally visibility. The dry bulb and wet bulb thermometers in the screen were read, the former to give air temperature and the two combined to calculate relative humidity. Back at the hut—with the radio schedule now fast approaching—the barometer had to be read and checked against the barograph, humidity calculated, barometer adjusted, and the whole series of observations translated into the numerical Weather Code.

One final stage remained: wartime conditions required that the message be re-encoded into a secret code. By now Sparks Hoskin was tuned in and ready to transmit to Radio Awarua: the operation generally went reasonably smoothly although occasionally Sparks had to keep Awarua on hold.

The 9.30 a.m. climatological observations came soon after the 9 a.m. schedule but were not transmitted; they contained the same information as the regular reports plus such additional data as solar radiation maximum and grass minimum temperature, and sea temperature. The barograph chart also had to have a daily time mark. The 9.30 observations had to be entered at the end of the month on an elaborate form—a lengthy task. The monthly climatological forms and barograph charts went back to Meteorological Branch headquarters in Wellington with our mid-year mail and at the end of the year.

Until our companion station at Carnley Harbour, No. 2, was closed down in the middle of the year it, too, had been sending weather reports—weather station 792. The No. 2 Station leader, Bob Pollard, was also met. observer. Bob returned to New Zealand with the No. 2 party, but

volunteered to come back as met. observer to No. 1, allowing me to accept Allan Eden's invitation to join the survey party for the remainder of the year.

When the surveying work was completed in June 1945, the station at Ranui Cove was closed down and all reporting from the Aucklands came to an end. Campbell Island—weather station 793—was retained following the war as a fully active meteorological and ionosphere research station; it was later moved to a new location and greatly enlarged and developed to become one of the essential stations in New Zealand's weather reporting network.[3]

The radio operators were key personnel in the Cape Expedition establishment. Because of the need for secrecy, radio traffic was always kept to a minimum—in 1941 just one schedule between the stations and the main contact point at Radio Awarua every 24 hours. This was increased to two with the addition of the weather schedule in 1942. In 1943 when the war situation improved there were four daily schedules, increased to five from late 1943 onwards.

Transmission was in Morse, the most efficient method and one permitting the use of secret code. While plain-language transmission was available it was for use only in emergency, and was in any case still relatively undependable; subsequently, of course, such outposts as the Campbell Island weather station maintained continuous contact using modern radio-telephones.

Private messages were not allowed in the first two years except in the case of bereavement or other urgent matters; in later years this was relaxed allowing each man to send and receive two personal messages during the year. The *Ranui* had no radio transmitter: only the operators at the three stations could contact Radio Awarua. At the stations and on the *Ranui* our only information from the outside world was news picked up in Morse by the radio operators or broadcasts coming over the standard domestic radio.

In the living room at No. 1 the radio table in the southwest corner housed the main set, an imposing, heavily-built receiver/transmitter. Power for the set and for lighting and the other facilities in the hut came from a bank of 12-volt accumulators in the adjacent battery room. Sparks Hoskin attended to the batteries, the puttering note of his Tiny Tim and Delco generators forming a familiar background to the station's daily round.

Beside the main radio was a set of shelves holding a second receiver/transmitter, a smaller version which could be transported to the emergency hut if there was a coastwatching alert and we had to evacuate the main station. The portable set could be dismantled and the sections strapped to the L-shaped ledges of our Yukon packs. While the emergency hut contained its own receiver/transmitter, the spare portable set allowed for backup and unforeseen circumstances.

While all station personnel were required to become thoroughly familiar with the route to the emergency hut (commonly known as the 'Emergency') and to take part in its maintenance, the radio operators had the special responsibility of regularly checking their emergency

[3] Continued as a manned station for 50 years, until replaced in 1995 by an automatic weather station.

equipment, including radio and batteries. There was a Delco generator at each hut and visits at least monthly were necessary to keep the batteries charged.

Our No. 1 'Emergency' was a small, well-constructed hut in dense bush some three miles to the south near Kekeno Point. It was reached by a route passing just to the east of Meggs Hill, a prominent landmark. Using the route we made every effort, of course, not to turn it into an obvious track. The hut was large enough to provide emergency shelter for the whole station party; and in addition to the radio equipment, it contained spare clothing and a good supply of emergency stores.

We took turns in accompanying Sparks to the Emergency—a day of reasonably good weather was generally chosen so that while Sparks's absence meant one or more schedules had to be missed, met. reporting was not seriously disrupted. On occasions we managed to travel down in the *Ranui* or by dinghy, but we could never really rely on either since the surge on the coast around Kekeno Point always made landing doubtful.

Coastwatching was by 1944 limited to the three brief daily checks at the Lookout; optimism as regards the war situation was growing and the front in the Pacific was now far from the subantarctic coastwatching stations. Our main tasks were now to assist the surveyors and to carry out full met. reporting. We were expected, nevertheless, to maintain the stations in readiness for any alert as before, including the full emergency hut routine.

Coastwatching over the full period of the Cape Expedition (1941–45) resulted in sightings of only two ships: and these were Allied merchant ships, one west-bound on 21 July 1943, and the other east-bound on 15 October 1943. Both sightings were made from our No. 1 Lookout. The expedition's first two years, 1941 and 1942, were times of the fullest alert—not only were German raiders known to have been in the vicinity recently, but after Japan entered the war on 7 December 1941 it was possible, indeed highly likely, that Japanese warships or submarines could pass through these waters.

Secret instructions issued by the Navy in 1940 during the expedition's planning stages, and since published, refer to the known presence in the Indian Ocean of the German pocket battleship *Admiral Scheer* and read: '… the earliest date on which she could reach the Auckland Islands at 15 knots is 12 March [1941]'. Naval intelligence officers believed the Aucklands would form an ideal fuelling rendezvous for the battleship, which was expected to try to reach Japan. However, the only record in the war archives of a possible sighting of an enemy ship says the German raider *Atlantis* was near the Auckland Islands shortly after the stations were established in mid-1941: she was not, however, seen from the shore.

Emergency procedures in case of an alert were thus never tested during the expedition. The Navy Office's original instructions emphasised that even if the enemy heard transmissions, they would not necessarily be able to locate their source, and that the well-concealed stations—and especially the emergency huts—would be discovered only with difficulty. Nevertheless, we could not help imagining the full implications of a possible enemy visit—the emergency huts' limitations as long-term shelters if the main stations were destroyed, and the

unlikelihood of early relief. The navy's instructions left absolutely no doubt as to the purpose of the coastwatching establishment. They included:

> *Our object* is to destroy or disable enemy raiders.To do this we must have intelligence of her movements.
>
> *Your object* is to report any ships visiting the Auckland or Campbell Islands, and to continue reporting without being detected.

The *Ranui* and Recreation

The *Ranui* arrived at something like monthly intervals, and her siren was always welcome. Early in the expedition, especially during the first two years, she had played an important role as a mobile station, extending coastwatching beyond the range of the Aucklands' two shore stations. Now she spent her time maintaining contact between the stations, with an occasional trip to Campbell, and provided the necessary transport for the surveyors.

Unlike the *New Golden Hind* which brought us down, the *Ranui* was a stoutly-built, fishing-boat sized craft, very much a work-horse. She had been built at Pegasus, the southernmost port of Stewart Island, in 1936 by a retired Norwegian whaler, Captain Larsen, and prior to the war had served as the cargo and passenger link across Foveaux Strait. She was purchased by the Aerodrome Branch for the Cape Expedition in 1940. Short—67 feet [20 metres] compared with the *Hind's* 91 feet [28 metres]—and comparatively broad-beamed, she was lively at sea, but reliable and well able to handle the boisterous conditions of the Roaring Forties. With her ketch rig she could, if necessary, carry a fair spread of sail, but relied mainly on the twin diesels.

The *Ranui's* home port was Waterfall Inlet, the southernmost indentation on the east coast of the main island before the Carnley Harbour entrance. As well as affording good shelter from the west, the inlet had the special advantage of a relatively peat-free stream cascading down near its head, providing clean water for the ship's tanks. A stores depot had been established there, which made the *Ranui* fully independent. During the expedition's first year the crew, in addition to their coastwatching patrols and visits to the stations, had to man a lookout on a plateau high above the inlet, but this proved almost impossible and was abandoned in 1942.

On board the crew observed the time-honoured watch-keeping routine. Their life thus differed from our daily round of shore station duties—yet their part in the expedition was essentially similar to ours, and like us they had to depend on an ordinary domestic radio for news of the outside world.

Les Clifton, Charlie Carlson, George Bish and Allan Eden on board the *Ranui*. Photo M.G. Easton.

The *Ranui* had a complement of four. Noel Worth, the captain, and Charlie Carlson, the mate, were both experienced sailors and widely travelled. The younger members, engineer Alec Lund, and general hand George Bish, were always lively company—they shared a violin, and a talent that ensured convivial evenings during *Ranui* visits.

At the stations Saturday night was the regular recreation night, duly celebrated with an issue of navy rum from our generous supply. This extra naval contribution to the expedition was a highly appreciated. At any time a visit from the *Ranui* was treated as a special occasion, every opportunity being taken to socialise and exchange news; some of the crew would come ashore for the evening (a big effort was expected from the cook of the day) or a visiting party would be welcomed on board. Over rum and coffee, with Alec Lund or George Bish fiddling, talk soon gave way to song, ample justice being done to *In Plymouth Town*, *Shenandoah* and all the other sailors' favourites. And if some of us had gone on board, the evening would end in a race back to the jetty between the ship's boat and our station outboard.

Charlie Carlson, a Norwegian of long sea-going experience, contributed much to these *Ranui* get-togethers. Charlie was of stout build, with a mariner's rolling gait and the broadest of accents. He took special delight in his on-board pet, a small black rabbit captured on Rose Island. Charlie insisted, 'He iss a goot liddle company, he iss, ja!' His sea-going career had included time in a windjammer. His possessions, often demonstrated at length, included a fine sailing-ship model and an elaborately decorated cord-and-canvas rigging bag, the handle a marvel of decoration in 'reversed plaits' and 'cockscombs' with a sliding ring consisting of one large Turk's head to close it down. Charlie had made a pre-war visit to Campbell Island in the Norwegian whaling mother ship *Clark Ross*, and liked describing the surprise of the shepherds working at Campbell when the *Clark Ross* steamed into Perseverance Harbour preceded by a string of small whale-chasers. At first they thought the chasers were tugs with a disabled vessel in tow, but it proved the ships were just in search of fresh meat, and 200 sheep were taken on board.

In general, our evenings other than Saturday night were spent catching up on undone work, or reading. The station library was extensive, by now including a big accumulation of books brought down by previous parties. My journal says: 'Enjoying current book *Trader Horn*, natural story-telling like Charlie Carlson's! … Nora Waln's *Reaching for the Stars* good reading, evocative of Germany just before the War and snowy Christmas scenes [this was 6 June, when I was experiencing my first snowfall]…Peter Freuchen's *Mala the Magnificent*, an unsuccessful Eskimo melodrama by an otherwise fine writer.' A feature of my year was my introduction to *War and Peace* which by the year's end I had read through three times: Charles Fleming, who spent 1942 at No. 2 station, had given me a copy shortly before my departure saying, 'It's just the thing'. Les Clifton was the only one of us rarely seen with a book, but this was because all his spare time—even by candlelight in a mountain tent—was given to his manuscript. Whether Les was writing a novel, history or adventure story we never discovered, but he could be seen at almost any time of the day considering, deleting and re-writing as he bent over the well-worn pages.

In my journal for 27 June I note, 'Allan Eden taught me to play cribbage'.

Len Hoskin and Bob Pollard relaxing in the main living room, No. 1 Station. Photo: E.G. Turbott.

This, a long-time favourite with sailors and others in isolated situations, became a regular form of recreation, especially on Saturday nights but also often during long periods of confinement while we waited for the weather to clear. Later during my spell with the surveyors at Carnley Harbour three of us had a perpetual crib tournament, our scores being marked up on one of the yellow-and-red trig flags. Mine crept up slightly towards the end of our stay, but I was always badly beaten by Allan and Les Clifton.

Possibly our Saturday evenings at No. 1 were less social affairs than those of other parties; certainly our 1943 predecessors achieved the ultimate in organised recreation with regular Saturday night dance to the music of Dunedin Town Hall's dance session from Radio 4ZB. Alan Paine had a copy of the *Subantarctic Observer*, a one-off magazine of articles, sketches and verse, which was produced as a joint station effort by the 1943 party. The inspiration behind the *Observer* was their leader, Bob Falla, who was a veteran of pioneer antarctic exploration when long-isolated shore parties produced magazines of this type. It included topical articles and stories, and the radio operator, 18-year old Johnny Jones, proved to be the station poet.

My journal for 13 April describes an evening while the *Ranui* was waiting for the weather to clear enough to take the surveyors to Musgrave Inlet. After helping unload fodder for the sheep at Ocean Island, Alec Lund and George Bish came ashore with the fiddle and this was regarded as good reason for a special rum issue. The music as usual led to singing; and someone raised the idea of reviving the *Subantarctic Observer* which led to lengthy speeches—mostly with little point—for and against, as the evening wore on. A committee was proposed. As a writer, Les Clifton was the obvious choice for editor.

By now for some reason the party had moved to the kitchen, where Alec was sitting on the side bench, fiddling hard with his seaboots drumming in time against the drawer labelled 'Dried Fruits', giving us a rousing recital of his native Danish folk-songs. George Easton, who drank only lime juice but liked a song session, gave up working on survey calculations and came in with his song book. More singing, followed by:

Mr Chairman, I have a proposal!

Who the devil is the Chairman?

Mr Chairman, I propose we form a Glee Club.

Committee to be Mr Paine, Mr Lund and Mr Bish, Mr Hoskin to write down the words of all the songs. (Mind you get all 24 verses of *In Plymouth Town*, Sparky!)

The next day, 14 April, was fine and clear, and the survey party, including Alan Paine as field assistant, made an early departure for their three-week camp at Musgrave Inlet. Nothing further came of the Glee Club and we did not get round to action on the *Observer*. Our routine was, in fact, much more broken than those of previous parties, for the surveyors had to be away in the field as much as possible, while our No. 1 party was reduced to three with Geoff Prichard's return home at mid-year.

News broadcasts gave us scraps of information about events on the mainland but were, of course, heavily slanted towards war news. The war bulletins became increasingly favourable: in Italy the Allies were moving steadily northward, while success had been achieved in the Solomons where the New Zealand division had been in action on Nissan (Green Island). My two brothers were both involved in the fighting, one in Italy and the other in the Pacific. On 6 June—D-Day—came the bulletin that seemed at long last to signal the war's end: we listened almost with disbelief to the news of the Normandy landings, perhaps one of the most distant outposts of the services to cheer on this new turn in the struggle. Even on the eastern front success was slowly being achieved against the Japanese in Burma and the Philippines.

By early May we were looking forward to the *Ranui's* mid-year voyage to New Zealand. It became unexpectedly imminent on 10 May, when at 6 p.m. a message came through for the expedition leader, Allan Eden. The news was that it had been decided to close down No. 2 station at Carnley Harbour immediately. The *Ranui* would now make her mid-year trip to Wellington—instead of Dunedin as usual—taking home the No. 2 party, together with as much as possible of the station's stores and equipment.

The war situation was now evidently regarded as much improved; coastwatching in the subantarctic, already greatly reduced, could give way to the urgent need for funds and manpower on the European and Pacific fronts. Allan's instructions were to make every effort to complete the Auckland Islands survey; after this our station would also be closed. At the same time it became obvious a permanent meteorological/ionosphere station was needed in the subantarctic, and for this Campbell Island was chosen, but the station would no longer have a coastwatching role.

Authority was given for personnel from No. 2 to remain, or for the parties to be rearranged, if this would help with the completion of the survey. The immediate result of this for me was that since Bob Pollard—station leader and met. observer at No. 2—was eager to stay with the expedition, he would replace me as met. observer at No. 1 for the remainder of 1944. This would allow me to join the surveyors as a field assistant for their work in the southern portion of the group, which would enable me to do more biological fieldwork and see something of Auckland Islands natural history generally.

The subsequent history of the survey and of the final end to the wartime occupation of the Aucklands may be outlined briefly here. It was not possible, mainly because of bad weather, to complete the survey until June 1945. Neither Les Clifton, of the survey party, nor I were available after December 1944, when Len Hoskin was also due to return. Les and I left for the mainland in mid-December, and in mid-January three extra men came down to bring the survey party and No. 1 station party up to strength. The new men were Tubby Wenham, to join the survey party as field assistant, John Jones (formerly of the 1943 No. 1 party) and Jim Orange (radio operator at No. 2 for the first half of 1944). John Jones was qualified both as a radio operator and met. observer, and as a result Bob Pollard could join the survey party in January as a second field assistant. Bob had been anxious to see something of the country beyond the stations and was glad to take this opportunity to go into the field. Len Hoskin's return was delayed until after the replacement personnel arrived in mid-January. No. 1 party had already been reduced from four to three at mid-year by the departure of Geoff Prichard, who had applied to leave the expedition because of his father's death, and it was not considered necessary to bring the party up to full strength. The station was closed and all activities on the Aucklands ended when the survey and station parties departed in the *Ranui* on 3 June 1945.

To return to the events of mid-year, when the message signalling the disbanding of No. 2 was received on 10 May the *Ranui* had been waiting to move the survey party from No. 1 to their next camp. She had moved round to a sheltered anchorage at Erebus Cove, but on the morning of 11 May Allan Eden was able to attract her attention from the Lookout with an Aldis lamp. He and Alan Paine left immediately for a quick visit to No. 2 to break the news to the party, and make the necessary arrangements for closing the station. Allan had planned to use No. 2 as the base for the southern section of the survey; he now arranged for enough food and equipment to be left in the abandoned station to provide for the survey party during the next few months.

Packing up was expected to take about a fortnight; however it was not until 31 May that the *Ranui's* siren signalled her return carrying the No. 2 party (Bob Pollard, Norm Hart, Basil Stallard and Jim Orange). In the meantime, since 10 May every spare moment had been spent preparing our home mail. Letters begun earlier were extended and new ones started on the ship's return from the mainland we could expect our first home news for five months.

Bad weather delayed the *Ranui's* departure, but the weather cleared on 2 June. At 2 p.m. the blue ensign was hoisted and she sailed off helped by a lively southwesterly breeze. The station and the *Ranui* gave Geoff Prichard a full-scale send-off on the evening of the 31st; at No.1 for the next four weeks only the survey party, Len Hoskin and I remained. Bob Pollard was making a brief home visit before returning to join No. 1, while Alan Paine (the No. 1 leader) joined the *Ranui* as assistant engineer for the New Zealand voyage.

As it happened this mid-year trip proved to be one of the longest on record. We heard that the *Ranui* was unexpectedly delayed in Wellington, but the shortest day, 22 June, had come and gone before we heard anything definite. When we did, it was just a bald message with the 6 p.m. schedule on 4 July, to say the *Ranui* had returned to Dunedin,

having encountered violent storms off the South Island coast. She had turned back off Cape Saunders to run into Otago Harbour for shelter, then run aground on a sandbank during a snowstorm inside the harbour. Damage to her rudder kept her in dock at Port Chalmers for repairs.

Finally at 9.30 a.m. on 19 July—a full six weeks after her departure—we heard her siren. The crew and returning party members looked thoroughly worn and tired; still more bad weather off Stewart Island had kept them another four days in shelter at Port Pegasus.With limited time available unloading took precedence, and only later in the day were we able to open the two bags of letters and parcels that came ashore, and read our mail. Noel Worth handed me a couple of last-minute letters he had carried down separately, and as I was cook of the day I glanced at them while preparing lunch.

Catch of fish at Port Pegasus, Stewart Island. Photo A.W. Eden.

Later when Alan Paine and Bob Pollard had settled in we talked at length, about the eventful voyage and to absorb all their New Zealand news. In addition to stores and vegetables, the ship's enforced stay in Pegasus meant we now had a generous supply of fresh fish.

The *Ranui's* voyage was far from over, for the Campbell Island (No. 3) party was still awaiting their supplies and mail. She left us again on 21 July to refuel at Waterfall Inlet, then set off immediately afterwards for the voyage to Campbell, which occupied the next four weeks. The weather was especially severe during her stay in Perseverance Harbour—so bad that an anchor chain parted in one gale. The No. 3 party was delighted to see the ship, not only to get their mail and stores, but to break their long isolation since the survey party's visit in January–February.

The *Ranui* returned to No. 1 on 12 August. Allan Eden was now most anxious to get away for the southern section of the survey; except for a little field work by outboard around Port Ross, all the surveyors could do during the ship's absence was complete their computations and get the northern half of the map into shape. The three surveyors and I prepared for our lengthy stay in the abandoned No. 2 Station at Carnley Harbour. Bob Pollard took over the met. routine at No. 1, leaving me free to go south.

Southern Survey

Noon on Tuesday, 15 August found us aboard the *Ranui*, heading south from Port Ross on the southern survey. I found it hard to believe that life at No. 1 and the met. routine was for the present over. The surveyors required an additional man for their party, so they could put two surveying teams each of two men in the field. As field assistant I would help in any way necessary—mainly carrying gear to observation points—but would have ample opportunity to collect and observe. Allan Eden, the chief surveyor and expedition leader, and assistant surveyors George Easton and Les Clifton by now had extensive field experience of local conditions. By joining them for this stage of the survey I could at last get an overall impression of the group and visit the high land round Carnley Harbour, which until now had been a tantalizing distant outline away to the south.

The main features of the new map were now complete as far south as Musgrave Inlet. The plan was now to map the southern portion of the group separately with a new baseline, the two sections to be joined to complete the map. We would have a comfortable main base, since the No. 2 hut on Carnley Harbour, abandoned as a coastwatching station in May, was still in a sound condition.

The run to Carnley was just a routine trip for the *Ranui's* crew, whose home port was Waterfall Inlet, the southernmost inlet on the east coast. The three surveyors had previously visited Carnley, but I was delighted to see new country and especially this strangely fragmented eastern side of the main island. For some 22 miles the eastern section is broken at regular intervals by deep fiord-like inlets, each reaching back almost as far as the high crest of the island's main ridge. The steep-sided inlets show every sign of glaciation—clearly evidence of erosion during the Ice Age, then invasion by the sea.

At No. 2 station, Carnley Harbour. Rear: Alan Paine. Middle row: George Bish, Alec Lund, Norm Hart, Allan Eden, Noel Worth. Front row: Jim Orange, Charlie Carlson, Basil Stallard. Photo: A.W. Eden.

Rata forest formed a coastal fringe, with scrub above leading to sweeping tussock slopes. Ahead the island widened out as we approached Carnley, the slopes above Waterfall Inlet rising towards the impressive mass of Mt D'Urville (2070 feet or 631 metres). The Carnley entrance is narrow, with Perpendicular Head rising to the north and the steep slopes of Adams Island to the south. Although we had left Port Ross in sunny weather and the voyage south had been calm, we now encountered a squall and a stiff Carnley breeze—I remembered the harbour's reputation for high winds and sudden weather shifts—and were tossed about for a quarter of an hour, before turning to shelter in Tagua Bay, just below No. 2 Station.

The last stages of the trip brought some little drama. I sustained a deep cut in my right thumb while helping Alec Lund with some lashing on deck, and it bled profusely. First aid finally stopped the bleeding, and Allan Eden agreed that my injury was not bad enough to require a return to base. The cut healed well, but I was relieved of carrying duties for the rest of the afternoon. I still took over as cook for our first evening meal (Les helped by peeling the potatoes).

We landed our stores and gear on a small beach at the head of Tagua Bay. No. 2 Station stood about 850 yards [730 metres] back from the cliffs above the beach, so we had to winch our gear to the clifftop, then carry it up a track to the hut. We left most of the stores at the landing, because much was included which would be used later for the field camps; stores for the base camp were carried up as required. The first day was spent unloading and sorting our stores and gear, before the *Ranui* returned to Waterfall.

We were now on our own, although we could expect to see the ship at intervals as the work progressed. For the first time since reaching the Aucklands we would be without radio news, because the station's generators had been sent back to New Zealand with the other equipment when it was closed. This meant, too, that our lighting would have to come from kerosene lanterns, candles and the surveyors' incandescent Coleman lamp, which they used for mapping operations.

No. 2 Station was almost a replica of No. 1. It was situated at the base of Musgrave Peninsula, and although it was well above sea level and somewhat exposed, the rata forest gave fair protection from the wind, as well as the necessary concealment. The No. 2 party's 14-foot dinghy and outboard had been left behind at Allan's request—there was also a good supply of petrol so we had independent transport to points around the harbour. Allan planned two main field camps at Western Harbour and Adams Island, and we would be dependent on the *Ranui* for transport to them.

The station's surroundings, however, were a distinct contrast to those of No. 1 at Ranui Cove. Instead of low-lying land, we were now surrounded by towering peaks. Looking northwest across Carnley Harbour's North Arm, we could see the massive Tower of Babel (1811 feet or 552 metres), its distinctive tiered outline formed by alternate layers of lava and scoria. The mountain's name was one of a number bestowed in this area in 1864 by Captain Thomas Musgrave from the wrecked schooner *Grafton*, a few remains of which lay below us on the coast of the North Arm. (To the *Ranui's* Charlie Carlson the mountain was always 'Tabernacle Hill', a name I thought almost as appropriate). Mt Dromedary (1270 feet or 387

metres)—another of Musgrave's picturesque names—lay a little to the north of the Tower, and jutted out into the middle of North Arm. From the landing track we could look south across Tagua Bay to the long, high outline of Adams Island, with its two high points at The Dome (2100 feet or 640 metres) and Mt Dick (2313 feet or 705 metres).

Since the weather on the day of the *Ranui's* departure was calm, we decided to try out the boat on a trip to neighbouring Camp Cove and Coleridge Bay. Camp Cove contained perhaps the best preserved castaway depot. It was just a small A-frame hut, with inscriptions on its outer walls from castaway days. One of these records the 1905 wreck of the French barque *Anjou*. Moving on to Coleridge Bay we attempted to climb a low hill to the south of the Tower of Babel; but a dense band of scrub finally proved impenetrable, and it was much too late to begin cutting tracks. It was clear we would have to do a lot of track-cutting before we could work effectively on any of the surrounding high points.

On 18 August we began work in earnest, spending a morning cutting a track between the station and the first peak to the north, Wilkes Peak (1867 feet or 569 metres). I was cook and stayed behind to prepare thermos flasks of soup and tea for lunch, since the party was near at hand. When I arrived with the lunch I found that they had opened up an existing rough track, and from here a route led over a series of ridges and tussocky flats to the Peak. On the flat after the first ridge we found a half-grown chick in a wandering albatross nest.

Although snow showers were now moving across from the west, George and I made a dash for the summit carrying trig poles and other gear. We erected a pole, and between snow-showers had our first glimpse of the long stretch of bleak fell-field and rock leading to the main island's two highest points, Cavern Peak (2162 feet or 659 metres) and Mt Raynal (2113 feet or 644 metres). The latter was especially distinctive with a flat platform top. Below us the sound-like arms of Carnley Harbour spread out to the east, northwest and west. Wilkes Peak, the site of the first trig station on the southern survey, later proved to have an altitude of 1867 feet or 569 metres. We made quick time home and found the others already had dinner under way.

Wandering albatross and chick, Wilkes Peak track. Photo: E.G. Turbott.

On the following day, 19 August, we made our biggest effort in this phase of the survey, traversing the whole upland area to the north and erecting trigs on Cavern Peak, Mt Raynal and the Giant's Tomb. This last is a massive outcrop between the two other peaks, also named by the *Grafton* survivors. We made an early start, well equipped with protective clothing. (From now on we always included waterproof leggings in our field outfit: without them our legs got soaked pushing through tussock and knee-high scrub, and froze immediately if we went out on to the unsheltered tops.) We picked up the poles and other gear that George and I had left on Wilkes Peak. A short rocky ridge led to the conical crest of Cavern Peak. We could see between hail and snow showers that to reach the peak, we would have to walk round the head of a deep glacial valley.

Far below us, the valley was filled with swirling mist. On its southern side, the sheer slope of Cavern Peak fell away to the head of Deep Inlet. The shallow cave from which the peak derives its name is on the south face just below the summit. To the north long, even slopes led down towards Hanfield and Norman Inlets. Miraculously, the showers suddenly cleared and, to our north, we could see the rest of the main island. Here, we were almost at the centre of the island's widest point: the land to the north of us, broken by the eastern inlets, was much narrower than we had realised. Only 16 miles [25 km] or so away, the familiar Port Ross landmarks of Mt Eden and Enderby and Ewing Islands seemed remarkably close.

The author on the summit of Cavern Peak (2162 feet or 659 metres) under temporary cover of snow. Photo: George Easton.

Now we divided into two teams: Allan and Les undertook to erect the trigs on Cavern Peak and the Giant's Tomb, while George and I carried on, over a seemingly unending tract of sodden fell-field and bare rock, to do the same on Mt Raynal. We were now well over towards the west coast and, when the showers lifted, from the peak of Mt Raynal we could see Disappointment Island just offshore. Heavy surf broke on the Sugarloaf Rocks and the coast of Disappointment; between the rolling masses of black shower cloud, occasional patches of sun lit up a leaden sea. Norman Inlet, the most extensive of the island's inlets, ended below us almost at the base of Mt Raynal. The head of the inlet is shaped like an

amphitheatre, and is separated by an extremely narrow ridge from the coast. The west coast cliffs were immediately below us, the land at the cliff-tops dropping abruptly into space. It was too cold to stay for long; having installed the trig pole with its red-and-white flag we returned, noting the flags now securely in place on the Giant's Tomb and Cavern Peak.

That day I had my first experience of the problems of the survey: while trig stations could be established with little difficulty in poor conditions like today's, the clear weather needed for theodolite observations came only at rare intervals. Long delays seemed likely before the survey could be completed. After we got back to camp, George and I worked out that we had covered about 16 miles [25 km]—a satisfactory total for our first full day, despite the inevitable penalty of blisters.

A preliminary visit to the Mt D'Urville area was scheduled for 20 August: as well as installing trigs, Allan planned to establish the baseline on a fairly level ridge leading from the summit of the mountain towards the northwest. However, high winds and constant low cloud made this impracticable: the baseline he finally chose was a far from level, but much more accessible, stretch on Musgrave Peninsula. As we approached the Mt D'Urville ridge along the track from Wilkes Peak, we enjoyed panoramic views, the most spectacular being northwards to the sheer face of Cavern Peak rising above Deep Inlet. The inlet was today free of mist and we could see a small delta at the valley head far below us. The ridge-top was remarkably bare and stony, the most windswept we had seen. The only vestiges of vegetation were occasional shrubs moulded by the wind into a flattened, triangular remnant in the lee of a surface boulder.

Allan decided that better access to the Mt D'Urville area could be obtained by opening up an existing rough track leading from the old emergency hut at the entrance to Tagua Bay, over the shoulder of the mountain to Waterfall Inlet. George and Les completed the track on the following day, while I accompanied Allan to Flagstaff Hill at the tip of Musgrave Peninsula, where we erected a trig.

Flagstaff Hill is only 722 feet or 220 metres high, but this is enough for a commanding view of the whole of the Carnley Harbour area. Looking directly up the North Arm we could see that the harbour ended below a moderately low saddle leading to the west coast. A little to the right of this rose the steep slopes of Mt Raynal; close at hand to our left were Mt Dromedary, the Tower of Babel, and Masked Island just outside Camp Cove. On the south side of the main harbour almost the whole of Adams Island was visible, with a clear view to the east right down to the harbour entrance. Snow covered the island's higher slopes; irregular light showers seemed to hang against the rocky slopes, and sometimes drifted into the valley heads.

Geologically, Musgrave Peninsula is considered to be the core of the more southern of the twin volcanoes to which the group owes its origin. Erosion of the ancient lava and scoria beds over time produced the harbour's indented coastline and massive terraced slopes. The more northern volcano is believed to have been centred approximately on the site of Disappointment Island, but here the southern ocean's force has eroded away much of the volcano, giving rise to the west coast's spectacular sea cliffs. The Auckland group resembles another of New

Zealand's volcanic relics, Banks Peninsula. This is understandable, because volcanism associated with plate tectonics was probably similar over the whole of the submarine Campbell Plateau, which borders on the New Zealand mainland to the southwest. Banks Peninsula is much younger than the Aucklands geologically; it is also considerably larger, nearly twice the total area of the Auckland group.

As well as putting up the trig on Flagstaff Hill, we searched for some trace of Musgrave's flagstaff, which the *Grafton* castaways erected in the hope of attracting the attention of some visiting sealer or other chance vessel. We could not find anything resembling a flagpole—the hill is extremely windswept and, even by 1944, may well have eroded down to much lower levels than those in Musgrave's day.

On 22 August Allan and George made a big effort and established several trigs in the Mt D'Urville area. They experienced intense cold and cloud at times so heavy that they had to use a compass to find their route. A rising northwester was giving every indication of turning into a storm—we were relieved when they arrived somewhat late and very wet, having crossed Tagua Bay directly into the wind.

Our next three days brought our first full-blown storm at No. 2 Station. The station is on a ridge and, although in the bush, is relatively exposed. By early morning on 23 August the whole hut was creaking and shaking in the gusts. Hail and snow showers continued without pause all day; the wind swung southwest towards evening but remained as strong as ever. Sheets of foam and spray from the North Arm would sometimes fly right across the Peninsula. It has sometimes been suggested that Musgrave's account of the gale that cast the *Grafton* ashore in the North Arm might have been exaggerated: we now had no doubt it was completely accurate. The gale was accompanied by frequent williwaws, producing columns of spray, some of which came well up the slopes of Wilkes Peak.

There was, of course, no question of fieldwork. I did manage to get as far as the small clearing where No. 2's met. screen formerly stood, and from there I could see up the whole length of the North Arm. Back at the hut, Les baked an almost perfect batch of bread, replacing yesterday's failed effort, when his yeast had overheated. I worked on cleaning a particularly fine sooty albatross skeleton. We all had plenty of time for reading, and endless games of cribbage. The wind and snow continued almost unabated throughout the following day, sometimes broken by brief patches of sun. Thick snow lay in the bush and on the foothills, and when the sun touched the distant peaks they reflected a bluish, icy gleam. The Tower of Babel was especially magnificent. On its sides transverse bands of snow now alternated with the black of the basalt flows. Looking towards the Tower I saw a snow plume suddenly streaming out as the whole summit was swept bare. By the third day the southwesterly was stronger than ever, though now fairly steady with fewer gusts.We could only work and pass the time indoors.

The storm was notable for the reappearance of the two pet pigs abandoned when the coastwatching station was closed. The pigs were extremely friendly, no doubt having been long accustomed to appearing at the station for food in spells of bad weather. We fed them with the flat loaves left over from Les's failed baking effort, which were most gratefully received.

The author at the remains of the *Grafton*, wrecked in 1864, Carnley Harbour. Photo: A.W. Eden.

The day after the storm was showery with much low cloud—unsuitable for an attempt on the tops. We accordingly split up, George and Les to do preliminary work on the baseline while Allan and I spent the day visiting the site of the *Grafton* wreck. Previous No. 2 coastwatching parties told us it was easy to find, a short distance up the coast of the North Arm.

The *Grafton*, a schooner of just 80 tonnes (not much larger than the *Ranui)*, was chartered in Sydney in November 1863 by F.E. Raynal, a retired French sea captain and goldminer, who had been told valuable argentiferous tin deposits existed on Campbell Island. Raynal had been away from the sea for so long that he decided to engage Captain Thomas Musgrave as master for the voyage to Campbell. Musgrave and Raynal signed up a crew of three. The party landed on Campbell in December 1863, but finding no signs of the tin deposit decided to continue to the Aucklands in search of seals. On 2 January 1864 a major storm in Carnley Harbour put an end to the expedition: Musgrave believed he had found shelter and a safe anchorage in the North Arm, but could have had no forewarning of the force of the westerlies inside Carnley. The *Grafton* was cast ashore at about midnight, lying on the beach broadside on to the storm. All five men managed to get ashore but the wreck rapidly broke up.

During the following days the men salvaged most of their possessions and much useful material from the wreck. The ship's 12-foot [3.6-metre] boat was also saved. During the first few weeks the castaways built a substantial hut close to the shore from the *Grafton's* spars and timbers. Musgrave and Raynal both kept diaries, their accounts also appearing later as published books. Sea lions provided the main food resource for the remainder of the summer and shags ('widgeons') were also a staple item; with the coming of winter desperate food shortages soon occurred.

At Christmas 1864, desperate after a year of isolation, the castaways resolved they would either build a seaworthy vessel or modify the dinghy enough to enable them to reach New Zealand. Musgrave and Raynal were both individuals of the strongest character and highly resourceful, and a reasonably seaworthy 17-foot long [5-metre] craft was eventually

constructed. Raynal proved to have amazing mechanical ingenuity: he produced various tools including a saw, approximately 180 bolts and at least 700 nails and spikes. The escape vessel, which they named the *Rescue*, was ready to sail on 19 July 1865. There was room only for Musgrave, Raynal and one other man. Despite a heavy gale off Enderby Island, the *Rescue* reached Port Adventure, Stewart Island, five days later. A public appeal in Southland secured enough funds to enable Musgrave to return to pick up the remaining two castaways in the cutter *Flying Scud*.

Musgrave made representations to the Australian ad New Zealand authorities, urging that the subantarctic should be searched for other castaways, which led to two search expeditions over the coming months. There had been two other major shipwrecks on the Aucklands in 1864: these were the *Invercauld* and the *Minerva*, both much larger vessels than the *Grafton*. Three survivors of the *Invercauld*, which went ashore near the northwest point of the main island, were rescued by a passing vessel in the following year; of the *Minerva* wreck little is known, but four of its crew are believed to have been rescued, also in 1865.

Musgrave was invited to join the first search expedition, sent out by the Victorian State Government in October 1865 in the steam corvette *Victoria*, commanded by Captain Norman. All the New Zealand subantarctic islands except the Snares were visited, domestic animals suitable for food were released and a thorough but unsuccessful search carried out. Shortly afterwards the paddle-tug *Southland* was despatched by the Southland Provincial Government, searching both Port Ross and Carnley Harbour, but again without result. It was not until 1877 that the New Zealand Government established a full network of permanent castaway depots, and began to search regularly for shipwreck survivors.

Allan and I followed a pebbly beach below the station, then struck inland through the bush to come out above a curved bay. In the centre of the bay we could see the mouth of a stream, and at the top of the beach were the last half-buried timbers of the *Grafton*, just a few curved portions of thick planking. Back a few metres from the beach was the rusted skeleton of the *Grafton's* stove, almost hidden in a hummock of *Polystichum* fern—the site of the hut that sheltered the castaways during their 18-month ordeal. A few pieces of decaying wood were all that remained of the hut, which had been stoutly constructed from salvaged spars and timber. The survivors named the hut 'Epigwaitt'—according to Musgrave an American Indian word meaning 'a dwelling by the water'.

We returned by a more direct route, climbing straight up through the bush and scrub to the Wilkes Peak track. Looking down over Tagua Bay we were surprised to see the *Ranui* at anchor—the crew were just coming ashore as we reached the landing. It was decided the ship would stay with us for about a fortnight, since she would be needed to take us on to our Western Harbour field camp. War news from the *Ranui's* radio was especially welcome—we were at last able to catch up with the heartening news of big advances by Allied forces, in France following the D-day landings, and in Italy.

We now needed only two days free of low cloud to finish installing trigs on the high points accessible from the station. The peaks still without trigs were The Dome and Mt Dick (both on Adams Island) and the Tower of Babel and Mt Dromedary across the North Arm. The breakthrough

came on 28 August; as day broke fine and clear we loaded the poles and other gear into the dinghy and left for Adams Island. In Tagua Bay we circled out to leave word with the *Ranui* of our departure and arrange for help in case of unexpected bad weather.

The landing we chose for the approach to The Dome was at the head of a deep bay to the west of Grafton Point. According to the No. 2 party, if we followed the quite considerable stream up the valley from the bay we would find a rough track giving reasonable access to the tops. On this day trip we hoped to avoid track-cutting, which could be done later as we would be camping on Adams for triangulation observations. We pushed through a waist-high *Stilbocarpa–Pleurophyllum* 'garden' at the head of the bay, then followed the stream through low twisted rata forest, but found no sign of a track. George decided to continue up the streambed, while Allan, Les and I turned up the left-hand slope. Almost immediately we found ourselves deep in a tangle of shoulder-high scrub; it seemed best once we had entered the scrub to go on, but it was a full 45 minutes before we finally emerged on to an open tussock slope. Sheer heaving and pushing were essential to make the slightest progress—sometimes we even had to crawl. The poles and other survey gear added considerably to our troubles. It was little consolation to see when we emerged that the scrub zone thinned out further up the valley, where there seemed to be fairly easy access to the tops.

We now had a clear route over gentle tussock slopes towards The Dome. A wandering albatross flew past at close quarters. It just missed Allan, and a moment later he called out that the bird had landed at a nest in a hollow nearby. Since discovering the wanderer chick on the Wilkes Peak track we had not managed to see the return of the adults to feed their chick. Now as we watched a parent bird went through the whole feeding process—while keeping a wary eye on us it remained quite undeterred by our presence. On landing it walked up to the nest, then shuffled closer until its face touched the chick's beak. The chick began to nibble the parent's beak, keeping up a frantic piping. Suddenly the adult went through a strange preliminary action, lowering its breast to the ground and elevating its tail. It then opened its beak and the chick's beak was immediately placed anglewise inside. A few seconds later a reddish, quite solid food mass was regurgitated and quickly disappeared down the chick's throat. We watched and photographed the repetition of the feeding process. It took place altogether six times while we watched, the adult sinking to the ground after each feed, then rising to repeat the breast lowering and tail tipping procedure before regurgitation. We did not wait to see the parent leave, to ensure that our presence did not interfere with the rest of the chick's meal.

We were relieved to meet George shortly afterwards beside a prominent rocky outcrop a little to the west of The Dome. He had made good time up the valley and had continued along the main ridge to look down on Fly Harbour. We stopped for lunch on the crest, enjoying the fine day and looking south over a blue sea. The southern slopes of Adams Island consist of downwardly tilting basalt flows—the outer margin of the Carnley volcano. The slopes end in sheer cliffs as spectacular as those of the main island's west coast. On this coast, however, one inlet breaks the line of cliffs, and now stretched out below us. Fly Harbour is the southernmost of the series of glacial fiord-like inlets occupying the east

coast of the main island. On the old maps it appears as a shallow indentation; it is, however, quite equal in extent to all but Norman and Deep Inlets. (The name of the harbour does not, as might be expected, commemorate a particularly dastardly blowfly attack—it is believed to refer to a visit to the south coast by one of the naval ships sent out in the days of the Enderby settlement, HMS *Fly*.) We looked down over sweeping tussock slopes, then the steep, scrub-covered sides of the inlet, merging finally with a fringe of very tall rata forest at the water's edge. A waterfall cascaded from the tussock to the bush far below.

At this stage we divided into two parties. George and Les set off to erect a pole on The Dome, while Allan and I went along the main ridge to the west. The snow and ice deposited during last week's storm was thawing, making the fell-field extremely slushy; at intervals there was better going when we came out on to the rocky crest. From a high point we seemed to be looking down on a miniature inlet, just an indentation in the line of coastal cliffs. I had kept a little to the left and suddenly found I had a view down a narrow, cliffy valley in which I could see a lake. A shingle bar separated the seaward end of the lake from the small inlet we had just seen; from where I stood there seemed to be a considerable drop from the lake level to the inlet.

'It's a lake,' I shouted to Allan, and we moved on a little until we could see the lake's full extent; as in the Fly Harbour valley the steep slopes down to the water's edge were covered in scrub, then bush. There was a considerable stream at the valley head, with a small delta where it entered the lake; today the surface was calm, only ruffled at intervals by a slight breeze. To this lake Allan subsequently gave the name Lake Turbott. It is remarkable because the ridges on either side closely overhang the valley, and for this reason it can be seen from only an extremely short section of the main ridge. Probably few, if any, earlier visitors had seen it before—there is certainly no sign of a lake on any earlier maps. Geologically, the Lake Turbott valley is clearly of glacial origin. A bowl-shaped hollow (or 'cirque') had been carved out, probably by a relatively small glacier, giving rise to the lake.

Our objective was now Mt Dick, the imposing black rock mass rising as a sheer precipice from the head of the valley above the lake: in *Islands of Despair* Allan describes Mt Dick as 'only half a mountain', referring to its vertical eastern face. We approached along the main ridge, finally reaching the peak by cutting footholds in the deep snow. Our climb above Fly Harbour had taken two hours. The weather now changed, a keen southwesterly springing up as we fixed the trig pole in place. When altitudes were finally calculated, Mt Dick would prove to be the highest point in the group.

From the Mt Dick summit we had sweeping views southwest to Astrolabe Point, where the coastline swings north, and to the east across the Lake Turbott valley to the ridge above Fly Harbour. Looking southwest, I was now amazed to realise an extensive wandering albatross colony occupied the whole of the gently sloping tussock-land down to Astrolabe Point. Everywhere nests were dotted about amongst the tussock. A few had parents beside them, probably shortly before or after feeding. There were a few adults wheeling overhead above the colony. The chicks seemed, as far as could be judged from this distance, to be of about the same age as the one we had seen earlier—this, like the young wanderer on the Wilkes

Lake Turbott, named for the author, fills a glacier-carved valley on Adams Island. Photo: A.W. Eden.

Peak track, I believed to be approximately half-grown (i.e. 4 months old). I made a very rough estimate of the size of the colony on this slope—between 800 and 1000 chicks.

I then looked over to the east, and was still more surprised to find that a colony of about the same size covered the slopes leading to the Fly Harbour ridge. Here the chicks were still further away, but the density of nests seemed much the same as to the southwest. My estimate of wanderer chicks for the whole area thus came to 1600–2000 birds. In my journal I later wrote:

> … this was the size of the colonies visible from the observation point on the island's main ridge: to the west, and possibly to the east past Fly Harbour, there may be many more. There is no doubt, however, that the southern face of Adams Island is one of the great wandering albatross breeding grounds.

Much subsequent fieldwork including a recent full-scale census has been carried out to study the Adams Island wanderers. The accuracy of any breeding census is complicated by variations from year to year, since this species is a biennial breeder; however, the total of breeding pairs on Adams Island was estimated at 7000 in 1973, and in a detailed 1991–97 census it averaged 5831. It seems probable then that my estimate of up to 2000 for the two main colonies was much too low. The recent surveys found the that the main nesting areas on Adams Island are essentially as I saw them, occupying the slopes to the southwest and east of Mt Dick; scattered nesting was found to occur elsewhere on Adams, but at much lower densities.

We were joined by George and Les on the way back to the boat. From the main ridge we looked across to the harbour's western entrance, where heavy surf was breaking on Monumental Island in Victoria Passage. Crossing the high, level fell-field above the valley's head we passed several groups of Auckland Island banded dotterels in breeding plumage. There was no time left to stop to discover whether nesting was already in progress. Les and George had seen more dotterels in the same type of habitat in the area round The Dome.

We crossed the harbour without difficulty in spite of a few whitecaps, and after reporting to the *Ranui* were glad to get in out of the keen southerly. We were very pleased with our first experience of Adams—bird life evidently free from predation, megaherbs at the landing undisturbed by pigs, the great wandering albatross colonies of the southern slopes. And there was the new lake—for me one of the year's highlights.

For the next four days the weather was reasonably settled, but low cloud made conditions unsuitable for work on the tops. The time was spent installing the all-important baseline on Musgrave Peninsula. The 61-chain

(4026-feet or 1227-metre) line had to be cleared and measured, a task requiring steady work by all three surveyors. Upon the line—after triangulation—all subsequent calculations for the map data on the southern section would depend. For most of the time I was free to collect specimens in the neighbourhood of the station and to work on my growing collections. I was also scheduled extra days as cook, to free the surveyors for work on the baseline.

We had regular get-togethers throughout the week with the *Ranui* crew; for them this meant the luxury of a hot bath, since our continually-burning kitchen stove provided abundant hot water. Planning a joint dinner, we inevitably got round to the future of No. 2 party's pet pigs. The pigs had stayed close to the station since their arrival during the storm. Perhaps it would be best at this stage to draw a veil over their fate. My journal records much time spent making our dried apples into apple sauce. Convivial evenings were spent ashore or on board, and with the fiddle in the hands of Alec Lund and George Bish justice was done to our repertoire of shanties and songs.

Working on the baseline, we encountered a highly territorial pair of skuas. This species migrates from the Aucklands from June to August. Promptly on the afternoon of 31 August a skua appeared flying low over Flagstaff Hill. On the following day two birds appeared and were clearly in the process of re-possessing the area. They were not, however, aggressive at this stage. We were away from No. 2 Station until late October, but when we returned to resume the survey the skuas were in full occupation. Now we had to visit Flagstaff Hill regularly to work on the survey. The skuas had built their nest on the ridge just below the hill and we were subjected to a full aerial attack as soon as we entered their nesting territory. I took the opportunity of carrying out a full programme of observations on this nest, continuing until shortly after the hatching of the chicks.

The clear day necessary for installing trigs on Mt Dromedary and the Tower of Babel came on 2 September. There was some cloud on the tops, but it was patchy and would, we believed, soon clear away. We planned to make our approach from Musgrave Harbour dividing into two parties, Allan and Les to be landed on Circular Head to climb Mt Dromedary while George and I went on to the Tower. A slip on the western face of Mt Dromedary seemed to offer a fairly straightforward route to the top; this was readily accessible from a small shingle beach and we landed Allan and Les there. George and I then took the dinghy to the opposite shore where a small cove lay directly below the Tower. The summit was still hidden in low cloud; however, the lower slopes appeared to offer no difficulty, and we hoped the cloud would quickly clear. Today I was carrying the trig pole, while George had the rest of the survey gear.

We unfortunately chose a route that led from a short tract of tall rata forest straight into the scrub zone. Although this was a little less intractable than that encountered on Adams Island, it was heavy going—it was only after strenuous efforts that we emerged on to tussock slopes. The clouds cleared; we could see that by swinging northward we would have a clear run to the top and would avoid the horizontal basalt cliffs on this side of the Tower. We followed an easy route through tussock, finally reaching the cliff surrounding the summit over which we had a short rock climb to the top.

We found the flat summit of the Tower quite unlike any of the peaks we had previously climbed. We were standing on an almost level and quite extensive tableland. Underfoot the ground was marshy and covered with the grasses, rushes, and cushion and rosette plants to be expected in damper habitats. There had been a brisk northerly as we climbed the ridge, but to our surprise on the summit plateau we were in a moderate calm.George took some time choosing a site for the trig; cloud patches descended upon us frequently, but he was able to identify a site well visible from all neighbouring peaks. We could see the others as they moved about setting up the trig on Mt Dromedary, a few hundred feet below the Tower. Looking westwards we were surprsed to find that the Tower of Babel is, in fact, an eastern outlier separated by just a short dip from an even more massive plateau. Allan was later to name this the Fleming Plateau; and it proved, when final observations were made, to be at several points a little higher than the Tower. It seemed the best approach to the Tower would be to come across the plateau, and we used this route from our field camp at Western Harbour for work on the Tower.

The view from the Tower was no less spectacular than our views from Mt Raynal and Cavern Peak. Here, however, we had a more comprehensive sweep up the western cliffs from Cape Bristow to Northwest Cape. At one point a waterfall plunged over the cliff edge. Halfway up the coast we could see Beehive Rock, but today Disappointment Island was obscured by heavy cloud. To the southwest white surf in Victoria Passage broke against Monumental Island. We looked down on the low flats at the head of Musgrave Harbour; over the shoulder of Mt Dromedary in the North Arm we could see little Figure of Eight Island. The low-lying isthmus at the base of Circular Head between Musgrave Harbour and the North Arm was remarkable for its vegetation pattern—lines of low, scrubby rata alternating with open lanes. The lines of rata all ran northeast–southwest, a most striking effect from this height. This pattern of vegetation, unique to the Aucklands, apparently owes its origin to both soil type and wind effect.

George and I made quick time on our descent, avoiding the scrub. When we arrived at the shore we found the cove was shallower than we had expected. The tide was well out, so we had to cut *Dracophyllum* runners to get the dinghy out into deep water. We crossed to pick up Allan and Les who had now been waiting for some time; they were a little apprehensive since a strong northerly was rising. We had to make one more stop, to check on a magnetic survey mark left on the western shore by the 1907 Philosophical Institute of Canterbury expedition. Then with a following sea we quickly reached the shelter of Musgrave Peninsula.

Western Harbour

Our next two days were spent preparing for the field camp at Western Harbour, checking stores, packing our gear and loading it into the *Ranui*.

On the morning we were to sail to Western Harbour, we woke to find there had been a heavy snowfall overnight. The station buildings and surrounding bush were transformed, and across the North Arm the sunrise was touching the white slopes of Mt Dromedary. A beautifully sunny day brought a rapid thaw: the trees were dripping and the track was slushy as we made our way to the landing with the last of our gear. As the *Ranui* sailed down the long Western Arm, we had some impressive views, with snow still thick on the heights of Adams Island.

To reach Western Harbour we had to skirt the sea-surge just inside the western entrance: here the great force of the outer ocean is felt as a strong ground swell. We were left in no doubt as to the strength of the pounding seas outside—even in today's relative calm both sides of Monumental Island were enveloped in a mass of foam. It was clear that the entrance would be navigable only in the mildest conditions. The *Ranui* rose and fell at the edge of the surge. On the right we could see Western Harbour opening up, just a small indentation on Carnley's northern coast. On the way up the harbour we took the chance—our last for some weeks—to listen to the radio news: Brussels and Antwerp were now free as the result of the Allied advance, and bells were to ring in New Zealand tomorrow.

Allan chose a landing place on the western side, where he could see a small stream, and where tall ratas promised some shelter from blowfly attack. I stayed with the dinghy, and when Allan signalled that the site was satisfactory I made repeated trips to the *Ranui* ferrying our gear ashore. We wasted no time unloading. The *Ranui* left immediately—the skipper, Noel Worth, doubted that the small and probably shallow inlet was a safe anchorage.

After their experiences at previous camps, the surveyors were determined to put up a roomy mess-tent, which would provide shelter during meals and space for cooking on our Primus stoves. For this purpose we brought several spare sheets of iron from No. 2, and with our cases of stores stacked at the head of the tent and the iron along one side we made a reasonably comfortable mess area. While we worked on the galley and completed a track to the landing the weather worsened: putting up our sleeping-tents became urgent. We had three small mountain tents measuring 8 feet by 5 feet [2.5 by 1.5 metres], and 4 feet [1.2 metres] in height; with tent-flies and waterproof canvas floors they were warm and weatherproof. Allan and George had a tent each, while Les and I shared. In bush the tent and fly could conveniently be suspended from the trees; a good deal of preparation was necessary, however, to raise the floor well above the sodden ground. We cut rata branches to make a ground layer, then piled *Polystichum* fern on top. Our efforts paid off, for rain soon set in, continuing steadily all night.

The camp proved reasonably comfortable, although the weather throughout our stay was especially bleak and cold. When we got up in the morning, or chatted at the end of the day, we greatly appreciated the shelter of the mess-tent. A log fire in the tent gave some warmth, but it

was usually too cold at night to sit around. We were glad to get into our sleeping bags as soon as possible. We could read or write by the light of the kerosene lantern, and Les could add a few words to his much-revised *magnum opus.* Les and I had to develop a fairly gymnastic routine to get into our sleeping bags and settle down on our tiny floor-space. For meals, we managed some variety—we even brought the last of the potatoes from No. 2—but tinned food provided the main ingredients. 'Wet hash' was a dependable favourite. Breakfast invariably included porridge; to Allan, a Dunedin man, any other breakfast would have been unthinkable, so the next day's cook had to remember to soak the oatmeal before turning in.

The survey work at Western Harbour was to represent a turning point since Allan hoped, as well as establishing the necessary trigs, to complete all triangulation observation in the area. He had not, however, allowed for periods of exceptionally high wind, which were to have a major effect on the observation programme. While the persistent low cloud we experienced in summer and autumn was always liable to be a problem, with the approach of spring long squally spells were also likely.

At the head of Western Harbour was a valley occupied by a substantial stream, and for our first two days there I had some time for collecting there and along the harbour shore. I noted that to the north the valley ended below a high point we named Bristow Trig (1733 feet or 530 metres). To the west a tussock-covered ridge ran from Bristow Trig along the line of the western cliffs to Southwest Cape. In the northeast, steep tussock slopes led up to Fleming Plateau and the Tower of Babel. During the fine weather, the surveyors began cutting tracks through the bush and scrub on both sides of the valley to provide access to the tussock slopes above. They also erected several trigs on the western ridge.

Our fourth day, Friday 8 September, seemed reasonably clear at daybreak, although much rain had fallen during the night. We decided that work on the tops was quite possible, and divided as usual into two parties—Allan and Les to install the last of the trigs on the western side, George and I to place one or more on top of the Fleming Plateau. George and I made quick time to the end of the eastern track but, emerging on to the exposed tussock ridge, were surprised to find that the wind had risen to gale force. We were at first in tall tussock with scrub patches which gave some shelter, but found it hard to believe the wind's strength.

We pushed on upwards but found ourselves beginning to gasp for breath as the wind force increased. We came to the zone of shorter tussock below the cliffy margin of the plateau. There were now frequent hail and snow showers from which we were able to shelter briefly behind occasional tall tussocks. At the base of the cliffs after a temporary lull there was a sudden gust and we found ourselves practically blown up the icy floor of a narrow 'chimney' on to the plateau. Conditions on top were a little less severe since, as on our earlier visit to the Tower of Babel, we found that the wind was deflected upwards.

George now made an extensive search for suitable trig sites; but visibility was never good enough for the task. Our only course was to leave the poles on the plateau, to be installed on a later visit. We made a pile of stones to weigh down the poles; this at least brought some reward for the day's work, for the stones sheltered a couple of beetles that I added to my collection. The plateau proved to be marshy on top, with ground

vegetation like that on the Tower. We had to be careful to avoid the cliff edge in case of sudden gusts.

During brief clear intervals we could see Musgrave Harbour and Mt Dromedary below us on the eastern side, and on the right Musgrave Peninsula with glimpses of Carnley Harbour towards the eastern entrance. The Tower of Babel was just a few minutes walk away across the saddle to the southeast—in clear view on the summit was the signal pole we had erected. On the plateau we were sheltered from the worst of the blasts, but we now found ourselves in a steady stream of icy air; it became intensely cold, with frequent showers of very fine snow. Our descent was a matter of leaning on the wind—for once literally!—until we reached the head of the track. First, however, we detoured to a slight rise with a direct view of the western entrance. In the gale the entrance was a spectacular sight—huge seas were pounding through Victoria Passage, while to the south off Adams Island waves broke at the top of the outlying Adams Rocks (the survey later showed the height of the tallest of the Rocks as 388 feet or 118 metres). On the Beaufort scale the term for winds of approximately 56 mph [90 km/h] is a 'whole gale'. We believed today's wind must have exceeded this category, possibly even reaching the force of a 'hurricane'.

Back at camp, Allan and Les reported that the wind on the coast had been equally strong. However, working in short spells, they had managed to erect their trig-pole in a semi-sheltered position. They too had spent a little time looking down on the spectacle of the western entrance and the waves breaking high over the cliffs of Adams Island.

The wind remained high with frequent violent squalls accompanied by snow or hail for the next six days, obliterating any hope of starting the observation programme. Allan did once carry his theodolite up to the nearest trig, only to be driven back to our camp by wind and snowstorms. The surveyors worked for a few days filling in topographical detail, which could be done in most weathers, and, accompanying Allan and George on these trips, I saw a good deal of the surrounding area. The enforced delay led Allan to think about solutions to the wind problem.

As he recounts in *Islands of Despair* (p. 114), it was particularly frustrating to note that the observation points were often free of cloud between squalls; the problem was the strength of the wind. Allan's answer after much thought was to invent a portable wind shelter, light enough to be carried over the very rough country, but strong enough to withstand the squalls. Windproof material such as canvas would shudder, causing the theodolite to vibrate, so instead he used the piece of hessian that we carried as a wrapping for the tripods. Stretched between a pair of straight poles cut from the bush, each supported by two guy-ropes, it made an efficient screen.

There was no opportunity to test the screen until 16 September. By then conditions were a little less severe. Allan and Les set out for the trig near Southwest Cape. Anchoring the poles in cairns of large rocks and securing the ropes with iron spikes, they found the observations could be made unhindered. As Allan's journal put it, the screen made 'just the difference between work and no work'; and with its help the observation programme was continued with comparatively little interruption until mid-summer.

The day after the gale Allan and I visited the western entrance, where some details of the coastline had still to be checked. Since the gale had lost little of its force we were also interested to see the entrance at close quarters with high seas pounding through the gap. The landscape at this end of Carnley Harbour is perhaps the most dramatic in the whole group. To the south across the entrance Adams Island's western tip rises to a flat-topped crest a little like the Tower of Babel. In front of this is a sphinx-like headland, and further west at the end of the main ridge the two towering Adams Rocks loom up, just offshore. Monumental Island occupies the centre of the entrance, also distinctive with its broad base and rampart-like summit.

The only navigable way past Monumental Island is through a narrow channel on the island's southern side. The steam corvette *Victoria*, under Captain Norman, used this channel in 1865 when she explored the group following the *Grafton* wreck, and she is still believed to be the largest vessel ever to pass through. Since then the channel has been known as the Victoria Passage. The list of vessels known to have used Victoria Passage includes the lifeboats of the wrecked *Anjou*, various launches employed in the search for the *General Grant's* gold and, more recently, quite a few expedition and research vessels. Not to be forgotten is the feat of Basil Stallard, the most adventurous member of the No. 2 party, who had earlier circumnavigated Adams Island and returned safely through the eastern entrance.

Victoria Passage, barely separating Adams Island from Auckland Island. Photo: A.W. Eden.

Allan and I stood on a sheer cliff just beyond Breaksea Point, looking down on the narrow northern passage between the point and Monumental Island. Outside the passage the immensely disturbed bight was swept constantly by fierce gusts. The waves seemed to climb vertically before subsiding in a mass of foam. Monumental Island was often almost submerged by huge seas. A loud booming from the entrance— it carried up the harbour to the camp—seemed to come mainly from a large cave in the seaward face of the island.

In the seething mass of foam below we saw to our amazement that a shag was fishing, evidently very much at ease. It dived as we watched, emerging a moment later with what looked like a long-legged crab. The bird continued to dive, finally disappearing out to sea beyond the line of foam. We continued on to a point from which we could look along the line of cliffs to Southwest Cape. Here the wind made it difficult to keep a foothold; we managed to find shelter in a small cave from which we could look out over the bight. We were amazed by the mastery of the seabirds in the turbulent conditions. Wandering albatrosses and giant petrels hung suspended in the violent gusts before wheeling out of sight between waves. There were even groups of red-billed gulls out in the bight. We noticed, however, that they dropped quickly to the sea's surface if caught by a severe gust.

I spent two days helping George on his topographical survey trips to Southwest Cape and the area of Bristow Trig. This was my first chance to see the famed western cliffs of the main island at close quarters, with their combination of sheer seacliffs up to 1200 feet [366 metres] high and rolling tussock slopes above. We were still experiencing snow and hail showers—often miniature blizzards—but in the clear periods we could see well into the distance. By now the higher peaks inland and on Adams Island were white, and thick snow lay everywhere under foot. Our most comprehensive view was from Bristow Trig. There the complete curve of the western coastline was visible with Disappointment Island offshore, while in the far north Northwest Cape was plainly in view.

The author in field gear. Photo: E.G. Turbott.

The western line of cliffs—especially those about Bristow Point and Cape Lovitt—must be one of the world's outstanding examples of the destructive power of marine erosion. We were looking down on the eroded remains of the northernmost of the two volcanoes (Disappointment Island is probably the last remnant of the volcano's core) while the comparatively gentle tussock-clad slopes below us represented an earlier Ice Age landscape. Even higher seacliffs are found on the south coast of Adams Island, at one place between South Cape and Astrolabe Point reaching 1726 feet or 526 metres.

On the trip to Southwest Cape I saw for the first time a waterfall being blown uphill by the wind. A fair-sized stream falls over the cliffs to the north of the cape. Today the stream was caught at the cliff edge by the wind, to descend on to the tussock as a constant freshwater shower. The vegetation

showed the influence of such regular 'watering'—the rosettes of the common upland daisy *Damnamenia vernicosa* were of giant size. Occasionally between gusts the stream would reach halfway down the cliff, but it was blown back nearly continuously over the tussock.

The visit to Southwest Cape was of much interest, since later in the year the cape is the site of a breeding colony of several hundred white-capped mollymawks. The main breeding centre for this species in the Aucklands is Disappointment Island. I could see the deserted remains of the nest mounds on a series of ledges down the face of the cliff. The colony had been limited mainly to the lower ledges, because of disturbance by pigs searching for megaherbs. There were numerous pig-tracks over the adjacent tussock slopes, and it was obvious that the lush vegetation—including plentiful *Anisotome, Stilbocarpa* and *Bulbinella*—could survive only down the cliff on ledges the pigs found inaccessible.

During these trips George and I were immediately above the site of one of the sailing-ship wrecks that made the Aucklands so notorious. This, however, was the least tragic. In February 1905, the French barque *Anjou*, registered at Nantes and commanded by Captain A. Le Tallec, reached the Aucklands in foggy weather. The 1642-tonne barque, with a crew of 22, was bound from Sydney to England with a cargo of wheat. At about 8.30 p.m. a line of cliffs was seen ahead and the vessel immediately struck. She was somewhere below the sheer cliffs extending from Bristow Point to Cape Lovitt—there was no question of trying to climb to the land above. An attempt to launch the boats was unsuccessful, one boat being smashed immediately. The captain insisted no further move be made until daylight. Heavy rain fell all day, but the whole crew in three lifeboats somehow managed to reach Victoria Passage and pass through despite rough seas. They spent their first night ashore in the bush. The signposts erected by the New Zealand government for castaways led them finally to the depot at Camp Cove. They remained there, building additional huts of scrub and tussock for shelter, until the arrival of the government vessel *Hinemoa* some three months later. The story of the survival of the whole of the *Anjou's* company after the wreck is the happiest from the grim shipwreck days. The remains of the Camp Cove depot still bears the carved inscription left by the *Anjou* castaways.

The enforced delay in our triangulation programme allowed us to make an unexpected visit to Adams Island. On 15 September the wind at last moderated a little but low cloud made work on the tops impossible. George suggested that he and I should take the opportunity to cross to Adams, where the last of the main trigs had to be erected on the high tableland at the southwest end.

We loaded the dinghy with plenty of petrol, extra rations, and our sleeping bags in case of an enforced stay. We also took a supply of *Dracophyllum* runners to make sure we would have no difficulty hauling the boat ashore. As we left we were glad to see that the cloud appeared to be partly lifting. It was by now almost calm, and we were greatly surprised to find conditions inside the western entrance comparatively mild—some surge was coming in but the only surface disturbance was a patch of strong upwelling just inside Victoria Passage. We landed on a boulder beach, pulling the boat up to the edge of the scrub and discarding our surplus gear. Nearby one of the old signposts for castaways was still standing: the inscription was obliterated but had

probably given directions to the boatshed further up the harbour shore. A little distance away we could see a small group of giant petrels apparently resting in the grass at the edge of a patch of low bush.

We headed for the tussock slopes behind the prominent sphinx-like headland that Allan and I had seen from the north side of the entrance a few days earlier. Before reaching the tussock we passed over an area of marshy ground with an abundant growth of megaherbs: prominent among these *Pleurophyllum criniferum* showed signs of its first spring growth. We were, in fact, at the far western end of the often-described 'Fairchild's Garden'; an area which is noted in mid-summer for its spectacularly-flowering megaherbs. In the tussock area we passed a couple of wandering albatross nests with chicks just a little older than the one seen on our first visit to Adams.

From the top of the ridge we found ourselves suddenly looking down across a cliffbound cove to the main tableland's forbidding northern face. At the western end of the tableland was a great stepped headland with the Adams Rocks just offshore. It was clear that to reach the tableland we would have to detour round the tussock slopes to the east. By now thick cloud had come down over the summit, although the cove below was still in full sun. We took a route leading up a long valley running north-and-south and then up a steep tussocky slope. There were scattered albatross nests throughout the whole tussock area, although at a much lower density than in great colonies we noted a few weeks earlier from Mt Dick. Entering the cloud, we crossed a slushy fell-field and after a short search believed we had found the highest point. We sat there having lunch, and in a sudden break in the cloud we found we were looking down on the spectacular bight between Astrolabe Point and Logan Point. Steep tussock slopes led to the edge of the towering south coast cliffs; on this side of Astrolabe Point the Lantern Rocks were conspicuous just offshore. The cloud now thickened, so after collecting a pile of stones for the base of the trig we made quick time back to lower levels.

George still had to check on the coastline to the west, giving me the chance to visit a breeding colony of giant petrels, which I noted on the eastern side of the valley as we climbed. There were just a dozen nests, cupped mounds very like those of the albatrosses. On each an adult was sitting on its single egg—now approximately half-incubated—and to my surprise they showed little reaction as I approached. If disturbed, this species is liable to repel intruders with an accurately directed jet of evil-smelling oil. The sitting birds today just hissed faintly, only once or twice briefly showing a tendency to spit. I was interested, however, in the behaviour of their mates, which swooped down quite threateningly several times, their wing feathers vibrating loudly as they reached the bottom of the dive. Compared with great albatross chicks, young birds in this species spend much less time in the nest, and would be ready to leave the colony in February, less than four months after hatching.

By now it had begun to rain with an increasing northerly breeze, making it urgent for us to get back to the boat. We delayed a little, however, on reaching the herb 'garden' when two Auckland Island snipe appeared just ahead. I had seen something of this small mottled-brown bird on Ewing Island, and had been looking forward to its appearance on Adams. We had a brief view but had to continue heading for the beach. There

was no time to investigate the group of giant petrels seen near the landing on our arrival: these now seemed very likely to have been another small breeding colony.

We had a strong head wind for the trip home. The rain increased but we crossed behind the entrance without any great difficulty, arriving back at the camp well soaked only shortly after dark.

Allan successfully tested his screen on the following day, 16 September. The weather on the next day was calm at daybreak, although judging from the previous week it seemed likely that squalls would develop later. However, there seemed no reason why we should not attempt the major triangulation visit to the Tower of Babel. Allan and I left laden with theodolite, tripod and screen. On the Fleming Plateau—in contrast with the extreme rigours of my day there with George—we found conditions quite calm and clear. We crossed the saddle to the Tower, where Allan began his observations. The weather now performed its customary complete switch. The observation programme on the Tower required a full four hours: during the whole of this time we were subjected to extreme cold and high wind with frequent showers of snow. My job was to note down each observation as Allan called it out. I began to look forward to the next snow shower because I could then stamp about, restoring some circulation to my numbed fingers and feet. In the end, thanks to the screen, the observations were completed. Allan then had one more task—a field sketch of the Musgrave Harbour area. We collected the poles that George and I had abandoned, then made quick time to the top of the eastern track. By now we were anxious to get back, since from the Tower we had seen the *Ranui* on her way down Carnley Harbour. After landing us at Western Harbour, she had left to avoid anchoring there, but when Les picked us up in the dinghy he said she would be back at 10 o'clock the following morning.

Adams Island and Final Stages

Allan planned to follow the Western Harbour camp with another short camp on Adams Island to finish the triangulation programme in the western area. Before lunch on 18 September we dismantled the camp ready for the move to Adams. Much depended on the weather. In view of the delays during our camp at Western Harbour, prospects for a spell of good weather were perhaps not particularly bright, but the idea of completing this section of the work was tempting. Sailing down the harbour in the sun we enjoyed a short interlude of relative luxury. Noel Worth appeared from the *Ranui's* galley carrying a plate of fresh scones, and later lunch in the forecastle was accompanied by a mug of beer.

The site of our second camp was at the mouth of one of the streams flowing into the harbour on the north coast of Adams. The stream valley led up to the base of Southwest Adams Trig; directly across the harbour was Trinity Cove, providing the *Ranui* with an excellent anchorage. The forest here was more open than at Western Harbour, but although this made pitching camp comparatively easy, we later found the open site made us particularly vulnerable to blowfly attack. The weather on the day occupied in shifting camp was the clearest experienced for a fortnight; to our regret we had possibly lost a full day of good surveying weather.

Almost inevitably the following day, 19 September, produced intermittent rain and a fresh westerly. Allan had to give up any idea of observation, but suggested this might be my chance to investigate the birdlife at Lake Turbott. George had earlier offered to accompany me; he was prepared, too, to carry his theodolite, as there might be opportunities for some topographical work. Our plan was to make it a two-day trip; our rations were light—mainly service biscuits and chocolate—but in addition to our sleeping bags we took a tent fly in case of heavy rain.

Allan and Les had gone ahead to begin work on an access track. We met them all too soon, so had to push unaided through the scrub zone to reach the tussock. The main ridge was shrouded by heavy cloud, but, aided by a brief cloud clearance, we found Mt Dick without much difficulty, and from there we were on the route of our earlier visit. The main problem was how to approach the steep descent to the lake: we (fortunately, as it later proved) avoided the western slope. We continued eastwards, finding the head of the lake valley above a cascade that tumbled over high cliffs; a little further on tussocky slopes seemed to provide a reasonable access route. As we descended we were still in cloud and the wind was freezing. Once the cloud swirled away momentarily and we thought we looked down on the pale surface of the sea; this, however, proved to be just a layer of mist far below.

At last we were out of the cloud and looking down on the dark green forest surrounding the lake. Directly below us the main stream continued in a series of cascades down the valley head. We crossed the stream, then dropped—almost literally since much of the slope consisted of cliffs 10–15 feet [3–4.5 metres] high—through scrub and finally rata forest. It was now late afternoon; George offered to set up camp at the head of the lake, giving me a couple of hours to check on a small flock of Auckland

Island teal I had seen feeding offshore. The flat at the top of the lake is scrub-covered, with multiple mouths of the main stream opening out on to a shingle delta. Two grey ducks swam down one stream. To get closer to the group of teal, I crossed to the eastern shore and continued through the bush until their faint piping revealed their position. All were in fresh breeding plumage, one male having a greenish tinge about the head. It was now getting dark and had begun to rain, so I returned to camp. Back at camp George had evidently lit a fire, and I headed towards the smoke curling up through the trees. After dark we heard much noise from breeding petrels, presumably white-headed petrels. Before we turned in we made a short search for them, but without result.

The next day brought clear skies, with no suggestion of cloud on the hilltops far above. The lake itself was clear and perfectly calm. Our objective was to move slowly down the lake shore, checking with binoculars for any waterfowl; and especially for any sign of the merganser which might, just possibly, have survived in this remote corner of the Auckland group. Birds round the camp included the usual bellbirds and a flock of red-crowned parakeets. We decided to go down the western shore—there was a lot of heat in the sun, accentuated since we were carrying heavy loads. Just beyond the delta we crossed a 'garden' of luxuriant *Pleurophyllum* and other megaherbs. For about two-thirds of the distance down the shore the bush fringe was quite narrow; progress here was easy with good views over the lake in all directions. In spite of all our efforts we saw few waterfowl. We observed single teal keeping close in to the eastern shore, and also on the east side of the lake we watched an Auckland Island shag performing a strange neck-swaying display, apparently directed at a pair of grey ducks swimming nearby.

We finally emerged on to a flat clothed in low tussock with some *Pleurophyllum*. Although we were still quite a distance from the coast, this area had been much beaten down by sea lions. We could hear them calling somewhere towards the lake outlet, still out of sight round the rocky point ahead. The lake now narrowed, and on rounding the point we found ourselves looking directly down to the shingle bar above the lake's outlet at its seaward end. The scene we now saw made up for the scarcity of waterfowl on the lake's upper reaches. A group of sea lions was resting on the gently rising slopes and on the patch of shingle; these tended to make bad-tempered lunges when we approached. Strangely enough several females were clambering up the steep tussock slopes several hundred feet above, their pale coats gleaming. Red-billed gulls and teal were floating quietly near the edge of the shallow lake. Above the outlet a group of seven or eight skuas were bathing vigorously in the fresh water.

The rock shelf separating the lake from the coast is no more than 40 feet [12 metres] high: behind this the lake is most effectively impounded. The strongly flowing stream at the outlet tumbles down over a bed of boulders to the sea. Today a strong surge in the inlet roared and crashed on the base of the cliff, then retreated in a swirl of bull kelp. Below the stream outfall big boulders lined the coast. Here we found much to our surprise a group of teal feeding actively in the surf, possibly in search of freshwater fish carried over the outfall. The teal were being tossed about in the waves, and even dived when caught by a particularly big surge.

We had a brief lunch break—shared by the skuas which came up screaming for scraps—but we had no time to spare before getting ready for the climb out of the valley. The slopes of tussock to the west seemed to offer a reasonably easy route, although a little steep. We began the climb heading northwest in the general direction of Mt Dick. The tussock proved to be growing on shallow soil, making any foothold extremely wet and slippery. We found that between the tussock-clad ledges we had to avoid low cliffs formed by exposed flows of black lava. As we searched for a way up I kept well to the left. Suddenly I sensed that the tussock had ceased in mid-air and shouted to George to watch out for the cliff-edge.

When George arrived we found ourselves peering down into space at the end of the curve of sheer cliff leading westwards to Astrolabe Point. This was at the eastern end of the bight; from here the cliffs increase steadily in height to at least 1400 feet [425 metres]. Close inshore in the middle distance was Amherst Rock; looking back eastwards over the lake outlet we could see another line of cliffs swinging round to South Cape. We considered ourselves lucky that in dense cloud on the previous day we had decided to drop down to the lake on the eastern side, rather than on this dangerous western slope.

The climb now became thoroughly exhausting, for we were on slopes of over 30 degrees in waist-high tussock. We were still in strong sun and were carrying heavy loads. Finally the angle of the slope began to decrease; we could see ahead the sheer eastern face of Mt Dick. George found a prominent point from which to take a series of bearings along the southern coast.

Above us on the Mt Dick summit we saw Allan and Les moving about. When we joined them later, we found they had made good use of the clear day, all the triangulation work from this trig having been satisfactorily completed. There had been some atmospheric haze, but not enough to interfere seriously with their observations. As we were leaving Mt Dick cloud came down on the tops. We had, however, left several cairns of stones above the head of the track and using these found our way back to camp.

It was fortunate we had something to show from that one good day's work on Mt Dick. The next four days proved hopeless for surveying, a succession of rain, mist and low cloud. And while we were away from camp the blowflies, perhaps enlivened by the sunny weather, had launched the worst attack we had yet experienced. Allan's tent was in a sorry state. He had to spend the whole of the evening before turning in, and much of the following day, removing blowfly eggs from his clothing and gear.

On the next headland to the east of our camp was a breeding colony of white-headed petrels. All through the night, we heard sounds from the colony. There were moaning calls as the birds circled overhead, and from the headland came a chorus of loud shrieks. One evening a bird landed at our camp in the glow of the powerful Coleman lamp. I visited the colony and examined several burrows, but none contained sitting birds or eggs; laying in this species occurs in November–December, so the sounds we heard were probably associated with courtship.

I had time, too, to make useful collections of spiders and other invertebrates. The bush birds on Adams—bellbird, fantail and the two

species of parakeet—were all present in good numbers. Their tameness was quite remarkable. We were delighted to find that a pair of tomtits, which had a strong territorial interest in the area around the camp, fed regularly on the ground at our feet. We had little doubt that this behaviour, so different from that observed anywhere on the main island, was due to the absence of cats.

By 25 September we were getting low in stores. The weather, too, showed little sign of improvement so Allan decided to call up the *Ranui*. A system of smoke signals had been arranged to allow us to make contact with the ship at her anchorage on the other side of the harbour in Trinity Cove. She made no move and it seemed possible that in the murky weather our signal had not been seen, so finally, George and Les crossed by outboard. They returned immediately to say that the *Ranui* had engine trouble—a defective part in the port-side starting-motor seemed likely to become a serious problem. Temporary repairs would get us back to No. 2, but Noel Worth believed the only safe course would be to sail to Dunedin as soon as possible for permanent repairs.

For Allan this meant a complete change of plans. Instead of quickly visiting the station for stores then returning to the camp and remaining until our work on Adams was finished, we dismantled the camp and loaded all our gear, ready to return next day. After a day of reorganizing and packing, we boarded the *Ranui en route* for Port Ross and No. 1. We expected to remain here during the *Ranui's* absence in New Zealand, possibly as long as three weeks.

In view of our long delays at the Western Harbour and Adams Island camps due to bad weather the only sensible procedure seemed to be to spend the waiting time at the station. There at least we were reasonably comfortable and could occupy the spare time productively, instead of expending a lot of time and effort on unproductive field camps. The Carnley area survey was finally completed by making day-trips, using the outboard to reach distant points like southwest Adams, or on foot to the neighbouring peaks.

It may be added that the survey ultimately required one further field camp. This was held at Tandy Inlet where access was available to the middle section of the main island. The camp lasted for three weeks in January–February 1945, by which time I had left for home.

At No. 1 news awaited us of a project that might have completely altered the course of the survey. New Zealand planners decided to make an aerial survey of the Aucklands; immediate instructions were that the *Ranui* should leave for Bluff to pick up a load of aviation fuel. The drums of fuel, for emergency use, were to be stored at some convenient spot in Carnley Harbour; and a mooring buoy would be sent down for installation in Camp Cove. The survey would be carried out by a Catalina flying-boat based at Bluff; the *Ranui* was to remain on standby in Carnley Harbour throughout the aerial survey period.

There was no question of the current survey programme being discontinued: the aerial survey's contribution would be in coastline delineation and topographical detail. Allan had strong doubts from the first about the feasibility of the whole project. The very few days free from cloud—the main requirement for aerial photography—was his primary consideration; further, although the met. reports from No. 1

were to be stepped up, judging when to send the aircraft down to coincide with suitable conditions would undoubtedly be difficult.

I resumed met. reporting at No. 1, so that Bob Pollard would have a break before my return to Carnley. During the aerial survey Bob's met. routine at Ranui Cove would be much more demanding. An extra full report would be required at 3 a.m., and hourly updates from dawn to dark.

The fate of the planned aerial survey may be outlined briefly. Arrangements continued in readiness until mid-December. The *Ranui* returned with the fuel and mooring buoy on 21 October, and took us back to Carnley. We proceeded with the survey as before, but had much bad weather with only a few good surveying days. We heard the Catalina once but this was only after a deceptively clear morning deteriorated rapidly, with much heavy low cloud. On 29 November, however, on a remarkably clear day we were able to carry out final observations in the Carnley area. On this day, too, we saw the Catalina for the first time. She appeared in the late afternoon off the west coast, circled Adams Island, and returned up the east coast. By now, however, a cloud layer had formed at about 1000 feet [305 metres]. We were told later that the news of the clear morning had not reached the plane's Bluff base in time; so the Catalina arrived at the Aucklands just as the cloud came down. In all, the aircraft made three trips during the two-month period; on none of these were conditions suitable for anything except a few oblique shots of no use for survey purposes. As Allan expected, the difficulties of aerial photography in such a climate proved insuperable. About a fortnight after the flight of 29 November the project was abandoned.

The *Ranui* was ready to sail for Bluff on Friday 6 October. Families at home would have been notified of the opportunity to send mail; at the station there was an all-out bout of letter writing. The weather on the morning of the 6th seemed promising with just a light west-southwest breeze. George and Les joined the *Ranui* as additional deck hands, a chance for a break and probably—in view of the time likely to be required for repairs—for a brief home visit. We saw the ship off at 11 a.m. with a good-luck rum on board. By noon the barometer had dropped rapidly and the wind veered northwest; in the evening rain began and it was obvious we were in for a storm. The *Ranui's* siren just after dark thus came as no surprise. They had turned back in extremely heavy seas 20 miles [32 km] out and after checking with the station anchored for shelter in Erebus Cove. The storm passed as rapidly as it came—the ship departed in much improved conditions on Sunday the 8th, although we could see that the seas out past Enderby were still high.

It was a welcome change during the following fortnight to take up station routine again. We had much rain and one substantial snowfall. Over the whole of this period Allan was occupied with computations and mapping. In occasional breaks from met. I was able to visit Ocean Island where the sheep still needed regular attention, and check on the Crozier Point shag colony. On one comparatively calm morning Bob Pollard, Sparks Hoskin and I travelled by outboard to Kekeno Point to carry out the routine check on the emergency hut. We were delighted to find that a rare visitor had come ashore there—a fine sea leopard. It had evidently been resting for some time in the sun because its coat, silvery-grey with prominent black spots on chin and underparts, was quite dry. When disturbed it slid down the beach and disappeared out into the bay.

Leopard seal, a rare visitor at Kekeno Point. Photo: E.G. Turbott.

When the *Ranui* returned, we wasted no time re-establishing ourselves at Carnley for the final stages of the survey. The weather for the trip down could not have been more deceptive—a calm day with patches of sunlight on the main island's eastern slopes and deep blue shadows towards the head of the inlets. We had a few partly fine days on arrival. By 26 October the aviation spirit—2000 gallons [9100 litres] in 44-gallon [200 litre] drums—had been stored in a small cove to the south of the station landing and the buoy was in position at Camp Cove.

We needed only five or six reasonably clear days to complete the triangulation observations at the major trigs. However, as November approached the weather became one long sequence of low cloud or spells of high wind accompanied by showers of rain or snow. The programme was finally completed, but only after several false starts. George and I had to make two unsuccessful trips before we could do a day's work on The Dome. Allan's successful day on Mt Raynal on 29 November came only after two attempts.

The period was productive enough in my case, for I had time for a good deal of collecting and spent several days photographing the skuas nesting on nearby Musgrave Peninsula. Some further topographical work was still needed, requiring visits by outboard to various points; George also repeated the magnetic observations made in 1907 during the Philosophical Institute of Canterbury expedition, and accompanying him I was able to see areas I had not yet visited, such as the North Arm. There were, however, periods of weather when even shorter harbour trips were impossible, resulting in long spells in camp. The *Ranui* was now under instructions to remain in Carnley Harbour in case help was required during the aerial survey. She was anchored just below the station in Tagua Bay, making frequent visits possible between ship and shore. During the worst survey weather we spent many hours competing for supremacy at card games, Coon Can being the favourite.

The first day any way suitable for work on the tops came on 29 October after two days of high wind and snow. In the morning there were still snow-showers about, but with clear intervals. Allan and Les decided on a short trip overland to the trig on Raynal Point, but since George thought

Skua on nest, Musgrave Peninsula. Photo: E.G. Turbott.

observation would be possible on the nearest of the main peaks, Wilkes Peak, he and I set off up the eastern track. This route led past the wandering albatross nest discovered in August; we were delighted to see one of the parents resting in the tussock a few yards from the nest, having presumably just fed the chick. The well-grown chick had lost much of its down; the originally substantial nest mound, too, was much flattened as the result of the chick's long occupation.

Near the top two banded dotterels flew past chasing each other in what seemed to be a territorial display; we had seen this species already on the bare tops of Adams Island but few had previously been recorded on the main island. At the trig George was pleased to find conditions reasonably good for observing although there was a cold southwesterly, with intermittent snow-showers, throughout the afternoon. I had to restore my circulation with much stamping about between observations. George's programme was completed just in time to return before dark.

A more promising day finally came on Sunday, 5 November. We waited until late morning to make certain that the cloud base remained well above the tops: it seemed stable, however, at about 3000 feet [914 metres]. There was a light southwest breeze, but visibility seemed good. We decided to undertake a two-party expedition, Allan and Les to go to Mt Dromedary while George and I were to do Southwest Adams Trig. Since this meant a long day dependent entirely on the outboard, we called on the *Ranui* to ask Noel Worth to come down the harbour in the late afternoon to check on our progress. If necessary, he would be able to pick us up and take the dinghy in tow.

Allan and Les landed in Musgrave Harbour at the foot of Dromedary as they had on their previous visit, while George and I continued on across a surprisingly calm Western Arm to the north coast of Adams Island. A slip a little to the west of our recent campsite seemed likely to offer an easy route to the Southwest Trig, so we landed here instead of the bay inside the western entrance. Hauling the dinghy above the high-tide mark, we made quick time to the trig. By 5.30 p.m. George finished his

observations. We had a little time to spare since in early November it was not dark until about 9 p.m. As we were not sure that our dinghy would be visible to the *Ranui* from offshore we decided to split up; after carrying out further topographical work George would return to the coast to pick up the dinghy, while I would meet the *Ranui* at the western end.

This gave me the opportunity on the way down for a hasty check on the giant petrel nesting colony in the valley below the trig. In the nests which had contained eggs on 15 September, I now found young chicks; these, perhaps three weeks old, were clothed in grey down, with patches of white down from their first coat still showing on head and neck. Although still quite small, they had already developed amazing accuracy in ejecting a stream of smelly oil when approached. I had to keep moving on, but had time to note scattered giant petrel nests towards the western side of the valley that I had not seen during our September visit. I continued downwards, passing now well-grown wandering albatross chicks; several times, too, a snipe rose in front of me from amongst the tussocks. Now that spring was well advanced there was much flower in the 'Fairchild's Garden' area. Drifts of golden *Bulbinella* occupied wide patches and the white and purple daisy *Damnamenia* was especially conspicuous.

As we expected, the *Ranui* was unable to spot the dinghy, so the crew were relieved when I finally appeared. George had seen the *Ranui's* arrival, but since it was now so late he set off immediately for Musgrave Harbour to pick up Allan and Les. We turned up in the *Ranui* soon after George's arrival. Their day on Mt Dromedary, like ours on Adams, had been highly successful. They had finished a good deal earlier, and lit a fire on the beach while they waited for us to take them off.

A gale followed by windy or overcast weather prevented any further work on the tops until 14 November. On the previous afternoon in quite mild although overcast weather I had been watching the skuas on Musgrave Peninsula, and camped all night by the nest. The birds' routine was of much interest; but when the next morning proved clear enough for observing I had to be ready for an active day despite my sleepless night. The day remained clear, and the triangulation observations were completed in the Mt D'Urville area. Allan and Les worked at the main D'Urville trig while George and I went on to the lower trig at Pyramid Peak. From the latter point we had excellent views of the whole eastern side of the main island, even Enderby and the other Port Ross islands being clear in the far northeast.

Skua defending nest, Musgrave Peninsula. Photo: E.G. Turbott

George and I now intended to make every effort to reach The Dome, while Allan and Les were aiming at Cavern Peak. Two days of low cloud followed. On the second, since a clearance later in the day seemed just possible, George and I hopefully took the dinghy across to the north coast of

Adams Island, but the cloud remained firmly in place on the tops. The next day the hills were clear; Allan and Les set out and managed a successful day on Cavern Peak, but George and I arrived at the Dome trig just as a sheet of low cloud swept over Adams Island from the south. Our efforts were rewarded at last on 18 November. Cloud well clear of the tops and good visibility all day enabled George to complete his lengthy observation programme.

These two further visits to Adams (17–18 November) were a most welcome opportunity for me, since we reached The Dome by the route from the bay to the west of Grafton Point, which led past the nesting wandering albatrosses on the northern tussock slopes. The chicks, now almost three months older, were, like the Wilkes track chick, rapidly losing their down; one had almost completely assumed its juvenile plumage, just a wispy collar of straggly grey down remaining round its neck. The plumage at this stage is a warm chocolate brown colour, with a strongly contrasting pure white face. This chick was especially active: as we approached we could see it rotating its wings vigorously above its head, obviously enjoying the sensation of this preliminary to flight. It had evidently been moving about and trying out its wings for some time for the area round the nest was thoroughly trampled. This well-advanced chick would probably be ready to leave within a few weeks. Chicks in neighbouring nests were of varying ages, some possibly a month younger and due to depart in mid-January.

Again Auckland Island banded dotterels were prominent as we crossed the fell-field towards The Dome; we saw a number of single birds and a group of six or seven towards the summit. We did not manage to find nests, but the nesting season was clearly now in progress. Not only were the dotterels in the fullest breeding plumage, but the 'distraction display' we saw several times was a clear indication of a nest somewhere nearby.

The morning of Sunday 19 November was fine but experience suggested that after the previous clear day we were probably in for another bad weather spell. Allan was anxious, however, to take every opportunity to reach Mt Raynal, the last major station in the trigonometrical programme in this area. He accordingly made an early start, accompanied by Les and Alec Lund from the *Ranui*. Low cloud met them soon after they reached the tops, and the weather later deteriorated further to squalls with snow and rain. Allan's first attack on Mt Raynal thus ended in an early return to camp. The met. reports that morning were, in fact, favourable enough for the 'all clear' signal to be given to the flying-boat base at Bluff. At about 11.15 a.m. George and I heard the Catalina's engines: the sound came from well out towards the western entrance but by now the low cloud sheet had rolled in.

George and I had also to make a final survey trip, to set up a trig and carry out observations at a point above the west coast near the head of Norman Inlet. This had been part of the programme for our camp at Western Harbour, but could not be completed. Like Allan's, this would be a full-day trip, but it involved travelling by boat to the head of the North Arm, with a comparatively short walk overland up the west coast.

We decided against setting out on the morning of the 19th, and the next five days brought unrelenting snow showers and low cloud. We were much relieved on the morning of 25 November to find the hills clear and the cloud apparently stable and well above the tops. There was a faint

northerly breeze, and the cloud was possibly banking up a little towards the northwest, but otherwise we seemed to be in for a good day. Allan accordingly left with Les and Alec, for Mt Raynal, while George and I launched the dinghy and set out up the North Arm. To our surprise a thick mist suddenly came down when we were approaching Figure of Eight Island.

Shortly afterwards steady light rain began, and continued for the rest of the day. Clearly neither party could think of survey work. George's second objective for the day was to locate the magnetic station set up at the head of the arm by the 1907 expedition and to take a new set of readings. We decided to complete the readings, and then spend the rest of the day exploring the North Arm.

Figure of Eight Island, centrally situated towards the head of the arm, is of special interest as the site of the only sea lion breeding colony outside the Port Ross area. No sea lions were to be seen when we landed; at Enderby by this stage the mature males would be ashore awaiting the arrival of the females. The season here had evidently not yet begun, but a little later when we visited the head of the arm we saw a number of males, apparently of all ages, performing chasing antics in the shallow water. It seemed likely that shortly the females would arrive and the harems would be established. A unique feature of the Figure of Eight Colony is its siting under trees. The forest consists mainly of mature rata, with *Dracophyllum* thickets in some places. The colony is a comparatively small one—this island, some 400 yards [121 metres] in length, can support at most only about 150 sea lions. We found the ground under the bush much flattened and bare of undergrowth, contrasting with the generally dense ground cover in forest on the surrounding slopes; some ratas had died towards the island's eastern coast, possibly killed by root trampling or over-manuring by the sea lions during the breeding season.

We continued to explore and had reached the narrow mid-point of the island when we suddenly found ourselves at the centre of a most determined attack by a pair of falcons. The birds left us in no doubt that we had stumbled upon their nesting territory. The attack was led by the male, a much smaller bird with a conspicuous white throat-patch. His mate, with streaky-brown breast plumage, waited anxiously nearby. The birds kept up a continuous scream, a high-pitched 'kek-kek-kek'. The male dived repeatedly at our heads, then as I stood in the open he aimed a 'power dive' directly at my head. He struck hard, also drawing blood with his sharp talons through my balaclava. A short search revealed the nest under a sheltering rata limb on top of a fern-clad hillock. There were three brown-blotched eggs, lying in a shallow cup with a lining of dry leaves and *Dracophyllum* needles. We returned later in the day and found the female—considerably larger than the male and more streaked below—incubating. She quickly left, both birds immediately resuming their attack.

Apart from the falcons, the island was notable for its abundant population of bellbirds. During our stay they produced a remarkably powerful chorus. This is a cat-free island and as on Adams we were struck by the birds' tameness and habit of feeding down to ground level.

At the head of the arm we found the water too shallow for the dinghy, and approached the magnetic station by walking for a short distance

round the rocky eastern shore. When George had completed his readings we visited the forest clearings made by the crew of the German steamer *Erlangen* on her escape voyage to a neutral port in Chile during the opening weeks of the war.

We knew the main outlines of the *Erlangen* story from official reports. Since then full details have become available with the publication of the diary kept during the voyage by the ship's master, Captain Alfred Grams. The story proved one of the most remarkable of the war. The *Erlangen*, a 6101-tonne cargo steamer, had been in port at Dunedin *en route* for Port Kembla just before war was declared on 3 September 1939. On 26 August she departed without warning, not to be heard of again until some months later when she arrived at the port of Ancud, in Chile. The *Erlangen* was crewed by German officers and Chinese seamen. Leaving Dunedin she headed for the Auckland Islands as a temporary refuge, with only about 187 tonnes of coal on board, enough for some five days' steaming; to reach Chile some 4830 nautical miles away she would need at least a further 440 tonnes.

The wooded shores of the Aucklands appeared to Captain Grams to offer at least a partial solution to his fuel problems. The *Erlangen* anchored on 31 August in the North Arm where the captain thought she would be well concealed. He even took the risk of beaching the ship for a period. For five weeks the crew worked unceasingly cutting and loading rata firewood. The crew made makeshift saws, but these had to be sharpened constantly. The tough rata also blunted their axes, and handling the intractable timber proved to be no easy task. By now about 260 tons of rata were on board; provisions were running low and it was suspected that a chase would be in progress. Mussels, which were collected in quantity, and 'wild geese' (presumably shags) contributed some additional provisions.

A search had, in fact, been mounted but as it happened when the New Zealand cruiser HMS *Leander* arrived to search the Aucklands she was unable to enter Carnley on account of extremely bad weather, and had to leave urgently for elsewhere; in the following year HMS *Achilles* searched Carnley for signs of enemy use but failed to discover the *Erlangen* clearings. Using her coal and rata wood, and for at least one-third of the distance under sail with tarpaulins rigged to masts and derricks, the *Erlangen* finally reached Ancud. Most of the ship's wooden fittings had been demolished to provide fuel for the final leg. Captain Grams decided to set out again in the hope of reaching Germany. However, after rounding Cape Horn and calling at the Argentine port of Mar del Plata, the vessel failed to escape the vigilance of British Navy patrols. To avoid capture she was set on fire and scuttled in the South Atlantic, Captain Grams and his crew spending the rest of the war in internment.

The *Erlangen* clearings were immediately located in 1941 when Carnley Harbour was reconnoitred prior to the establishment of the Cape Expedition. The clearings seemed to have been made during the *Erlangen's* escape, and this was confirmed when a German-made hammer and boat-hook were discovered. George and I found two quite large clearings, one on the point between the two streams flowing into the head of the arm, and the other towards the head on the eastern shore. On the latter, a narrow fringe of bush had been left uncut along the

shore, doubtless to give some concealment should a search vessel be examining the area; we thought it probable that the *Erlangen* would have anchored more or less out of sight to the north of Figure of Eight Island. On many of the cut rata stumps we could see clear evidence of the makeshift tools—irregular grooves and sawmarks told of desperate efforts to gather enough fuel for the *Erlangen* to make her escape.

For our return we had a stiff following breeze, blowing steadily down on us from the valley below Mt Raynal. George had not yet examined the site of Musgrave's hut, 'Epigwaitt', so we made a brief stop; the breeze then swung behind us as we followed Musgrave Peninsula's north coast. We even raised the hessian survey screen to aid our outboard with a little sail power. We found the Mt Raynal party playing Coon Can and not a little envious of our day off exploring the North Arm.

The breakthrough for both parties finally came on Wednesday 29 November: faultless observation conditions for most of the day brought complete success. After three days of low cloud the weather in the morning was clear and calm, but for a veil of cirrus creating a sun halo. Any other cloud was, unbelievably, totally absent. Allan and his party left early on the four-hour tramp to Mt Raynal. By mid-afternoon the observations were complete. For Allan a day of perfect surveying weather was by now almost unbelievable—he wrote in *Islands of Despair* that it was 'the best day I was ever to experience during my stay in the islands' (p.129).

Allan Eden making sightings for mapping at a trig station. Photo: A.W. Eden.

When George and I reached the head of the North Arm we hauled the dinghy ashore, well clear we hoped of the shallow head of the harbour in case we happened to return at low tide. Here the west coast is just over a mile away. We followed up, and were soon looking down on the clifftops from the slopes below Mt Raynal. Our progress through waist-high scrub broken by occasional patches of tussock was at first slow; then open fell-field led to our observation point close to the west coast, above the great amphitheatre of Norman Inlet. Here we were about midway between Bristow Point and Disappointment Island. In a cliffed embayment immediately below to the north lay the Beehive Rocks. Beyond this the main island's central ridge rose in impressive peaks; to the highest peak in the area Allan was later to give the name Mt Easton. Looking eastwards we had a view down the full length of Norman Inlet as far as the entrance where both north and south heads were visible. Far below at the inlet's head the white-painted castaway depot was just a speck in the green bush.

Today out at sea all was calm, with only a faint swell breaking at the foot of the formidable western cliffs. The observation point was just to the north of a great canyon, which we could only glimpse as it penetrated deeply into the cliffs in the direction of Norman Inlet. The cliffs are about 1200 feet [365 metres] high, the black lava walls of the canyon dropping sheer for about 800 feet [244 metres]. It seemed probable that at the

Smith Harbour and Norman Inlet from the summit of Mt Raynal (2113 feet or 644 metres), one of the highest summits on Auckland Island. Photo: A.W. Eden.

head of the canyon there would be an immense cave. We thought this might be the cave that had claimed the *General Grant*, but several other caves were identified later during our journey up the west coast that might have done so.

While George was observing we could see the other party at work on Mt Raynal. By late afternoon low cloud was forming, but the observations by both parties were finished before it began to reach the tops. Just after the two parties had left their observation stations—and the cloud had begun to close in—George and I heard the roar of aircraft engines. We saw the Catalina a moment later at about 1000 feet out towards Disappointment Island. She disappeared in the direction of Adams Island, returning, as we heard later, up the east coast at about 800 feet [244 metres] in full view of the Mt Raynal party.

Back at the head of the harbour, George and I were surprised to find that now at low tide we would have to haul the dinghy over some 50 yards [45 metres] of mud. We were by now practised in cutting *Dracophyllum* runners and were soon afloat. Cloud had settled low on the tops; we arrived back at the station about half-an-hour after the Mt Raynal party, who were anxious to check on our sighting of the Catalina. Everyone believed, somewhat optimistically, that she must have taken advantage of the good day and had at least worked at the north end. Later, however, we heard that nothing had been achieved. For us just seeing the aircraft was a memorable event, a reminder of the outside world after nearly 12 months of isolation. The day ended on another high note. George Bish had been ashore from the *Ranui* all day preparing dinner, topped off with his speciality—a cherry pie.

It was now necessary for Allan to assess the stage the survey had reached. Although the trigonometrical work in the Carnley area was finished he realized that, to complete the map, further work would be needed in the centre of Auckland Island around Tandy Inlet. In addition, a good deal of topographical detail was still required for all parts of the southern region.

Plans had to take account of the approaching end of the year, when the normal relief of personnel at both the Aucklands and Campbell could be expected, though no word had yet been received from Aerodrome Branch headquarters in Wellington concerning a relief schedule. Allan had for some time been considering moving before Christmas to a Tandy Inlet field camp, should the Auckland Island party not be relieved. He accordingly arranged for the *Ranui* to take him to No. 1 to despatch a message asking for news of any planned change in personnel.

Allan was unable to get any definite directions from headquarters, so he returned to No. 2 without any news. Since 30 November, I had been occupying my free time with a good deal of collecting around No. 2 Station. Now I asked Allan to arrange for me to visit the Southwest Cape mollymawk colony, and George offered to accompany me.

George and I had to wait until 4 December for suitable weather to journey to Southwest Cape. We landed at our old campsite and made quick time up the western survey track. The tussocky ridge above led to the cape past the waterfall, today just tumbling normally over the cliff in the moderate wind. We had been looking forward, now spring was now well advanced, to seeing flowering megaherbs (*Anisotome*, *Stilbocarpa* and *Bulbinella*) amongst the mollymawks on the cliff-ledges the pigs couldn't reach; now various handsome flowering plants stood out amongst the tussock, including much *Damnamenia* daisy—varying in colour from white to blue or purple—and the shrub *Hebe benthamii* with flowers of a brilliant sky-blue.

The colony, deserted on our previous visit on 11 September, was now in full occupation. Just past the waterfall many mollymawks circled below us close to the cliffs. From a vantage point a little further on, we looked back towards the waterfall, where the the ledge below was occupied by a long row of sitting birds. The breeding cycle of this mollymawk on the Aucklands will be described in some detail in a later section dealing with the natural history of the group. The birds return to the colony in October–November; their breeding season of about seven months is comparatively short, in contrast to that of their relatives the great albatrosses, in which the cycle takes 11 to 12 months.

Mollymawk colonies are typically noisy and lively. From below came a chorus of strange bleating calls, together with much croaking and guttural rattling. Incubation is shared and there was constant action as birds arrived and were greeted by their sitting mates.

On the ledge below, each bird was on a nest-mound of peaty earth. Densely growing megaherbs surrounded the nests, the pure white of the birds' plumage contrasting vividly with the deep green foliage. We were close enough to see that the plants were in flower: pale purple heads of *Anisotome*, yellowish-green globular flower heads amongst the huge pumpkin-like leaves of *Stilbocarpa* and, especially conspicuous, orange-yellow *Bulbinella*.

Constant disturbance by pigs prevents this colony from extending to the upper slopes. We in fact saw one pig running off into the tussock as we approached. A little nearer to the cape we managed to reach an occupied ledge at the bottom of a 8-foot [2.5-metre] drop—just enough to make it inaccessible to the pigs. Here we could investigate more closely; the sitting birds allowed us to approach without leaving their nest-mounds, and each when moved gently aside proved to have a single white egg.

Nearly all the eggs had a sprinkling of faint reddish spots at the broad end. The white-capped mollymawk has a bluish-grey bill with a pale yellow upper ridge and lemon-yellow tip; the feet are pale blue-grey. The scene with the handsome white plumaged, dark-winged birds on their mounds, surrounded by megaherbs, was unforgettable.

We were able to view most of the colony from various angles. The lush vegetation of the ledges—heavily fertilised by the nesting birds—contrasted strongly with the slopes above clothed in just a little tussock. There was one nest with a sitting bird on the slopes accessible to pigs—some mollymawks were evidently still prepared to attempt nesting in the area in spite of them. As far as we could tell nesting extended from the cape northwards almost as far as the waterfall; some lower ledges were out of sight, making any estimate of the colony's size most difficult. Most of the occupied ledges were narrow, but we could see one broader area of considerable extent close to the cape. It seemed likely that the whole colony comprised roughly 500 nests; a few days later on our passage up the west coast we were able to confirm that our view from above had included most of the colony, though a fairly extensive section low down on the cliffs adjacent to the waterfall must have been out of sight.

We apparently visited at an early stage in the nesting cycle, for there were quite a few empty nests in some of the lower sections. Here the owners were still performing their elaborate courtship ceremonial in preparation for mating and laying. The colony as a whole, however, was composed mainly of sitting birds, probably all on eggs at an early stage of incubation.

We soon had to leave. We had promised ourselves to inspect on the return trip the castaway boatshed on Adams Island's northern coast—we had seen it a short distance to the east of our earlier landing inside Victoria Passage. From a distance the shed seemed to be in good order, and was thus likely to be of much interest. We made a landing in an area of especially luxuriant megaherbs: in addition to abundant *Bulbinella*, *Stilbocarpa* and *Anisotome*—all in full flower as at Southwest Cape—we were delighted to see tall purple heads of *Pleurophyllum criniferum* in abundance. This species, dying down each winter, is noted for its vigorous growth and flowering throughout the summer; the flowers, perhaps less spectacular than those of *Pleurophyllum speciosum*, are button-like without showy ray florets, but *en masse* they make a striking display. We were at the eastern end of the celebrated megaherb meadow, 'Fairchild's Garden', and glad of the chance to see the area at its full flowering peak.

The boatshed proved to be in better condition than any of the castaway buildings we had yet seen. The boat itself, about 18 feet [5.5 metres] long, appeared to be sound and still usable. Oars were stacked in the rafters ready for use—it seemed likely that this was one of the more recent installations of the New Zealand Government's depot maintenance programme.[1]

[1] The boat—still in reasonably sound condition—was transferred in 1973 to the National Museum, Wellington, for restoration and exhibition. It has recently been lent to the New Zealand National Maritime Museum, in Auckland, where it is on show.

We had intended to rig up our tent fly as a sail to make use of the following breeze, but the wind now died down completely. This at least left us with calm conditions for the long outboard trip back to the station.

Allan finally received directions from Aerodrome Branch headquarters on 8 December. He and Les had gone out to the *Ranui* to listen to the ship's radio, when a message came through that the *Ranui* would shortly be making relief trips for both the Aucklands and Campbell. She was to proceed to Dunedin on 14 December to pick up new personnel and stores.

Now Allan could plan the remainder of his stay. He would move back immediately to No. 1 to await the *Ranui's* return with new manpower, and then proceed with the final stages of the survey. The survey would now be continued with at least some new personnel. Les and I were unavailable to return, but George wished to come back to see the survey through to completion.

Allan now realized that no time must be lost, and arranged for our party to leave No. 2 the following day, 9 December. We were to return up the west coast of the main island. Our route would allow the surveyors to check coastal features, and possibly let me land briefly on Disappointment Island.

Disappointment Island

After we received the message about the end-of-year programme we spent a hectic day on 8 December preparing for our return to Port Ross. Allan wished to keep the No. 2 Station in working order, since it was likely the surveyors would return to finish the few remaining tasks. We checked and packed our personal gear, and made sure the hut was shipshape for its future occupants.

On the morning of Saturday 9 December we boarded the *Ranui*. We had all eagerly awaited the chance to sail up the west coast, and possibly to land on Disappointment Island. By 8.40 a.m. we were ready to pull out of Tagua Bay.

Our route now took us past the site of two of the most celebrated Auckland Island wrecks, those of the *General Grant* and the *Dundonald*. The *General Grant* was wrecked in 1866, at the peak of the sailing-ship era, but by the time of the *Dundonald* wreck in 1907 sail was rapidly being replaced by steam. The story of the wrecks has often been told, so only the briefest outline will be given here.

If reports are to be believed, the *General Grant* was the pride of the Melbourne to London shipping run. A fine, new full-rigged ship, she was owned in Boston and carried both passengers and cargo. On 4 May 1866 she sailed from Melbourne bound for London round Cape Horn. In command was Captain W.H. Loughlin, with a crew of 22. She carried 61 passengers, a number of them miners returning from the Australian goldfields where gold fever was at its height. According to the ship's records her cargo included a large consignment of gold; and the miners were likely to have been carrying a good deal more. The route past the Aucklands was the usual one in those days.

On 13 May at about 10 p.m. and in an extremely light wind, the cliffs of the main island suddenly appeared ahead. In the absence of sufficient wind the *General Grant* was trapped in the dreaded half-moon of coast curving round from Disappointment Island in the north to Bristow Point in the south. Drifting in, she struck at about 1.00 a.m. The first impact broke off her jib boom. Drifting along the coast, she entered a huge cave. Great pieces of rock were dislodged, damaging her forecastle; then as the surge rose and fell the foremast was driven down through the hull. At dawn the ship's three boats were launched. The wind had now risen; in the rough seas only two boats managed to get away. Of the original 83 crew and passengers there were only 15 survivors—68 including the captain were drowned. The survivors included one woman, a stewardess, Mary Ann Jewell. The survivors rowed the boats to Disappointment Island, then after a day's rest they rowed on to Port Ross.

Rescue did not come until 18 months later. On 21 November 1867 the remaining survivors were discovered by the sealer *Amherst*. At Erebus Cove they obtained some shelter by repairing a hut remaining from the Enderby settlement. The party suffered constant hardship, living mainly on seal meat and occasionally killing a pig or goat; seal skins were used to replace worn-out clothing. Strangely enough, the supply of food left by Captain Norman of the *Victoria* in the previous year, following the *Grafton* wreck, was never found. After seven months at Erebus Cove four of the men, including the first officer Bart Brown, set out in the 22-foot

pinnace in an attempt to reach New Zealand, but were never heard of again. Later one man became ill and died. The party, reduced to 10, moved to Enderby Island shortly before they were rescued, because they thought they would have a better chance of signalling to a passing ship from there.

The subsequent history of attempts to locate the wreck and recover a fortune in gold is perhaps better known than that of the wreck itself. There seems little doubt that salvage proposals for the *General Grant's* gold will continue to be made. However, the search so far has been without any conclusive result.

The immediate outcome, as in the case of the *Grafton* wreck two years earlier, was a thorough search. This was organized by the Southland Provincial Government, which chartered the rescue vessel *Amherst* early the following year. Depots containing food and other supplies were established on Enderby Island, and in Norman Inlet and Carnley Harbour. Although there was much public interest in providing for future shipwrecks, the New Zealand Government delayed establishing a regular castaway depot service until 1877. Henry Armstrong, the leader of the *Amherst* expedition, prepared a report, in which he drew attention to a 'glaring error' in the chart of the Aucklands then in use—the group was shown no less than 35 miles to the south of its true position!

If the *General Grant* was a luxury vessel, the *Dundonald* was a work-horse. A four-masted barque of 2205 tons, she was employed in the cargo trade between Sydney and London. On 17 February 1907, crewed by Captain Thorburn and 27 men, she sailed from Sydney carrying 30,000 bags of wheat. It was expected she would be off the Aucklands at about midnight on 6 March. At 8 p.m. in a strong gale land appeared straight ahead. She struck immediately at the base of towering cliffs at what proved to be the northwest corner of Disappointment Island. By morning 12 men, including the captain, had been washed overboard or trapped below. The remaining 16 made their way to the top of the cliff and finally over the tussocky slopes to the summit. They had thought they were on the main island where they knew there were depots; they now realised they were on Disappointment Island, and would have to struggle to survive.

Over the coming weeks they moved to the slopes above the bay on the eastern coast, mainly to be near a stream. They built small huts from twisted branches of the shrub *Hebe elliptica*, roofed over with sods of peat and tussocks. Food was available—the nests of the abundant mollymawks contained young chicks. After the first few days, when the birds were eaten raw, a few precious matches were found; when the men got a fire going, they set up a roster to keep it burning continuously. The survivors were soon reduced to 15—the mate, Jabez Peters, died of injuries and exposure on the twelfth day after the wreck. After three months the mollymawk chicks were almost ready to leave and, but for an occasional sea lion, the food situation was likely to become desperate. The main island was in full view about five and a half miles away. Their only hope lay in a desperate effort to build a boat.

The castaways' persistence in designing and constructing a coracle is an especially interesting part of the *Dundonald* story. Every corner of the island was combed for suitable branches of the shrubby *Hebe*, and they were shaped to make the framework. To cover the coracle they had canvas salvaged at the time of the wreck. The first coracle—in all three

were built—was ready on 31 July and made the crossing safely, carrying three men. The men had agreed that the searchers would light a signal fire when they found the depot. Nine days passed before a fire was seen; and when the searchers returned later that day they reported they'd failed to locate the depot. During their absence, the remaining men had built two more coracles. One was rejected as unseaworthy, but in the third four men made another crossing on 6 October. This time they reached Laurie Harbour at the head of Port Ross, where a signpost pointed the way to the depot in Erebus Cove. Their coracle capsized on landing and was completely wrecked; but they now had not only supplies of provisions and clothing, but also a seaworthy boat enabling them to return to Disappointment Island for their companions.

The castaways did not have to wait long for their final rescue. The government steamer *Hinemoa* was now servicing the depots regularly, and she had left a message at Erebus Cove saying she would return in about a month. As it happened, the *Hinemoa* had an extra task on this round of the depots—she had to land the members of the Philosophical Institute of Canterbury scientific expedition on the Aucklands and Campbell. The *Hinemoa* arrived at Port Ross on 16 November, and was met by the *Dundonald* castaways; however, they had to wait until the expedition ended on 29 November before they could leave for New Zealand. The day before leaving, the *Hinemoa* visited Disappointment Island with the castaways and some members of the scientific party. The party inspected the castaways' huts and retrieved the frame of the first coracle, which had been abandoned at the landing. The *Hinemoa* brought the coracle back to New Zealand, and it was displayed at Canterbury Museum, where it has attracted much interest ever since.

After the *Dundonald* wreck, the New Zealand government realized a boatshed was needed on Disappointment Island. Before this, a wreck on the island had been considered unlikely. A boatshed, boat and some stores were put ashore at Castaways Bay, the last installation made during the depot-servicing period.

The first stage of our route back to Port Ross up the west coast would be past familiar country. Turning south round Gilroy Head at the Carnley entrance we began the long stretch along the Adams Island south coast. On the ridge above was The Dome and further to the west Mt Dick; steep tussock slopes led down to Fly Harbour, followed by the valley of Lake Turbott. We were in a calm sea disturbed only by a long southeasterly swell.

As we sailed west towards Astrolabe Point we passed cliffs that rose steadily to nearly 1400 feet; from streams in the shallow tussock valleys waterfalls plunged 1000 feet to the sea. We looked up to the brink of the precipice where George and I had halted so abruptly in our climb out of the Lake Turbott valley to Mt Dick.

It was now about six weeks since our latest visit to the great wandering albatross colonies on the southern slopes. Back then, some of the chicks were almost ready to leave the colony. Now we were very interested to find immature albatrosses among the large numbers we passed offshore. Departure from the colony seemed to be in progress, though probably, still at an early stage. Some young were floating with groups of adults resting on the water—we passed close to one such party including a dozen newly-fledged young.

Passing Astrolabe Point and the Lantern Rocks, the *Ranui* turned northwest. Above was the great looming tableland on which we had worked during the survey; the Adams Rocks at the foot of the western point were the most prominent landmarks in this area. Then came Monumental Island, standing fortress-like at the exact mid-point of the western entrance.

We wanted to examine the full extent of the Southwest Cape mollymawk colony. Mollymawks had begun to circle round the ship at the Adams Rocks and numbers increased towards the cape. We slowed down, and looked up at the rows of occupied ledges we had seen on our visit a few days earlier. On ledge after ledge sitting birds were conspicuous against the luxuriantly growing *Anisotome* and *Stilbocarpa*. Across the water came the constant noise, a mixture of strange bleating and croaking, typical of the colony.

As we had expected the colony occupied the whole cliff-face from the cape almost to the waterfall, which in the calm was tumbling normally over the cliff. We could see, too, that there was a considerable section low down near the waterfall that would have been out of sight from above. With the colony thus spread out before us, it was interesting to note the upper limit of the dark green megaherbs; the zone accessible to pigs where the megaherbs ceased and tussock began showed up even more distinctly from the sea.

We continued past the massive cliffs at Cape Lovitt and Bristow Point. Great flocks of petrels—sooty shearwaters and prions—surrounded us; the shearwaters were feeding in dense groups or 'rafts', plunging repeatedly into the fish shoals.

We had so far been keeping close in. As soon as we reached Bristow Point the scene completely changed. Disappointment Island now lay straight ahead at the northern end of the deep bight formed by the main island's western coast as it curves away to the northeast. We were looking along the line of spectacular cliffs that follow closely along the island's central ridge. Seen from the sea the coastline was just as striking as it was from above, with cliffs at some points rising to almost 1200 feet. It was into this formidable region of sea and rock that the *General Grant* had drifted to meet her end in 1866.

We were aiming to have as much time ashore as possible on Disappointment Island, so were unable to check the cliffs more closely, or identify the *General Grant* cave. Even at this distance several great clefts in the cliff-face were prominent; one that seemed to match what we had read of the *General Grant* story lay towards the centre of the bight, a little to the south of the Beehive Rocks.

It was now 1.30 p.m., and Disappointment Island was just ahead. As we watched a wisp of cloud appeared on the summit, followed by a complete weather change, with typically little warning. Preceded by a faint northwesterly breeze, dense rain-cloud—or even possibly fog—appeared over Bristow Point and came quickly down over the ship. Noel Worth slowed down to half-speed, but was apprehensive. Fog off this coast would mean he would have to make a broad circuit out to sea, then head immediately for Port Ross. But today our luck held. The cloud that closed down so suddenly proved to be simply mist with a little light rain, and passed off almost as quickly as it had come. Shortly afterwards, in

clear weather and at full speed, the *Ranui* headed past a needle-shaped rock towards the landing in Castaways Bay.

We could now see that the tussock slopes above were closely dotted with many thousands of nesting white-capped mollymawks. Disappointment Island was known to be the main breeding centre for this species; their abundance on the island had been recorded by the 1907 Expedition; in the words of Leonard Cockayne they appeared like 'innumerable great white flowers amongst the brown tussocks'.[1] As we approached we passed through big flocks of some hundreds of mollymawks on the water; we could now hear—in much greater volume than at Southwest Cape—the bleating and croaking of the immense colony above.

White-capped mollymawk colony, Disappointment Island. Photo: E.G. Turbott.

We decided on a shore party of three—Les, George and myself—while Allan stayed on the *Ranui*, to make a circuit of the island and check coastline details. Les was going to collect geological specimens and George undertook to collect plants and invertebrates. Our time ashore had to be limited to the hour or so of the *Ranui's* circuit, because we still had the four-hour voyage to Port Ross ahead of us, and, as the cloud remained fairly low, the skipper was anxious to get away. Rowing in, we landed on a rock ledge. In the calm conditions there was little surge, so we put out a stern anchor to make the dinghy fast and stepped ashore. An access path, apparently excavated in the rock, led to the corrugated-iron boatshed, which was sited about 10 yards above the sea. The boat was still there, resting keel-up inside the four-foot-high roofed shelter. The roof had rusted away completely, and the stern of the boat could be seen just inside the doorway. This too was in an advanced state of decay.

When I crawled in to examine the boat's intact bow end, I was startled to see in the half-light three white-chinned petrels sitting on their nest mounds. This species digs a substantial burrow up to a couple of yards

[1] Leonard Cockayne, 'The Ecological Botany of the Subantactic Islands of New Zealand', in *The Subantarctic Islands of New Zealand* (Wellington, Philosophical Institute of Canterbury, 1909), p. 234.

long, ending in a spacious nest chamber; the similar shelter provided by the derelict boat had evidently attracted the attention of these three pairs. Each had built a low nest mound of tussock—on wetter sites construction of such mounds, to ensure the eggs and chicks remain dry, is characteristic of this species. As soon as I approached the birds gave their loud clacking cry; each proved to be sitting on a single white egg. Right up at the bow stood a single rockhopper penguin, also taking advantage of the shelter but not, however, using the boat as a nest site.

From the boatshed George and Les headed uphill, aiming for the tussock-clad ridge above. I decided to spend my time photographing and observing the nearest group of mollymawks, which sat on their nest mounds amongst tussock and dense megaherbs on the north side of the valley. I clambered round a steep slope where an aggressive male fur seal on a rock platform below snarled on my approach; a couple of young male sea lions further along also reared up and roared. At the start of the mollymawk colony the fringe of dense *Poa litorosa* tussock was in flower. A flock of about a dozen redpolls rose from the flowerbeds with a noisy metallic twittering.

The area occupied by the mollymawks proved to be a mixed colony. Even before I reached the first of the nest mounds, I noticed some large burrow mouths in the wet ground. From several shallow burrows came the clacking of white-chinned petrels. There was clearly a considerable colony of this species in the area. Then when I entered the waist-high megaherbs round the nesting mollymawks, I found that the luxuriant vegetation also hid many nesting rockhopper penguins.

I spent some time watching the mollymawks' behaviour because observation was easier here than at Southwest Cape, where the birds were packed together closely on the cliff ledges. The two colonies were

Rockhopper penguins, Disappointment Island. Photo: E.G. Turbott.

at much the same stage in the breeding cycle. On most nests birds were sitting on eggs, but at several empty nests pairs were still performing their courtship dances. White-capped mollymawks begin laying in early November and continue until at least mid-December. The eggs' incubation period is about 70 days and fledging takes a further four and a half months, so the colony is occupied until June or July.

The sitting birds took little notice as I approached. When I moved an incubating bird gently aside to inspect the egg, the bird remained on the nest without protest. Sometimes, if forced to stand birds held their eggs close to the skin under their breast feathers. Incubation is shared by both sexes, so there was constant arrival and departure. The main volume of sound came from the guttural croaking of the reunited pairs, a ceremonial accompanied by much bill-touching and sometimes some bowing.

The ceremonies of the courting pairs were much more elaborate. Displays began with a little bowing soon intensified with much mutual bowing and bill-touching. During the later stages the birds spread their tails widely. The courtship call was a quite startling bray (or 'bleat'), delivered with the head bowed forward and bill wide open; this often ended with a deep-throated croak.

I was in an area of lush megaherbs mixed with only a little tussock. The handsome mollymawks on their nest-mounds were almost hidden amongst the ground cover. The two main megaherb species, *Anisotome latifolia* and *Stilbocarpa polaris*, were both in full flower. Both species have big, globular flower heads; in *Anisotome* the individual flowers are highly scented and coloured reddish-mauve, in *Stilbocarpa* flowers are greenish-yellow with brown centres. There was also much flowering *Bulbinella* with vivid orange-yellow spikes. Another megaherb, *Pleurophyllum speciosum*, with its huge corrugated leaves, had not yet begun to flower. Pushing through the waist-high, sometimes shoulder-high megaherbs was in some places quite difficult; the *Stilbocarpa's* twisted rhizomes were a further obstacle to progress.

The large-leafed subantarctic biddy-bid *Acaena minor antarctica* also formed large open patches of ground cover. The patches could have been where nests had been abandoned; biddy-bid also grew abundantly round the base of some occupied nest-mounds. Our trouser-legs became so heavily covered with its burrs that a full-scale cleanup was needed on our return to the ship.

It was only when George returned from the upper slopes and described the vegetation there that I was able to form an overall picture of the Disappointment Island mollymawk colony. He had looked down on extensive tussock-clad slopes dotted everywhere with nesting mollymawks; here low-growing *Anisotome* and *Bulbinella* sprouted amongst the tussock. It was probable that dense megaherb 'meadows' would be found only on heavily fertilized and sheltered ground like these slopes above Castaways Bay. George added that on the higher ground numerous biddy-bid patches could be seen among the nesting birds.

When we returned to the ship, Allan provided further information on the size and distribution of the colony. He had found mollymawks evenly scattered over every slope, even reaching the summit—1043 feet or 318 metres—with especially dense populations on the western and southern

slopes. We made a combined estimate of the full size of the colony and and agreed there were no less than 50,000 pairs. (Recent estimates based on research visits and aerial photographs suggest a total of 70,000–80,000 pairs).

The colony has every claim to be regarded as unique. Not only is it probably the largest single known colony for any species of mollymawk, but the site differs from that preferred by most species. Generally, mollymawks prefer cliff-tops and steeper seaward slopes, presumably to make take-off and landing easy. On Disappointment Island the nests are distributed over the whole island on the inland slopes. It might be noted, however, that the island is relatively steep everywhere and this, combined with constant strong winds, probably means it is perfectly fitted for the mollymawks' aerodynamics.

The rockhopper penguins nesting among the dense megaherbs above Castaways Bay were a surprising revelation. Relatively small numbers of this species were known to inhabit the Aucklands and only scattered nesting colonies had been found, mainly at the base of the western cliffs. My first experience of the breeding penguins was something of a shock. As I stumbled through dense *Stilbocarpa* I stood on a nest, breaking one of the two eggs. The reaction of the sitting bird was less violent than might have been expected—it just croaked angrily and moved back immediately on to the nest.

I found several nests, all deep among the megaherbs and quite invisible until the birds were disturbed; two nests contained a two-egg clutch, but the others had just a single egg. Shrill calls indicated that there were more nests scattered over the slope; George also reported hearing rockhoppers among the megaherbs further up. The probable size of the colony was hard to estimate, but it seemed likely that it extended throughout the megaherb zone. E.R. Waite, in his account of the birds observed during the 1907 expedition, says this species was 'the only penguin I saw on Disappointment Island'; evidently, however, he found no sign that the birds were breeding.[2] (Recently, the colony has been checked by several expeditions and estimated at about 100 pairs; no evidence that the species nests elsewhere on the island has been found.)

The third species breeding, the white-chinned petrel, was present in considerable numbers. In addition to the occupied burrows mentioned earlier, there were always two or three circling above the colony during my visit. This petrel, large enough to be immune to skua attack, is noted for its habit of moving freely in and out of the colonies during the day.

By 3 p.m. the *Ranui* had reappeared and was circling below in the bay. We had been warned to return to the ship promptly, and I met George and Les shortly afterwards making their way back to the landing. After climbing to the ridge above, Les returned to the coast where he collected a good range of rock specimens; George had an extensive collection of plants and invertebrates.

On the basis of our combined observations we added a few records to our bird list. George had heard the unmistakable piping of Auckland Island teal as he moved up through the megaherbs, but had not managed to see the birds. We saw no sign of the Auckland Island snipe, recorded

---

[2] 'Vertebrata of the Subantarctic Islands of New Zealand', in *The Subantarctic Islands of New Zealand,* p. 576.

as common by several recent expeditions. While we saw no bellbirds or other bush birds, we noted that one land bird, the pipit, was particularly common—its trilling song was heard constantly throughout our stay on Disappointment Island and numbers were seen by George in the tussock zone. We also heard blackbird song several times, which suggested a well-established population.

Of seabirds, the island probably supports a considerable population of skuas; as well as preying on sooty shearwaters and white-headed petrels, they must take many mollymawk eggs and chicks. When George reached the top of the ridge, he was challenged immediately by a pair of skuas on their nesting territory. A sooty albatross soared above while we were landing. Its nest was probably close by on the cliffs round the bay, but there was no time to investigate. The wandering albatross breeds on Disappointment Island in comparatively small numbers in scattered sites along the upper ridges. However, during George's brief stay in the tussock zone, he saw no sign of albatross nests. The population was first recorded on 27 November 1907 by E.R. Waite, who saw nests of 'one year old' birds.[3] Interestingly, on the 1907 expedition G.A. Buddle photographed a young wanderer on Disappointment Island; the photograph was later published in Buddle's *Bird Secrets of New Zealand*[4] and shows a young bird almost ready to leave. (Recent expeditions have estimated the population at 200–300 pairs.)

There were no remaining signs of the *Dundonald* castaways' seven-month stay 37 years earlier. Although the wreck had been at the western end of the island, the castaways finally chose to build their huts on the ridge above Castaways Bay. The stream flowing into the bay was an important source of water, and from the elevated site they could keep watch for passing ships. The castaways realized long before their first attempt to reach the main island that the mollymawk colony on which they depended for food would shortly be deserted. By this time starvation must have been a very real threat, their food supply reduced to such seals as they could catch, probably supplemented by a few wandering albatross chicks. The sheer size of the mollymawk colony at the time of the wreck on 6 March meant the food supply had seemed practically inexhaustible. However, the needs of 15 men must have been considerable. While the chicks probably provided their main food, adult skins and feathers were used for various purposes, including warm bedding. The colony must have suffered considerable losses. However, such a setback would have been only temporary and it can be supposed that mollymawk numbers recovered rapidly.

Leonard Cockayne commented on the environmental impact of the castaways' stay when he wrote about the group's ecological botany in the reports of the 1907 expedition. With reference to Disappointment Island, he says: 'This island had not previously been visited by a naturalist …There is no forest, but a good deal of scrub of *Veronica* [now *Hebe*] *elliptica* and species of *Coprosma* existed before it was cut down by the unfortunate castaways from the *Dundonald*.'[5] It thus appears that, in their search for material for their coracles and probably also for firewood,

---

[3] Ibid, p. 567.

[4] (Wellington, Reed, 1951), plate 88, opp. p. 64.

Disappointment Island and Sugarloaf Rocks. Photo: M. G. Easton.

the castaways may have made a clean sweep of the island's woody vegetation. *Hebe elliptica* reaches a maximum height of only six and a half feet but has strong, twisted, stems. This was apparently the main species used by the castaways and must have regenerated rapidly. On our visit we found it abundant all round the coast in Castaways Bay.

Our stay had lasted just an hour and a half. Although the day had become brilliantly fine and sunny, Noel Worth was anxious to start the four-hour journey to Port Ross. We had a near-casualty: Les escaped by a hairbreadth from plunging down a 130-foot chasm [about 40 metres] into a sea cave at the head of Castaways Bay

After a brief delay to free the anchor, which had become wedged in the rocky seafloor, we left on a direct course for Northwest Cape. Ahead the cliffs of the main island's northern section were even more dramatic than in the south, rising at many points to 800 feet [about 250 metres] and just south of the cape to an incredible 1600 feet [500 metres].

Our course took us well to the north of a group of rocky islets between the main island and Disappointment Island: the Sugarloaf Rocks. Allan had included them in his circuit, and reported that they were precipitous and almost bare of vegetation. Disappointment Island and the Sugarloaf Rocks were both named by Captain Abraham Bristow, the discoverer of the Auckland group. Bristow included both names in the sketch-map he drew of his discovery in 1806.

At only one place could we see a possible route up the western cliffs that the *Dundonald* castaways could have used after they crossed to the main island. There was a break in the line of precipitous cliffs at a point due east of Disappointment Island. Here the castaways must have

[5] *The Ecological Botany of the Subantarctic Islands of New Zealand*, p. 222, footnote.

climbed the seaward face to reach the main ridge above; after crossing the ridge they would have been able to drop down to Laurie Harbour at the head of Port Ross.

We rounded Northwest Cape passing close to the Column Rocks, a spectacular group of pinnacles just offshore. Then came Black Head and Beacon Rock at the entrance to North Harbour, a sheltered inlet that lies at the foot of the Hooker Hills. Finally came the low familiar outlines of Rose and Enderby Islands, before we swung south into Port Ross. The day remained clear and sunny, although a little low cloud had settled down over the west coast beyond the Hooker Hills. To find blue seas and sunlit slopes on our return to No. 1 was an event in itself—a strangely balmy and relaxing end to one of our most memorable days.

We dropped anchor in Ranui Cove at 7.30 p.m. The crew had planned a farewell dinner on board—a chance, too, to catch up with the events of the day and the survey. Back at the station we had another long session, as we relived the year's highlights and heard Allan's plans for the concluding stages of the survey.

My schedule for the next four days was thoroughly hectic. I re-sorted my collections and had a marathon bout of packing. On 14 December our party boarded the *Ranui* for the last time. The voyage back to Dunedin proved uneventful. I was once again able to follow the changes in the prevalent species of seabirds, including the mollymawks and various smaller petrels, as we passed from subantarctic to warmer New Zealand waters.

I got up at 4 a.m. on Saturday, 16 December 1944, just as the flash of the Nugget Point lighthouse appeared. Shortly afterwards it was light enough to see the Otago coast. Before long I was looking once more at farmhouses and green fields—our year's isolation was over.

Auckland Islands' Natural History: Brief outline with further field notes

Geology

An important development since the days of the Cape Expedition is the emergence of the theory of continental drift (plate tectonics), not accepted widely in the 1940s. Two young geologists later to become well-known, Charles Fleming and Robin Oliver, did fieldwork as Cape Expeditioners respectively on the Auckland Islands and Campbell, and their subsequently published accounts provided the basis for present views on subantarctic biogeography.

Earlier ideas on the origin and relationships of the flora and fauna tended to propose a former land connection with mainland New Zealand. Although the plants and animals clearly had strong New Zealand relationships, naturalists found it difficult to understand how the ancestors of such highly distinctive and obviously ancient subantarctic groups as the daisies of the genus *Pleurophyllum* and the primitive wingless stoneflies could have reached the islands. There has since been much research on other islands of volcanic origin—especially on the Hawaiian group—which has greatly changed ideas on the rates of evolution and powers of dispersal of island floras and faunas. Plants and animals, many scientists now believe, have previously unsuspected powers of dispersal for long distances overseas using the slow but effective processes of water drift, wind carriage and random dispersal by flight.

Geology gives no support to the suggestion of an earlier land connection with the mainland. The Aucklands and Campbell are of volcanic origin: both are geologically comparatively young, the Aucklands dating back some 20 million years and Campbell perhaps eight million. The Auckland Islands are the much eroded remains of twin volcanoes, centered respectively upon Port Ross in the north and Carnley Harbour in the south. The effect of subsequent marine erosion is evident in the great sea-cliffs of the western and southern coasts, while glaciation during the Ice Age carved out the eastern fiord-like coastline. In the case of Campbell there was just one volcano, with its centre located in Perseverance Harbour. The two groups emerged from the sea on the broad submarine bank known as the Campbell Plateau.

The whole range of Auckland Islands land plants and animals are clearly just a group of invaders from the New Zealand mainland. Degrees of relationship vary. Some plant species, such as the southern rata *Metrosideros umbellata*, are precisely the same as that common over much of the South Island and Stewart Island, and the tui and bellbird are no different from their mainland counterparts; other species are a little different or very different from their New Zealand relatives. Among the latter are several birds (the Auckland Island teal or 'flightless duck', closely related to the New Zealand brown teal, is the best-known example), and various plants such as the two gentian species.

The understorey of the rata forest is a quite remarkable association of species originating from the much larger range found in a similar situation in New Zealand. All are exactly the same as their mainland relatives: haumakaroa *Pseudopanax simplex*, inanga *Dracophyllum*

longifolium, haupiro ('stinkwood') *Coprosma foetidissima* and matipo *Myrsine divaricata*. The spectacular daisies of the genus *Pleurophyllum*, on the other hand, have no near mainland relatives but have features in common with the New Zealand mountain daisies (*Celmisia*). Those Auckland Islands forms differing considerably from their New Zealand relatives presumably indicate an earlier invasion, allowing a longer period for evolution in isolation. Such species as the rata, on the other hand, were clearly geologically recent arrivals. This more recent element is likely to have reached the islands during the period following the last Ice Age, ending some 10,000 years ago.

Plant Life

The Auckland Islands are some 232 square miles [600 km^2] in area and extend from north to south over 29 miles [47 km]—by far the largest land area in New Zealand's subantarctic. Exactly what factors have led to the group's being partly forested are still little known. The presence of forest is almost unique in the New Zealand subantarctic, and on islands worldwide round the subantarctic zone; on most the characteristic plant covering is tussock grassland. The vegetation of the Snares is something of a special case, as here, in combination with much tussock, low forest is formed by the endemic tree daisy *Olearia lyallii*, a close relative of the subalpine tree daisies of the mainland.

On the Auckland Islands grassland occupies the upper regions and is replaced only on the topmost ridges and peaks by fell-field and bare rock; on the lower slopes a shoreline fringe of rata forest is separated from the tussock by a broad band of scrub.

Tussocks

The species of tussock of which the grassland is composed vary, both within the Auckland group, and compared with the other subantarctic islands. Antarctic tussock *Chionochloa antarctica*—up to 4 feet [1.2 metres] in height, orange-yellow and fairly tall and drooping—is the principal species on the main island and Adams Island. However, a second tussock, *Poa litorosa*, a little more compact and of a paler, yellowish-brown colour, is present in some areas especially near the coast. This species is common, forming the main plant covering, on Disappointment Island. On Campbell Island *Poa litorosa* is today the main tussock species; although *Chionochloa antarctica* was originally also common it was almost eliminated by sheep, to be replaced by *Poa litorosa* (the same may have occurred as the result of attempts at farming on Rose Island). On Antipodes Island, 500 miles [800 km] to the northeast, the main plateau is clothed in *Poa litorosa* tussock.

Rata forest

Little more can be said to explain the presence of forest on the Aucklands. Campbell Island 190 miles [304 km] to the south is only slightly colder, although a good deal windier; here, however, tussock is the dominant vegetation except for some extensive stands of *Dracophyllum* scrub on the lower levels. R.L. Oliver and J.H. Sorensen suggest in their account of Campbell Island's flora that the absence of forest may well be explained by Campbell's greater exposure to strong winds: 'The fact that trees grow on the Auckland Islands a little to the north is probably due to the greater height of those islands, and the correspondingly better shelter.'[1] The contrast between the mainly

[1] *Botanical Investigations on Campbell Island* Cape Expedition Series Bulletin 7, Pt. 1 (Wellington, DSIR, 1951).

tussock-clad islands of the subantarctic—except for the Snares and Auckland Islands—and the vegetation of southern South America has often been commented on: there beech (*Nothofagus*) forest comes right down to the southernmost tip of the continent in latitudes well south of the Aucklands and Campbell. This, however, is on an almost continuous land mass; and the southern beeches are known to have particularly weak powers of dispersal.

'A dense thicket of stag headed trees… gnarled and stunted by the violence of the gales,' wrote J.D. Hooker of the Auckland Islands forest in 1840, and Leonard Cockayne in his *New Zealand Plants and their Story* says the islands have 'thick woods, weird and grotesque'.[2] Forest dominated by southern rata reaches an altitude of only about 162 feet [50 metres] and is thus essentially no more than a coastal fringe. In the lower-lying surrounds of Port Ross the forest areas are quite extensive; where the land rises steeply, as it does over much of the southern portion of the main island and on Adams Island, the forest zone is at its narrowest. In comparative shelter, for example about Port Ross and on the floors of the eastern finger-like inlets, the trees may be up to 30 feet [9 metres] and occasionally 39 feet [12 metres] in height. Medium-sized trees and shrubs form the understorey; *Pseudopanax simplex* and *Dracophyllum longifolium* may reach well up towards the canopy, while the lower undergrowth consists mainly of *Coprosma foetidissima* and the wiry shrub *Myrsine divaricata.* Ferns (including filmy ferns), mosses, lichens and liverworts grow in abundance on the forest floor, often also covering the main trunks. The large, handsome shield fern *Polystichum vestitum* in the shelter of the forest may form a distinct trunk up to 39 inches [1 metre] high, almost like a miniature tree fern.

The most distinctive feature of Auckland Islands rata forest, even where it grows tallest, is the close, wind-shorn canopy; underneath, wind effect produces a maze of sprawling, often quite prostrate trunks, topped by a dense tangle of leaning branches. Allan Eden says in his *Islands of Despair* that the survey party found it quite possible, though time-consuming, to find a way through the forest by clambering over the prostrate trunks, but the undergrowth was often so thick that it was necessary sometimes to cut tracks just to reach the zone of scrub, where track-cutting had to begin in earnest.

Tree fern

The record of a tree fern found in 1903 in forest at the head of Norman Inlet, and recorded by Cockayne in his early paper on subantarctic botany, attracted much interest.[3] The fern was discovered by one of the party and identified by Cockayne as belonging to the widespread mainland species *Cyathea smithii*. Only a single individual was found; it was growing according to Cockayne in 'luxuriant forest'. A photograph taken during the 1907 Philosophical Institute of Canterbury Expedition was published both in the expedition reports[4] and in Cockayne's own

---

[2] In Capt. Sir James Clark Ross, *A Voyage of Discovery and Research in the Southern and Antarctic Regions During the Years 1839–43*, Vol. 1 (London, John Murray, 1847), p. 144.; 3rd Ed., (Wellington, Government Printer, 1927) p. 171.

[3] 'A Botanical Excursion During Midwinter to the Southern Islands of New Zealand', *Transactions of the New Zealand Institute* 36 (1904): 225–333.

[4] C. Chilton, in *The Subantarctic Islands of New Zealand* (Philosophical Institute of Canterbury, 1909), p. xvii.

New Zealand Plants and their Story. The discovery aroused special interest since this is the southernmost locality in the world to be reached by tree ferns. During the Cape Expedition Bill Dawbin of the No. 2 Station found the tree fern, although only in limited numbers, at sea level in the rata forest of Waterfall Inlet. A more extended search during recent expeditions has shown that its distribution includes a number of east coast inlets as far north as Chambres Inlet and south to Adams Island; it is apparently most abundant on the north and south sides of Deep Inlet.

Scrub zone

Away from the coast the forest soon becomes stunted and more twisted. It merges at about the 162 foot [50 metre] level with the next zone, the belt of low-growing, dense—in some places literally impenetrable—lowland scrub. The upper limit of this zone varies considerably: it may extend up to 975 feet [300 metres] above sea level in the north of the main island but only reaches some 585 feet [180 metres] in the more exposed southern section and on Adams Island. The scrub is commonly about shoulder-high but sometimes reaches only 39 inches [1 metre]. It contains much stunted rata and *Dracophyllum*, but the main constituents are two low shrubs, *Myrsine divaricata* and *Cassinia vauvilliersii*; with these also grow *Coprosma foetidissima*, *Coprosma cuneata*, *Pseudopanax simplex* and white-flowered *Hebe odora*. The upper surface of the scrub is closely wind-shorn and the tangle underneath amazingly dense. As a last resort attempts have been made to walk over the tight canopy or even to crawl along pig or seal tracks—the latter not for the faint-hearted!

'Clears'

A special feature of the scrub zone is the development in some areas of long open lanes (or 'clears') passing right up through the upper forest and scrub to the tussock-grassland. Lanes are especially well developed on the relatively gentle slopes above Port Ross; elsewhere they are found on the peninsulas between the eastern inlets and in some areas round Carnley Harbour. The most conspicuous plant in the lanes is the comb sedge *Oreobolus pectinatus*, growing in the form of hard, green cushions; firm and springy underfoot, these make for easy walking. Between the cushions are a number of interesting ground plants, including a little scattered tussock; another cushion plant, bright-green *Phyllachne clavigera*, with small starry white flowers, is also common. The two species of subantarctic gentian, *Gentiana cerina* and *Gentiana concinna*, also grow in the lanes; unlike their white-flowered relatives of the New Zealand mountains, the flowers of these gentians are red-streaked or warm purplish-red. Incidentally, our track from No. 1 Station to the Lookout passed over the lower end of one of the 'clears' so that the show of *Phyllachne* and gentian flowers in spring and summer always made a point of interest on the walk. Easy travel on the lanes improves access to the open tops to some extent; however, even here the route is frequently interrupted by belts of low forest or scrub.

Leonard Cockayne considered that the formation of the lanes could be attributed to strong prevailing winds inhibiting invasion of the grassland by scrub; later research has suggested that they are simply caused by slightly boggier soil conditions, and this is still under investigation.

Tussock grasslands

Tussock grasslands occupy most of the upper portion of the main island and Adams Island, giving way on the topmost ridges and peaks to sparsely covered fell-field or bare rock. The main species is antarctic tussock *Chionochloa antarctica*; this may at its tallest be shoulder-high and hard

to push through where closely-packed. However, further up the slopes the tussock is more widely spaced and climbing becomes easier. The taller tussocks have a well-marked base (or 'stool') formed by the old matted leaf stalks; the base is often thickly covered in filmy ferns.

From a distance the sweeping tussock slopes may seem to consist of nothing but tussock. This zone is in fact the stronghold of some of the group's most handsome and spectacular plants, including the remarkable giant herbs (or 'megaherbs') for which New Zealand's subantarctic quickly became famous. J.D. Hooker of the 1840 Antarctic Expedition, who was the first to describe the Auckland Islands flora, wrote that it included species 'more remarkable for their beauty and novelty than any other country can show'.[5] It should be added that unfortunately on the main island pigs have eliminated a number of the notable species over wide areas, but they may still be seen to perfection on pest-free Adams and Disappointment Islands.

Among the tussock, the plentiful shield fern *Polystichum vestitum* is most noticeable; there is often a good deal of low-growing *Dracophyllum* and even stunted, shrubby bushes of rata. The most distinctive shrub is *Hebe benthamii,* a close relative of the many species of native *Hebe* (or koromiko), but unique in its brightly-coloured flowers, aptly described by Hooker as 'of the intensest blue'.[6] *Hebe benthamii* flowers from about October until as late as May; we never ceased to appreciate its show of flowers during our spring traverses of the tussock uplands. Also scattered through the tussock were two densely branched species of *Coprosma, Coprosma ciliata* and *Coprosma cuneata*, the latter a subantarctic endemic found only on the Aucklands, Campbell and the Antipodes.

Flowering plants

On the ground amongst the tussocks are *Lycopodium*, ferns and orchids. Here also belong three of the most handsome and colourful subantarctic flowering plants, all three endemic to the Aucklands and Campbell. The first is a daisy, *Damnamenia vernicosa*, a close relative of New Zealand's mountain daisies (*Celmisia*). It has low-growing rosettes of stiff, glossy leaves, and white- or purple-petalled flowers with deep purple centres. The second species, the subantarctic buttercup *Ranunculus pinguis* is of robust growth, with cupped yellow flowers like those of a number of the mainland alpine buttercups. Finally, the subantarctic forget-me-not, *Myosotis capitata*, appears frequently, generally in rocky areas. It has flowers of the deepest blue, measuring up to two-fifths of an inch [1 cm] across. Cockayne thought the forget-me-not one of the most attractive flowering plants of the subantarctic, 'the prince of forget-me-nots… perhaps the most beautiful plant in the New Zealand flora'.[7] *Damnamenia vernicosa* is even more abundant in fell-field (see the next section) and in bogs along the margins of the topmost ridges; the forget-me-not, too, is not restricted to the tussock zone, but may occur in rocky places right down to sea-level.

Megaherbs

Turning now to the megaherbs, they are scattered throughout the grassland, but prefer wet or even boggy ground; where conditions are suitable they may, along with the three flowering species mentioned above, form 'meadows' amongst the tussock.

---

[5] In Ross, *A Voyage of Discovery*, p. 147.

[6] *Flora Antarctica* Vol. 1 (London, Reeve Bros, 1847).

[7] *New Zealand Plants and their Story*, p. 175.

Probably the most impressive of the megaherbs are two aster-like species belonging to the genus *Pleurophyllum*, possibly distant relatives of the New Zealand mountain daisies. *Pleurophyllum speciosum* has broad, corrugated leaves often 19 inches [half a metre] in diameter, and mauve-to-lilac-petalled flowers in dense clusters on a tall flower stalk. *Pleurophyllum criniferum* has a taller more slender form, with pointed leaves and button-like purple flowers with inconspicuous outer ray florets. (Note that a third *Pleurophyllum* species with a flat, somewhat dwarfed growth-form is found on the upper-level fell-fields). The third megaherb, *Anisotome latifolia* (*Umbelliferae*: carrot family), has masses of compound leaves and great rounded heads of reddish-mauve flowers. This species is much sought after by pigs, so that on the main island it is found nowhere but on inaccessible cliff ledges and inland rocky outcrops.

Stilbocarpa polaris, a member of the ivy family, has massive creeping rhizomes and great, pumpkin-like leaves; the waxy greenish-yellow flowers form globular heads as much as 16 inches [about half a metre] across. It is found also on Campbell and the Antipodes, and extends to Macquarie Island, where it was much used as food by the early sealers and whalers and known as 'Macquarie cabbage'. A second species, *Stilbocarpa robusta*, is found on the Snares, and the punui (*Stilbocarpa lyallii*) of Stewart Island and southeast Fiordland is a close relative. Like *Anisotome latifolia* this species is favoured by pigs.

Finally, the fifth megaherb species is a member of the lily family, *Bulbinella rossii*, perhaps the most magnificent of the flowering plants found on the Aucklands and Campbell. Each plant may be as much as 39 inches [1 metre] in height, with heavy, strap-shaped leaves. The orange-yellow flowers are borne in massive spikes. Where *Bulbinella* grows in extensive beds it can produce a most spectacular show.

Five other species of *Bulbinella* are distributed over mountain districts on the New Zealand mainland (one is commonly known as 'Maori onion'); all have handsome yellow flowers, although modest in comparison with *Bulbinella rossii.* The ecology has been greatly affected by grazing animals in two parts of the New Zealand subantarctic: by cattle and rabbits on Enderby Island, at the entrance to Port Ross, and by sheep on Campbell. The result in both areas has been the development of a remarkable new ground cover consisting almost entirely of *Bulbinella rossii*, which being unpalatable to stock has finally almost completely replaced the previous vegetation. Stands of *Bulbinella* on Enderby cover almost all of the flat ground bordering on the northwestern cliffs; Campbell has extensive *Bulbinella* in several separate areas. Now that the cattle and rabbits have been removed from Enderby, the fate of this modified plant cover will be of the greatest interest; similarly, on Campbell where sheep have been eradicated, regeneration of the *Bulbinella* and other vegetation can be monitored.

An example of the 'meadows' of Auckland Islands megaherbs and other eye-catching flowering plants may still be seen in the spectacular area known as 'Fairchild's Garden', which occupies the coast of Adams Island just inside the western entrance to Carnley Harbour. The area was named in honour of Captain Fairchild, a legendary figure on the early government vessels responsible for servicing lighthouses and castaway depots round the New Zealand coast. A recent description comes from Cape Expeditioner, Jack Sorensen, who visited the 'Garden' *en route* to

Campbell Island where he spent three terms and completed a considerable body of research. Sorensen says in his *Wild Life in the Subantarctic* (1957):

> At 'Fairchild's Garden'… I saw the luxuriant growth of many species of plants which are not to be found outside the Auckland or Campbell Islands… Acres of glossy green-leaved *Bulbinella* with golden flower-heads reaching 2 feet in height, great clumps of mauve-coloured *Anisotome*, and the three magnificent species of *Pleurophyllum*, made an unforgettable sight. These latter plants seem out of place in such regions, particularly the one named *speciosum*. One of these had leaves that when expanded measured 3 feet across, and had eight flower spikes in full bloom, with another developing. Each spike had 25–30 aster-like flowers coloured from mauve to lilac. Through this almost tropical verdure large sea lions staggered drunkenly along… (p. 3)

'Fairchild's Garden', estimated by one early visitor to cover 395 acres [160 ha], is situated at sea level and has accordingly always been more accessible than the high-level grassland where the megaherbs 'meadows' are mainly found. E.J. Godley in his more recent outline of Auckland Islands vegetation notes that while the ground in the area of the 'Garden' is not steep it is also highly exposed: he says, 'Presumably because of the exposed situation inimical to tree growth, the upland species have here been able to descend to sea-level.'[8]

Fell-field vegetation

The zone of fell-field and bare rock that occupies the topmost ridges and plateaus was to become thoroughly familiar, for we spent long periods tramping over the open tops during the southern survey. The two highest points are Cavern Peak (2162 feet or 659 metres) on the main island, and Mt Dick (2313 feet or 705 metres) on Adams Island; between these and the other main peaks the fell-field area at an altitude of 1500–1800 feet [460–554 metres] takes the form of tundra-like open terrain, reasonably easy to traverse but generally extremely wet and sodden. The ridge-tops lie north and south on the main island, but east and west on Adams. The fell-field in places is just loose scoria-like rubble, but has a surprisingly varied plant cover. We found the going quite hard, for even the bare rubble was soft and wet (accentuated by snow melt since this was in early spring) and in places my journal says it was necessary to 'almost wade' through slushy sedges and cushion-plants.

The mat-like vegetation of the fell-field where the ground is comparatively firm is commonly composed of sedges (mainly *Carpha alpina*), often with a good deal of the dwarf ground lily *Astelia linearis* (also common in the South Island mountains) and a thick carpet of filmy ferns. The purple-centred daisy *Damnamenia vernicosa* may form dense mats and there is generally much scattered *Bulbinella rossii*, and often some *Ranunculus pinguis* and *Myosotis capitata*. Sometimes these are replaced by a taller growth of the tussock-like brown or orange-green rush *Marsippospermum*. Over the whole of the fell-field the most conspicuous plant is always *Pleurophyllum hookeri*. This, not nearly so robust as its two megaherb relatives, is a distinctive feature of the open fell-field: a silvery-green rosette of sharp-pointed leaves up to 12 inches

[8] 'Notes on the Vegetation of the Auckland Islands', *Proceedings of the New Zealand Ecological Society* 12 (1965): 58.

[30 cm] across, dotted over the sward at intervals or in extensive patches giving the landscape a silvery sheen. The flower heads may be as tall as 2 feet [60 cm], but are modest compared with those of the two other species; the flowers like those of *Pleurophyllum criniferum* are purple and unpetalled.

In very wet areas the cushion-plant *Phyllachne clavigera* may predominate. However, *Damnamenia vernicosa* often takes over in the form of thick, dense mats making an attractive show with glossy leaves and striking flowers; gentians and *Ranunculus pinguis* also frequently show up in the bogs. Sometimes at the lower edges of the fell-fields there are stands of *Centrolepis pallida*: this rush-like bog-plant is a striking deep green, showing as vivid patches from a distance.

Finally, the bare rock of the peaks often supports abundant lichens, liverworts and mosses; and in crevices and even on rock faces where enough peat has accumulated there is a surprisingly rich flora including almost any of the ground species of lower levels. On the main island where pigs have almost eliminated the megaherbs over wide areas, the shelter provided by crevices among the upper-level rocks may produce such finds as a stray flowering *Pleurophyllum criniferum* or *Pleurophyllum speciosum*.

Snares daisy tree

Mention must be made of a special feature of the vegetation about Port Ross—the presence on Ewing Island and in Erebus Cove of stands of the handsome Snares tree daisy *Olearia lyallii*. Ewing has tall rata forest at its centre, surrounded by an outer zone of *Olearia* occupying perhaps two-thirds of its area (only 123 acres or 50 hectares in all). The approach to the island is most striking, the furrowed trunks and large pale-green leaves of the *Olearia* contrasting strongly with the familiar dark-toned rata. *Olearia lyallii* grows on Ewing as high as 42 feet [13 metres], probably taller than anywhere on the Snares. We knew during the Cape Expedition of a second stand of tall *Olearia lyallii* on the headland at Erebus Cove. Since then an extensive survey has revealed small trees or seedlings at scattered locations throughout the same general area (Enderby Island, Ocean Island, Laurie Harbour and several places round Webling Bay between Crozier and Kekeno Points).

There is now general acceptance of a suggestion by E.J. Godley that *Olearia lyallii* reached the Aucklands as a chance introduction from the Snares, probably in the early sealing days when landings were being made regularly on both groups. This species is characterised by its abundance of tiny seeds, which could easily have been transported on muddy boots. Support for the suggestion also comes from the records of the 1840 British Antarctic Expedition, and its botanists Hooker and Lyall, whose material came from a single low-growing example on Ewing—Hooker wrote that the species was to be regarded as 'a rare plant' in the Aucklands. Along the same lines, it seems probable that the Erebus grove became established by chance transference from Ewing at the time of the Enderby settlement. Much thought has been given to the conservation problem presented by this species as a possible invader of the Aucklands, since it is so clearly now spreading. It has even seemed possible that the native rata forest could be partly replaced; however, it has been decided that practical steps at present should be limited to exterminating the seedlings so far found and to keeping a close watch on any signs of further spread.

Land and freshwater birds

Bellbird and tui

Of the native bush birds, the bellbird and tui are widespread in rata forest throughout the group. The bellbird—undoubtedly the group's most abundant land bird—inhabits bush right up to the scrub edge, low scrub such as that on Enderby and the edges of the open lanes. Tui populations are more difficult to estimate for numbers tend to gather at a plentiful nectar source, and this species is probably only moderately common. Insects and fruit form a high proportion of the diet of both the honeyeaters, but nectar is always keenly sought after; the fullest flowering season of rata round Port Ross was just beginning on our arrival and patches of trees in bloom were attracting both species. The Auckland Islands provide a second main nectar source in *Dracophyllum longifolium*, available both in the forest understorey and in the zone of lowland scrub. *Dracophyllum* flowers almost throughout the year and the sweetly-scented, yellowish-white tubular flowers, borne upright or hanging in clusters, are rich in nectar. Recent observations suggest that in some parts of the group *Dracophyllum* may be an important source of additional food in the form of honeydew, produced if the bark is heavily infested with scale insects. This is a well-known item in the bellbird's diet in South Island beech forests.

Breeding by both species was at an advanced stage when we arrived at the end of December. A noisy family of three young tuis was being fed in the bush about the station, and on a visit to Ocean Island on 19 January we were surrounded by several separate broods of bellbird chicks not long out of the nest. Bellbird song was almost always to be heard about the station, but on the Port Ross islands—Ocean, Ewing, Enderby and Rose—and on Adams Island this species appeared especially confident and vocal. Bellbirds on these islands, free of the feral cats that threaten bird life on the main island, were confident and tame and would feed right down to ground level in forest and scrub. Quite recognisable differences in bellbird song patterns could be observed from area to area, even between the closely adjacent islands of Port Ross. The song of this species is repetitive and stereotyped compared with that of the tui, making recognition of such local song 'dialects' fairly easy.

Silvereye

The silvereye is probably the second most common species in bush and scrub. It seems likely that the Aucklands were colonised by silvereyes soon after their establishment on mainland New Zealand from Australia in 1856; large numbers invaded the mainland in that year and some may even have reached the Aucklands simultaneously. I recorded much silvereye song about the station through January and February. By May winter flocks had formed as they do on the mainland: my notes for 5 May say 'flocks of up to 50 are now the rule'. The silvereye's diet includes more insects and fruit than nectar, but nectar is taken eagerly when available. Fruit sources on the Aucklands—for the two honeyeaters as well as the silvereye—are various *Coprosmas*, *Pseudopanax simplex* and the wiry shrub *Myrsine divaricata* (I noted all these with ripe fruit at Ranui Cove in mid-May).

Tomtit

While the tui and bellbird cannot be distinguished in any way from their counterparts on the New Zealand mainland, and so probably represent a fairly recent invasion in terms of geological time-scale, the Auckland Island tomtit is a well-marked subspecies: its earlier arrival having allowed it to evolve in isolation. During his year at the Carnley Harbour

station (1942), Charles Fleming gave much time to researching tomtits, his results being included later in his paper reviewing all the New Zealand tomtits and robins (genus *Petroica*).[9] On the mainland, tomtits have survived reasonably well in forest remnants and even adopted settled habitats to some extent, especially in the South Island.

The males on the mainland (and on the Chatham Islands) have a neat black-and-white or black and lemon-yellow plumage pattern; the females are much duller, just greyish-brown above and grey merging to white or yellowish-white below. This difference in plumage between the sexes disappears in the Auckland Islands subspecies, as Charles Fleming was the first to note. The female is not quite such a glossy jet-black as the males, but has the same black back, head and throat, with a pale yellow breast. There are altogether five subspecies of tomtit in the New Zealand area: North Island, South Island, Chatham Islands, Snares and Auckland Islands subspecies. Charles Fleming found on the basis of several morphological characters that the Auckland Islands tomtit could be linked more closely to the Snares tomtit (a completely black form) than to any of the other subspecies, suggesting that the original colonisation of the Auckland Islands took place by way of the Snares: the Snares and Auckland Islands populations would subsequently develop in isolation into two highly distinct subspecies.

We met handsome, alert tomtits daily on our walk up the Lookout track. They would appear, too, as soon as we landed to set up a field camp. Occasionally one would come into the hut searching for insects. The tomtit is highly territorial, the males displaying aggressively on the border of the territory, sometimes even to a human intruder! There were probably three or more territories between the station and the Lookout, and we heard the males' powerful territorial song—a phrase of four to five warbled notes—regularly. The male has a sharp contact call, 'swee', a fainter version of which is given by the female. During Charles Fleming's year at No. 2 Station he kept a record of the main events of the breeding season: there was a period of intense song, territorial defence and sexual display in July-August; nest building began as early as 22 August, and laying a month later (first recorded 20 September). Tomtits are found in a variety of habitats on the Aucklands besides the bush: we saw them in the scrub zone and even in lower parts of the upland tussock on Adams Island. On the cat-free islands they would go down on to the ground in search of earthworms and ground invertebrates; they even pounced on flying insects on the coastal rocks.

Parakeets

The two final species in the list of native bush birds are the parakeets, red-crowned and yellow-crowned. As R.B. Sibson aptly puts it in *From Penguins to Parakeets*,[10] the combination of petrels, penguins and brightly-plumaged members of the parrot family on our offshore islands is 'almost paradoxical'. New arrivals on the Aucklands often found it hard to believe it when these colourful parakeets would flash past in the bush, or sit tamely on the scrub or on the leaves of one of the great megaherbs on the cat-free islands. These two species now have a much restricted range on the New Zealand mainland (they have been almost eliminated

[9] 'New Zealand Flycatchers of the Genus *Petroica* Swainson', *Transactions of the Royal Society of New Zealand* 78 (1950): Pt 1 14–47, Pt 2 127–160.

[10] Auckland, Waiatarua Publishing, 1990.

by introduced predators, especially the ship rat) but have survived well on the offshore islands. On the main Auckland Island the yellow-fronted parakeet is perhaps the more abundant species, but both are common on the Port Ross islands and on Adams. The flight call of both species is a penetrating chatter 'ki-ki-ki-ki-ki', a little higher-pitched in the yellow-crowned. They feed on various vegetable items: flower buds, leaves, seeds and fruit, and also insects and other invertebrates. We saw them feeding in the bush canopy on the main island, and both on trees or shrubs and on the ground on the other islands; on Adams Island we several times disturbed red-crowned parakeets that had been feeding on the ground in the tussock zone.

Neither of the two parakeets has differentiated subspecifically from the mainland form; this is of interest since red-crowned parakeets on the Kermadecs, Chathams and Antipodes are quite distinct subspecies. On the Aucklands a proportion of the population are quite recognisably hybrids; Charles Fleming first noted this in the Port Ross area and at No. 2 Station (Carnley Harbour) in 1942, and in 1944 I recognised hybrids about Ranui Cove and on Adams Island. The hybrid characters are noticeable especially on the crown, yellow or orange feathers replacing red in varying degrees; the red spot behind the eye, too, which is strongly developed in the red-crowned species, may become yellow-mottled. R.H. Taylor, in the period from 1975 to 1986, carried out much research on evolution and hybridisation in the two New Zealand parakeets, and describes similar hybridisation—a 'hybrid swarm'—resulting from recolonisation of Mangere Island, in the Chatham group, by both species.[11] It seems possible that on the Aucklands predation by cats has reduced the population of red-fronted parakeets enough on the main island to produce a strong tendency to hybridisation; however, it should be noted that several recent observers have reported a high population of hybrids on the Port Ross islands.

Introduced birds

The spread of introduced birds from the mainland to the outlying islands, a distance of up to 530 miles [850 km], has always been the subject of great interest. The Auckland Islands list is as follows: blackbird, song thrush, hedge sparrow, chaffinch, goldfinch, redpoll, skylark and starling. Two additional species—yellowhammer and house sparrow—have been recorded but are probably only stragglers. The habitats occupied on the Auckland Islands are similar to those on the mainland, except that only on Enderby is there anything like a man-made environment; as might be expected, hedge sparrows and starlings are especially common on Enderby. The redpoll is widely distributed in the tussock zone and on the 'clears'; we met it, too, right up to the summit ridges as we crossed the snow-patched fell-field of the main island and Adams Island. Blackbirds are everywhere common in the bush, as well as in scrub on Enderby and Rose, and blackbird song was a feature of spring (first heard mid-July) and early summer as it is on the mainland. How soon these species spread to the Chathams and the subantarctic after their introduction in the 1860s apparently remains unrecorded, although a search of early accounts might well produce information of interest. The Philosophical Institute of Canterbury expedition in 1907 recorded only blackbird nests and eggs at Terror Cove and two goldfinches seen at North Arm, Carnley Harbour.

[11] 'Some ideas on speciation in New Zealand parakeets', *Notornis* 22 (1975): 110–21.

Pipit

Four ground or open country birds have still to be mentioned; all are subspecifically distinct and form a notable element in the bird fauna. The pipit has a slightly stouter bill and tawnier plumage than its mainland counterpart; it is common on shore rocks, but also appears on the 'clears' and high in the fell-field zone. The semi-pastureland on Enderby has provided much additional habitat for the pipit—likely, of course, to be reduced with the re-growth of scrub and forest following the removal of the island's cattle and rabbits.

Snipe

The Auckland Island snipe belongs to a group of small, handsome, mottled-brown ground-dwelling birds originally found throughout the New Zealand area. They have proved so vulnerable to mammalian predators that they now survive only on a few predator-free islands—their extreme vulnerability was highlighted when ship rats got ashore on Big South Cape Island in 1964 and immediately exterminated the last survivors of the Stewart Island subspecies. Fortunately Adams and Disappointment Islands still provide extensive snipe habitat, and there is also a well-established population in the Port Ross area on Ewing. We saw snipe on Adams Island in the western herb 'meadow' ('Fairchild's Garden') and in the tussock zone. On Ewing Island they were easy to watch for they fed in the daytime on the more-or-less open forest floor, probing like miniature kiwis deep into the leaf-litter. They made short flights were made when disturbed, but never for more than two or three yards [metres].

Rail

In spite of much effort during the Cape Expedition no definite record was made of another ground species, the Auckland Island rail—something of a mystery since its existence was known only on the basis of two specimens obtained in the 1860s. It was obviously likely to survive only on the cat-free islands; Charles Fleming had a few glimpses of birds thought to be rails on visits to Adams Island in 1942, and it was suspected that calls heard on Ewing in 1943 were those of rails. The subsequent history of the rail has been dramatic: a research party camping on Adams Island in January–February 1966 saw a rail which was eventually captured and brought back to the Wildlife Division Native Bird Reserve at Mt Bruce. Then in November–December 1989 a field party on an expedition organised by the Department of Conservation (G. Elliott, Kath Walker, R. Buckingham), undertook a full-scale search on Adams Island with outstanding success.[12] The methods used included trapping and various newly-developed techniques, including the use of taped calls. Nests were found, and rails were recorded at almost every point on the island visited, a total population of probably several hundred birds. The rail, once considered the rarest of Auckland Islands birds, is clearly still well established and every possible step is being taken to ensure its survival.

Banded dotterel

A story with a similarly encouraging ending is emerging about the Auckland Island banded dotterel, believed in Cape Expedition days to be limited to a total population of less than two hundred. It was thought that it bred only on the high country of the mainland and Adams Island, and that the whole population came down to spend the winter on the ideal foraging and resting area provided by Derry Castle Reef. On the mainland the banded dotterel breeds on sandy coasts and the South

[12] G. Elliott, K. Walker and R. Buckingham, 'The Auckland Island Rail', *Notornis* 38 (1991): 199–209.

Island riverbeds; it forms flocks in winter with other waders on tidal harbours and estuaries. It is a partial migrant, more than half of the total population crossing the Tasman to spend the winter in southeastern Australia. Bob Falla recognised that Auckland Islands banded dotterels were of heavier build than their mainland counterparts; he was later to formally describe the Auckland Islands banded dotterel as a new subspecies, giving it the name *exilis*. Plumper than the mainland form, this subspecies is darker brown above and has longer legs; even in full breeding plumage the two breast bands (narrow black above and broad chestnut below) tend to be broken by scattered pale feathers giving a mottled effect.

In 1944 we first met banded dotterels in April on Enderby Island, noting a small flock in winter plumage in the open area of gravel and sward at the base of Derry Castle Reef. We saw them again during the survey of Adams Island. It was now spring (August–November) and on the high-level fell-field they were apparently present in fair numbers; all were in breeding plumage. Unfortunately we could not stop for long enough during the survey trips to check on nesting; their behaviour, however, left little doubt that the area was occupied as a breeding ground. Breeding had been previously recorded only in 1943 when a nest had been found by the No. 1 party on the main island above Chambres Inlet. In April 1980, R.J. Pierce carried out a most interesting ecological survey of some 150 banded dotterels feeding on intertidal platforms and on the adjacent sward at Derry Castle Reef.[13]

A main project of the 1989 Department of Conservation expedition was to survey the dotterel's distribution and breeding: the field party (Kath Walker, P. Moore, G. Elliott) was notably successful both on Adams Island and Enderby Island.[14] On Adams (2 November—6 December) 273 were counted, distributed throughout the fell-field area; 11 nests were located. Perhaps more surprising were the results on Enderby Island, where dotterels were discovered breeding for the first time; a total of 440 were counted and eight nests found. The behaviour of the dotterels on both Adams and Enderby indicated the presence of many more nests. It is thus now clear that the earlier idea of a small population breeding on the high ridges of the main island and Adams, and migrating for the winter to Enderby, was probably mistaken; however, it seems likely that the dotterel's marked increase on Enderby, and the commencement of breeding, represents a comparatively recent population change.

The Auckland Island banded dotterel, in fact, seems to be mainly sedentary in its habits; it seems likely that most of the population just spend the winter on the coast adjacent to the breeding areas, the Adams Island birds in Carnley Harbour, and the birds now breeding on Enderby at Derry Castle Reef or elsewhere round the coast—an interesting topic for further research. An earlier population change had already occurred—the arrival of pigs and cats is likely to have greatly reduced or almost eliminated breeding on the main island, where the 'clears' as well as the high-level fell-field would have provided much suitable habitat. If

---

[13] 'Habitats and feeding of the Auckland Island Banded Dotterel (*Charadrius bicinctus exilis* Falla 1978) in autumn', *Notornis* 27 (1980): 309–324.

[14] K Walker, P. Moore and G. Elliott, 'The Auckland Island Banded Dotterel has apparently increased', *Notornis* 38 (1991): 257–265.

pigs and cats could now be removed, the dotterel population would probably be one of the first to show a marked increase.

Waterfowl

Five waterfowl are recorded as breeding on the Auckland Islands, one clearly extinct.

Merganser

The Auckland Island merganser was, as indicated by subfossil bone deposits, once widespread throughout the New Zealand mainland and the Chathams; midden sites show that it was a favoured Maori food, suggesting that hunting in prehistoric times brought about its extinction. Likewise at the Aucklands it was probably sought for food by sealers, whalers and even for a few years by the Enderby settlers; and the coming of cats and pigs would ultimately have eliminated it on the main island. It first became known when specimens were collected by the French *Astrolabe* and *Zelée* expedition under Dumont d'Urville in 1840. From the 1870s onwards specimens were sought assiduously, some for private collections and others for museums; known specimens number about 30, and collecting was probably finally responsible for the merganser's demise. The search for specimens was certainly quite relentless: in those days when ideas of conservation were still undeveloped rare species were collected as a matter of course. F.R. Chapman in his comprehensive account (of a round of the subantarctic islands with Captain Fairchild in the government vessel *Hinemoa* in January 1890) writes:

> A boat was sent into a cove on Adams Island… and by chance came upon a brood of young mergansers with their parents. The old birds got away, but the chicks were seized; and I had the satisfaction… of securing a couple for our [Otago] museum. [15]

R.A. Wilson made the same tour in the *Hinemoa* in the following year (October 1891) while still a schoolboy: In his *Bird Islands of New Zealand* he later wrote:

> Professor Chapman obtained some young mergansers for his museum, and I shot a pair myself near the same position in Carnley Harbour the next year. One of these I gave to the Dunedin Museum and the other to Edgar Stead's collection [the Stead Collection is now in Canterbury Museum].'[16]

The merganser, a slim-bodied diving duck, probably fed mainly on fish as do its northern hemisphere relatives; it would have inhabited both the sheltered inlets and harbours, and lakes and the pools of streams. In the streams native trout (*Galaxias*) are present, and these are likely to have been an important food item. Records of food obtained from specimens include marine crustaceans, molluscs and worms, as well as fish. Although it had much reduced wings in comparison with Northern Hemisphere species, it was capable of flight. All Cape Expedition parties had high hopes of re-discovering the merganser—our 1944 survey party especially penetrated into many areas little or never previously examined. An exhaustive search has also been made by experienced observers on several more recent expeditions. But in spite of all efforts the merganser still remains undiscovered.

---

[15] 'The Outlying Islands of New Zealand', *Transactions NZ Institute* 23 (1891): 491.

[16] Christchurch, Whitcombe & Tombs, 1959, p. 35.

Teal

We saw the Auckland Island teal (often referred to in early accounts as the 'flightless duck') regularly all round the coast of the Port Ross islands, Ewing, Ocean, Enderby and Rose. Single birds or pairs sometimes floated offshore or fed on the rocks near the station, but it has been eliminated as a breeding bird by pigs and cats on all parts of the main island. It seemed to be most numerous on Ewing Island; streams and swamps give some additional habitat on Enderby Island, but there are only limited suitable areas on the cliffy north coasts or both Enderby and Rose. It was common, too, along the northern shoreline of Adams Island; there were numbers up the large stream which flows to Carnley Harbour a little to the west of Grafton Point, and we even saw it up the stream's tributaries. Food for the teal consists largely of marine organisms from the shore and intertidal zone; rotting kelp, probably with plenty of fly larvae, is given much attention. Streams and swamps, too, provide all the foods normally taken by dabbling ducks. Much feeding is done at night; as the birds feed the high-pitched piping call of the male is often heard. Watching a teal on the shore at the head of Ranui Cove, I saw it dart out and catch a mouse which had run out on to the rocks; after much violent shaking the mouse, obviously now dead, was abandoned; evidently it was too large to be swallowed. The teal is essentially flightless, but its half-sized wings are of some use as they scramble over coastal rocks and even when the bird is making its way up low cliffs. If we chased them with the outboard they would patter off along the surface, flapping vigorously as if trying to rise—once Geoff Prichard and Len Hoskin believed that they saw a hard-pressed teal manage to rise several feet off the water!

The plumage pattern of the Auckland Island teal is very like that of its mainland counterpart, the brown teal, although overall a little duller; but the drake in breeding plumage lacks all the highly coloured features of the brown teal drake, especially the glossy green head and white collar—at most a breeding drake may have a faint green gloss on the head. The underwing is white, mottled with brown, as in the brown teal; both sexes have a narrow white eye-ring. The Auckland Island teal is generally regarded as related subspecifically to the brown teal; there is a second subantarctic subspecies, also flightless, on Campbell Island—now found only on the small outlier Dent Island because of rat predation.

The interesting suggestion has recently been made that the brown teal and the two subantarctic teal—all obviously related to the Australian chestnut teal—may have originated from two separate invasions from Australia. The earlier invasion by chestnut teal would have given rise to the two subantarctic teal, while the brown teal, which is probably more closely related to the chestnut teal, would have resulted from a comparatively recent invasion. The Auckland Island rail, also, is thought to have originated through direct invasion of the Auckland Islands from Australia: it is regarded as a subspecies of a common eastern Australian species, Lewin's rail.

Ducks

The remaining breeding waterfowl are the grey duck, the New Zealand shoveler and the mallard (the last an introduced species self-established from the mainland). We saw the grey duck at most of the points visited on the main island and Adams, although in small numbers—clearly a well-established breeding population. The other two species were recorded only rarely during the Cape Expedition and hence were regarded as probably stragglers; both are now known to be breeding and at the time of our observations may have been in the earliest stages of establishment.

Birds of prey

The two New Zealand birds of prey are present on the Aucklands but the falcon, not the harrier, is the established and widespread species—the reverse of the situation on the mainland. The harrier was recorded on only a few occasions during the Cape Expedition, and so was considered essentially a straggler; it has been seen regularly on recent expeditions but it is doubtful whether it can be regarded as a breeding species.

The present-day habitat of the falcon on the group is probably much like that originally occupied by the species on the mainland before the replacement of forest by farmland, and before its persecution by settlers intolerant of its predatory habits. Although the pairs are well spaced out it is everywhere well-established, in forest and in the tussock and fell-field zones; Enderby Island has a pair (possibly two pairs) and there is probably one pair on Rose. Introduced birds as well as natives are now available as prey; I saw a falcon dash into a large flock of redpolls on the Enderby north coast—on this occasion without making a kill—and a blackbird was chased through the forest near the Carnley Harbour station. The 1989 research party saw a falcon chasing a small flock of banded dotterels on the Adams Island fell-field; both banded dotterel and pipit are probably included in its prey.

The falcons' unconcern on being approached was always quite remarkable—they would sit in front of us until the last moment, then move silently to another perch just a few metres away. Falcons at the nest are notoriously aggressive, diving repeatedly at any human intruder and making a direct hit without hesitation. On 25 November on Figure of Eight Island in Carnley Harbour, George Easton and I heard the scream of a falcon, and I was attacked by the male bird; it threw its weight hard against my head and drew blood with its talons.

Stragglers and migrants

Finally mention must be made of various stragglers and migrants among the land and freshwater birds of the group. The welcome swallow is of special interest since in 1943 the No. 1 party at Ranui Cove made the second earliest record of this Australian species in the New Zealand area; it has now colonised the New Zealand mainland, beginning with major invasions in the late 1950s and early 1960s. Numbers have since been recorded at the Aucklands where it is almost certainly now a resident.

The list of stragglers, recorded once or on only a few occasions, is as follows: long-tailed and shining cuckoos, Australian chestnut-breasted shelduck, Canada goose, black swan, white heron, white-faced heron, little shag and black shag. (Seabird vagrants will be mentioned in a later section.)

Records have also been made of a number of migrant waders—an 'overflow' from the great migratory influx reaching New Zealand each summer from northern hemisphere breeding grounds. Records have been made mainly on Enderby Island at Derry Castle Reef, an outstanding area suitable as resting and feeding habitat for birds of this group on the Aucklands. The species most regularly recorded at the Reef during the Cape Expedition and subsequently was the turnstone; a small flock of up to 100 was nearly always present from about October to April. When Auckland Island banded dotterels gathered in the area they fed with the turnstones along the shore and on the reef at low tide.

The following waders have also been recorded either once or in small numbers: Siberian tattler, wandering tattler, black-tailed godwit, bar-

tailed godwit, red-necked stint, curlew sandpiper, lesser knot, spur-winged plover and Pacific golden plover. R.J. Pierce also identified a stray individual of the mainland subspecies of the banded dotterel in April 1980.

Seabirds

Albatrosses and petrels

We were fortunate at No. 1 Station in being near a nesting colony of the royal albatross. This greatest of southern seabirds had re-established itself on Enderby Island after a lengthy absence, probably not long before the arrival of the first Cape Expedition parties. Unfamiliar and spectacular seabirds, ranging from the magnificent albatrosses and mollymawks to the ubiquitous predatory skua, are perhaps the most memorable feature of subantarctic wildlife. The plant life and land fauna of the Aucklands are closest in affinity to the New Zealand mainland. The seabirds and seals, in contrast, are typically subantarctic. They belong mainly to groups, and even in some cases to species, with a worldwide distribution in the subantarctic zone. The circumpolar zone of relatively cold subantarctic water goes back to the geological opening up of the Southern Ocean. Within the zone a pattern of seabird distribution has been built up controlled largely by the prevailing westerly wind and its accompanying surface water current, at this latitude sweeping almost unhindered round the globe. The Auckland Islands' tube-nosed oceanic birds—the albatrosses and the smaller species of petrel—and the penguins are in the subantarctic category; so, too, are the Auckland Island shag and the distinctive antarctic tern. The only reminder on the Aucklands of the familiar seabird life of the mainland are the two common New Zealand gulls, the red-billed and the black-backed, and the white-fronted tern.

Both species of 'great albatrosses'—the royal albatross and wandering albatross—breed on the Aucklands and on Campbell. The royal is by far the more abundant species on Campbell Island, which has just a few nesting wanderers. The main breeding ground in this region of the wandering albatross is on Adams Island; on the Auckland Islands, the royal albatross breeds only in small numbers (altogether about 60 pairs on Enderby and Adams Islands, and on the north coast of the main island).

Royal albatross

There are two subspecies of royal albatross breeding respectively on the Chathams and on Taiaroa Head, Otago (the slightly smaller Northern Royal), and at the Aucklands and on Campbell Island (Southern Royal). The breeding cycle of the royal albatross is by now perhaps the best known of any seabird: at Taiaroa Head detailed studies have been in progress since 1938; and Jack Sorensen during the Cape Expedition completed a full three years of meticulous observation on Campbell Island's colony. Royals outside their breeding season circle the globe, spending much of this stage of their existence in subantarctic seas off South America before returning by way of the cool waters of the South Indian Ocean and Australia. At the time of the Cape Expedition the nesting royals on Enderby Island numbered perhaps half-a-dozen pairs; later observations have shown that the colony is clearly expanding—15 nests were recorded in 1966, rising to 20 in 1981. This was formerly a large and thriving colony: when Ross said 'considerable numbers' had been discovered in 1840 breeding near Port Ross, he was probably

referring mainly to Enderby.[17] R.H. Taylor in his survey of the human modification of Enderby Island suggests that numbers were probably taken by the Chatham Island Maori party established in 1842–56 on the island and on the adjacent mainland;[18] the Enderby settlers who arrived in 1849 may also have used them for food. The only subsequent record is a reference to albatrosses having been taken by the survivors of the *General Grant* while on Enderby in 1866–67. There were apparently no nests on the island at the time of the 1907 Philosophical Institute of Canterbury Expedition.

In an earlier chapter I recorded my visits to a royal albatross nest on the hilltop a the western end of Sandy Bay on Enderby Island. The first visit was within hours of the chick's hatching, and I was delighted to have been able to time the hatching so closely, for the chick's development could now be recorded for comparison with Jack Sorensen's life history studies on Campbell. Since incubation in the royal takes from 77 to 81 days, the egg in this nest had been laid in early December, the same timing as at Campbell Island, whereas at the Taiaroa Head colony laying is about a fortnight earlier.

I was able to make three subsequent visits, following the chick's development for its first six months. On 19 April at the age of 53 days the chick was a ball of snowy down. The guard period of five to six weeks was now over; however, a parent was resting about 110 yards [100 metres] away and had probably just fed the chick. By this time the chick was thoroughly independent and capable of clattering its beak at us in adult fashion. By 8 July (133 days) the chick still had a full coat of down, but the black wing feathers and coverts had begun to show up. It was now a little over half-grown (in the royal the period from hatching to departure is approximately eight months). Its beak, previously fairly slim and with a slight curve—a 'Roman-nosed' effect—had developed the adult hooked tip. On my final visit on 3 August (186 days) the down had become patchy, revealing most of the white body plumage; the black wing feathers and coverts were now more prominent. I weighed the chick, and it proved to have reached 23 lbs [10.4 kg].

In their final weeks before departure both royals and wanderers gradually shed the last remnants of down. In the royal the first (juvenile) plumage is pure white, except for the black wing feathers and coverts; there is also a variable amount of dark brown marking on back, tail and crown. The wandering albatross, in contrast, has a highly distinctive juvenile plumage, chocolate brown with a white face and white underwings; during the first two years much of this brown plumage is replaced by white, but it is not for at least 10 years that the final adult plumage is assumed. In their fully adult plumage royal and wandering albatrosses are very similar, both having white plumage overall except for the black wing tips; at a distance at sea the two species are often almost impossible to distinguish. Auckland Island birds have a darker adult plumage than the more southern forms of wandering albatross.

On 3 August I examined a second nest noted earlier on a slightly lower ridge to the southwest. Here the chick, possibly three weeks older, had

---

[17] *A Voyage of Discovery.*

[18] 'Influence of man on vegetation and wildlife of Enderby and Rose Islands, Auckland Islands', *New Zealand Journal of Botany* 9 (1971): 225–268.

lost all but a few shreds of down; on its crown it had a well-developed patch of dark brown feathers.

The nests we found on Enderby were no more than shallow cups lined with a little tussock. In his account of the royal albatross in the Cape Expedition bulletin series, Jack Sorensen gives a lengthy description of nest construction, which on Campbell Island involves building up an elaborate mound. Large amounts of tussock, moss and other vegetation are gathered and moulded together with wet peat or mud. The adults may even continue to build the nest during the incubation period, trowelling up any material within reach until the mound is surrounded by a distinct 'moat'. Jack Sorensen believed that the mound was important in keeping eggs and chicks dry on the soft, peaty ground. Here on Enderby the soil conditions and vegetation were very different. The 'moorland' vegetation comprises mainly firm *Oreobolus* cushions and matted ground vegetation, mixed with dwarf *Cassinia* scrub, none of which could be built up readily into a nest mound. The climate, too, is considerably drier than on Campbell, probably rendering elaborate mound construction unnecessary.

The royal colony came second only to the Sandy Bay sea lions as a feature of the wildlife of Port Ross. Visits to view the chick's progress always aroused much interest—when the *Ranui* took us across Charlie Carlson especially was always ready to climb the hill to inspect the 'chook'. It seems likely that the Enderby colony will now continue to expand; the recovery of bush and scrub now that the cattle have been removed may reduce the amount of open habitat available for nesting, but such change is likely to be slow.

Wandering albatross

My introduction to the nesting wandering albatrosses of the Aucklands came in August, a few days after we had reached the Carnley Harbour station to begin the southern survey. We needed to make a track to Wilkes Peak. Our route passed first through bush and scrub, then up a ridge broken at intervals by tussock-clad flats. On one of the flats a wandering albatross chick was sitting in the cup of a substantial nest. It was of nearly the same age as the half-grown royal chick recorded in July on Enderby. The chick took little notice as we approached, just clattering its beak; there were constant bitter snow showers but the nest was obviously getting a good deal of shelter from the surrounding tall tussock.

The main contrast with the royal chick I had been observing on Enderby was in the wanderer's down colour: instead of white this was pale grey, a somewhat deeper shade on the body but paler, almost white, on the head. Another small difference was that the eyelid, black in the royal, was white in the wanderer chick. Under the down on the breast the first (juvenile) body plumage was already clearly visible, in a distinctive chocolate brown colour. I was able to visit the chick at fairly regular intervals from our headquarters at No. 2 Station. The last visit was on 29 October *en route* with George Easton for survey work on Wilkes Peak. The chick's down was by now patchy, revealing much of the brown body plumage and contrasting white face. On this occasion, too, a parent was present for the first time; it was sitting a few yards away, having evidently just fed the chick.

On 22 August Allan Eden and George Easton found a second wandering albatross nest containing a chick of almost the same age at about 1300 feet [400 metres] elevation on the lower slopes of Mt D'Urville. The site

was much more exposed than that on the Wilkes track, amongst sparse tussock little higher than the chick's head. The wanderer nests found by our party, and similar scattered nests in the same area located by parties stationed in previous years at No. 2, seemed likely to be no more than outliers of the great breeding colony on nearby Adams Island. Details of the Adams Island colony have been given in an earlier chapter.

Briefly, the Adams Island colony which is being investigated as part of a major research programme on the group's seabirds, contained an average of 5831 nests in the 1991–97, making it one of the two largest in the New Zealand region (up to 5700 pairs breed at the Antipodes). A smaller group of 200–300 pairs nest at the Aucklands on Disappointment Island. An accurate census of breeding numbers for wanderer and royal albatrosses is much complicated by the fact that these species are biennial breeders; this means that if successful the birds breed only in every second year and, further, success at any one colony may vary from year to year.

The wanderer is completely circumpolar in breeding distribution. Unlike the royal which breeds only in the New Zealand region its colonies are situated on islands right round the globe in the subantarctic; perhaps the largest outside the New Zealand area are on South Georgia and the Prince Edward (Marion) Islands. There are several subspecies, including one on each of the Aucklands and the Antipodes. Of the world's total population of wanderers no less than half are found in the Auckland Islands and the Antipodes.

The Wilkes track wanderer chick was of special interest since on its discovery on 18 August it appeared to be approximately half-grown; this stage was reached by the royal chick on Enderby some five weeks earlier. The timing of the wanderer breeding cycle on the Aucklands had already attracted the interest of the naturalists at No. 2 Station, Charles Fleming and Bill Dawbin; their impression based on observations had been of a comparatively late season. The stage reached by the Wilkes track chick on 18 August confirmed this; laying had obviously been at least a month later than that of the Enderby royals. When we visited the Adams Island colony later the chicks seemed to be of a roughly corresponding age, although there was clearly a fair degree of variation in age throughout the colony. It seemed likely that the main laying period had been from mid-January to February;[19] the incubation period as in the royal is about 80 days, but the chick takes about a month longer to develop than in the royal, that is nine rather than eight months. This would mean that, allowing for the longer development period, the Wilkes track chick, aged about four months on 18 August, would have hatched in mid-April, from an egg laid in late January.

White-capped mollymawk

The mollymawks, which are slightly smaller than royal and wanderer but included also in the albatross family, are well represented in the New Zealand subantarctic. Only the white-capped mollymawk breeds on the Aucklands, but two species (black-browed and grey-headed) on

[19] Recent research has shown that the impression of a comparatively late breeding season at the Aucklands was incorrect, probably since the observations during the Cape Expedition (Fleming, Dawbin, Turbott) were based upon so few nests. Laying has now been shown to reach its peak in the first week of January (earliest 29 December, latest 5 February). (See Kath Walker and Graeme Elliott, *Emu* 99 (1999), 239.)

Campbell. In all mollymawks the black or dark-grey upperwings are joined across the middle of the back by a dark saddle, whereas in the two 'great' albatrosses this area is white. Underneath, the wings in mollymawks are white with a variable dark border, each species having a quite distinctive underwing pattern. Their flight, like that of the 'great' albatrosses, is stately, a masterly performance of effortless ease even in the highest winds.

The white-capped mollymawk breeds at three points in the Aucklands. By far the largest colony, that on Disappointment Island, reaches the remarkable figure of 70,000–80,000 nests according to a recent estimate. Smaller numbers breed on the main island at Southwest Cape and a few at the southwestern end of Adams Island. I was able to see only a little of the mollymawks. On the first of my two visits to the Southwest Cape colony, the birds were not in occupation. I spent a short time ashore on Disappointment Island, described in an earlier chapter. Mollymawks breed in dense colonies, abandoning the area for the winter months, but returning in approximately September–October; the development of the chick takes only about four months (the incubation period is about 70 days), so that the cycle relative to that of the larger albatrosses is much reduced.

I had experienced the noise and constant activity of a mollymawk colony previously during a visit to the Chathams in 1937–38 with Charles Fleming, so was prepared on reaching the Cape on 4 December for the constant arrivals and departures and for the din produced by the birds' weird bleating cries. The colony contained only a few hundred nests. Numbers were difficult to estimate since most were on ledges well down the cliff face. The lush vegetation growing on the heavily fertilised ground of the ledges included many flowering megaherbs (*Anisotome*, *Stilbocarpa, Bulbinella*) amongst which the nests were closely packed. Each nest was a well-built mound composed mainly of peaty earth, sometimes with a little green plant material. On ledges near the top where the nests were accessible we could investigate the sitting birds, which proved to be on eggs at an early stage of incubation (laying takes place throughout November and December). A few late breeders, however, were still performing courtship ceremonies, with much head-swaying and a variety of elaborate gestures, including intertwining of bills.

Accompanying this was constant calling—noisy 'bleating' or braying followed by a deep-throated drawn-out croak or rattle. The latter call was also delivered as a greeting to arriving mates. The birds' bills and facial skin are strikingly colourful. In the white-capped mollymawk the bill, mainly bluish-white, has a lemon-yellow tip; along the line of feathers at the base of the bill is a narrow line of black skin and on the lower mandible an additional orange-yellow streak. When the birds call the interior colouration of the mouth can also be seen; both mouth and tongue are pale purple. This visit was too early for us to see the chicks; they are much alike in all mollymawk species, clothed in dense, pale-grey down and with black beaks.

The Southwest Cape mollymawk colony is highly vulnerable to disturbance by pigs. We could see that there had been much pig movement about the tussocky area along the clifftop; this accessible area contained just one nest on which a bird was sitting on its egg. The

topmost fully occupied ledge was about 8 feet [2.5 metres] below the clifftop, down far enough to make it inaccessible to pigs. Clearly but for the pigs the colony would have extended up on to the higher slopes. It seemed likely however that the pigs had made the area uninhabitable by their constant search for palatable megaherbs, rather than by attacking the birds and nests; it seems unlikely pigs would attack birds of this size.

A somewhat similar situation on Campbell Island was described by Jack Sorensen in *Wild Life in the Subantarctic* where the rich vegetation of the mollymawk colonies attracted feeding sheep—these would forage right up to the nests often causing the chicks to overbalance either on to the surrounding muddy ground or over ledges to the colony below.[20] In neither case were the chicks able to return to the safety of the nest. Sheep were removed from this part of Campbell Island in 1970.

Mollymawks

The white-capped mollymawk is one of a group of four subspecies, along with Salvin's mollymawk, the Chatham Island mollymawk and the Australian shy mollymawk, restricted to the New Zealand-Australian region (the total population of the Australian subspecies of about 5000 pairs breeds on islands in Bass Strait and off southern Tasmania). In contrast, the black-browed and grey-headed mollymawks, which form the great colonies of Campbell Island, are of circumpolar distribution. There are large colonies of both species on South Georgia, and the black-browed especially breeds in immense numbers on the islands of the Cape Horn region and on the Falklands.

Light-mantled sooty albatross

The fourth member of the albatross family breeding on the Aucklands differs from the others in its mainly solitary nesting habits (occasionally a few may group together) This bird, the light-mantled sooty albatross, was of much interest to Cape Expedition parties since its unfailing return in October was recognised as heralding the end of the winter months. There were breeding sooties quite close to the Carnley Harbour station, while at Campbell several pairs nested on Beeman Hill near No. 3; even at our No. 1 Station where the closest nest was at Dea's Head we began to see them offshore promptly in early October. Sooty albatrosses on the wing cannot be mistaken, with their graceful, comparatively slender bodies and narrow wings; head, tail and wingtips are sooty-brown, but the back ('mantle') and underparts are ashy-grey. At close quarters a narrow blue line can be seen running along the lower bill, and there is a distinctive half-circle of white feathers behind the eye. At the nest sooty albatrosses appear remarkably unconcerned, continuing with courtship displays or feeding chicks no matter how often the nest is visited. The nest is substantially constructed of peaty soil and vegetation, sometimes on the narrowest of cliff ledges. Courtship displays, as in the other albatrosses, are elaborate and are accompanied by much loud calling; the call is a distinctive, far-reaching 'pee-oo'. Jack Sorensen completed a most exhaustive study of the light-mantled sooty albatross at Campbell Island; his results form *Bulletin No. 8* of the Cape Expedition series.

The only nest of this species I was able to examine reasonably closely was situated on an inaccessible ledge on the northern face of Dea's Head. Here on 18 May the almost fully-fledged chick could be seen from below moving about on the now much-flattened nest mound waiting impatiently to be fed. Most of the young sooties departed by the first

[20] Christchurch, Whitcombe & Tombs, 1951, p. 41.

week of June, the breeding grounds remaining deserted until October. On Adams Island in November we could see sooties wheeling round the inland cliffs both north and south of the main ridge, and hear their penetrating cry coming from the nest sites. A number were seen, too, from the summit of Cavern Peak circling round the great cliffs leading down to Deep Inlet, and were evidently nesting in that area.

The light-mantled sooty albatross is another circumpolar species breeding right round the globe in the subantarctic. Its greatest concentration is probably in the New Zealand region (Auckland Islands, Campbell and Macquarie Island).

Buller's mollymawk

In winter and spring a further member of the albatross family, Buller's mollymawk, appeared at the Aucklands in small numbers. The first records were of birds seen singly in June and July off the coast in the Ranui Cove area; later after we arrived at the Carnley Harbour station on 15 August a group of up to eight was seen regularly inside the harbour for several weeks (last recorded on 5 September). Once the group fed in association with one of the ever-present rafts of Auckland Island shags. All were adults, and were readily identifiable as southern Buller's mollymawks: this subspecies, which breeds on the Snares and Solander Islands, is distinguished by its grey head with conspicuous silvery-white forehead. Recent research has shown that while the breeding season of the northern subspecies (Three Kings and Chathams) extends from October to June, that of the southern (Snares–Solander) subspecies is remarkably late (laying from December to February; departure in August-October). The greater part of the population of both subspecies migrate to the eastern Pacific after breeding, many remaining for the non-breeding season off the coasts of Chile and Peru. The Auckland Islands are probably well outside the normal range of mollymawks from the Snares, but these records late in the season might be explained if these were birds that had left the colony early because of failure to breed.

Giant petrel

The two species of giant petrel (or nelly) are comparable with the albatross family in size, but belong to a distantly related group of the same order (*Procellariiformes*: the tube-nosed oceanic birds). The species breeding on the Auckland Islands is the northern giant petrel. We visited the small colony at the western end of Adams Island on 15 September, on which date the birds were sitting on half-incubated eggs. The nest like those of the albatrosses is a generally substantial mound of tussock and other vegetation; the chicks, clothed in pale-grey down, resemble young albatrosses but spend a much shorter time in the nest—less than four months.

Recent expeditions have found that this species now nests also on several islands in the Port Ross area (Enderby, Rose, Ocean) and on Disappointment Island. Giant petrels, in addition to feeding voraciously on offal of all kinds, are well known as active predators on young and even adult penguins, and other seabirds; dead seals or whales are a particularly favoured food source, the birds returning repeatedly to the decaying carcasses in vulture-fashion until all is finally demolished. Their flight is somewhat stiff, falling short of the full stately soaring of the albatrosses. It seemed likely that some, at least, of the birds recorded at Port Ross in January-May—often close in below the cliffs to the east at Ranui Cove—were southern giant petrels. Two were seen with overall greyish-white plumage, much paler than the greyish-brown of the

northern species (in both species the juvenile plumage is a dark sooty brown). On 15 May Len Hoskin described a giant petrel flying close inshore off Tucker Point which was in completely white plumage except for a few black spots—the typical 'white phase' of the southern giant petrel.

Burrowing petrels

The only burrowing petrel still able to breed at all commonly on the main island, although subjected to the depredations of pigs and cats, is the antarctic prion. In contrast, on the Port Ross islands and Adams Island there are, in addition to the prions, often dense populations of three further species: sooty shearwater, white-headed petrel and diving petrel. These islands are also the main breeding ground of three species of storm petrel, which are apparently present in much smaller numbers.

While our visits to the Port Ross islands were never long enough for a detailed investigation of the petrel nesting grounds, some impression of the species present could always be gained by checking on the activity of the highly predatory skuas. The results of the skuas' nightly raids upon the breeding petrels appeared at their 'middens'—spots to which they carried the captured birds to be killed and consumed, or divided up for feeding to the skua chicks. Discarded petrel heads, wings and feet were perfectly identifiable; and pellets containing the remains of smaller items eaten whole were often regurgitated. The midden we were able to inspect most regularly was on Ocean Island. It always contained remains of the two larger burrowing species, the sooty shearwater and the white-headed petrel. Neither appeared to breed on Ocean Island, but they had apparently been brought from the breeding grounds on the larger adjacent islands, Ewing, Enderby or Rose. Skua middens on Enderby Island commonly contained remains of the same two species, together with smaller numbers of prions. However the diving petrel and the three species of storm petrel apparently manage to escape the marauding skuas.

Sooty shearwater

The midden remains and investigation of a limited number of burrows suggested that on Enderby by far the commonest breeding petrel was the sooty shearwater. This impression has since been confirmed by extensive field studies of the burrowing petrels of the Auckland group; in particular, immense numbers breed on Disappointment Island, almost equalling in density the great colonies on the Snares. All through the summer from the time of our arrival in December feeding flocks of sooty shearwaters were a familiar feature of our trips about Port Ross. They fed, sometimes in company with prions and cape pigeons, on shoaling fish, plunging in repeatedly after much wheeling and gliding above the shoal. The stomach contents of one specimen consisted of a paste containing remains of a small, silver-skinned fish, too fragmentary to be identified. Krill and squid are probably also eaten.

Sooty shearwaters (the well-known 'mutton birds' of Stewart Island) have a uniformly dark brown plumage, often with a conspicuous silvery-grey patch on the underwing. They breed over a wide area from offshore islands and headlands in northern New Zealand to the Chathams, Snares, Aucklands and Campbell Island; their range beyond New Zealand includes several islands off southeastern Australia, Macquarie Island and islands in the Cape Horn region and the Falklands. This species is a migrant to the North Pacific after breeding, appearing in large flocks in the waters off Japan and North America. We recorded the last sooty

shearwaters before departure in early April; they were seen again for the first time on 4 October when we passed through a large flock off the Carnley Harbour entrance.

White-headed petrel

Of the burrowing petrels, the white-headed petrel is second in numbers only to the sooty shearwater on the Aucklands. It is never seen amongst the feeding flocks of petrels offshore. After visiting the burrow this species flies directly out to sea, and even there the birds feed alone or in small groups rather than in flocks. On Adams Island we camped 18–26 September in a small bay almost opposite Trinity Cove, just inside the western arm of Carnley Harbour; there was evidently a white-headed petrel colony on the adjacent headland, from which throughout the night we could hear a chorus of high-pitched shrieks. We had a powerful Coleman lamp that tended to attract the calling petrels; finally one landed at our feet in front of the tents. This was my first close view of this handsome species: a heavily-built petrel with a jet black bill, white face relieved by a dark eye patch and warm grey back. The white-headed petrel, unlike the sooty shearwater, is non-migratory but spends the non-breeding season well out to sea; most are believed to move northwards for the winter into more temperate waters. Its breeding range includes the South Indian Ocean subantarctic zone (Crozets, Kerguelen) and Macquarie Island, as well as the New Zealand subantarctic (Antipodes and Auckland Islands).

Prions

Prions (or whalebirds) are medium-sized petrels widely distributed round the world in both subantarctic and antarctic zones. Blue-grey above and white below, they are often difficult to spot in the distance at sea until as they wheel their white underparts flash in the sun. Of the six species, four breed in the New Zealand region; the remaining two species are regular visitors to New Zealand waters. Baleen-like lamellae inside the base of the bill, used to filter out krill and other planktonic organisms, are most prominently developed in the broad-billed prion, the species breeding abundantly in the Stewart Island area and on the Chathams. Of the two prions found on the Aucklands one, the fulmar prion, is evidently present only in small numbers: we saw this species occasionally offshore and there are breeding records from Rose, Ewing and Ocean Islands. The common breeding species, the antarctic prion, is, however, widely distributed throughout the group. In summer we constantly saw flocks numbering many thousands offshore in the Port Ross area; on 23 February on a trip to the emergency hut at Kekeno Point we passed through flock after flock each containing hundreds of feeding prions.

Antarctic prion

The antarctic prion elsewhere in its range it is immensely abundant, probably one of the most numerous of all southern seabirds: its breeding population on South Georgia alone has been estimated at many millions. Except on the Auckland Islands the breeding grounds of this species are in the open, usually in peaty tussock. On the Aucklands, although there are a few colonies in open situations such as the Enderby Island cliff tops, most burrows are located in the forest fringe. It seems likely that the greater part of the prion population of the Aucklands is distributed throughout the main island and Adams Island in this type of habitat. A record of this species in the coastal forest of Chambres Inlet in early March is mentioned by Allan Eden in *Islands of Despair*; he says that on being awakened by a scratching sound he investigated and found a prion making repeated attempts to climb up the canvas of his tent. The

burrows in a clearly occupied colony that I examined at Camp Cove in Carnley Harbour on 26 October were long and tortuous, winding deeply amongst the ancient rata roots; there were blue-grey prion feathers and droppings at the burrow entrances and I could hear a harsh cooing note from within. On 3 November, at another colony in nearby Coleridge Bay, the birds could be heard calling from deep in their burrows.

Diving petrel

The fourth of the common Auckland Islands burrowing petrels, the diving petrel, is quite distinctive. Diving petrels with their rounded, quail-sized bodies and whirring flight bear little resemblance to the graceful shearwaters and other larger petrels. When we disturbed them on a trip to Ewing or Enderby they would make a brief flight close to the surface before plunging in to reappear at some distance. Large numbers breed on Enderby Island; there were also a number of burrows on Ocean Island which in January contained well-grown chicks. Unlike the three previous species, the diving petrel did not leave the area after breeding but was seen regularly all through the winter about Port Ross.

The distribution of the common diving petrel is circumpolar, various subspecies breeding on islands round the globe in southern temperate and subantarctic zones. The very similar South Georgian diving petrel, found mainly in the colder section of the subantarctic, was discovered breeding on tiny Dundas Island during the Cape Expedition. Early records indicate that it also originally bred on Enderby Island. Recent expeditions have been unable to find any sign of the Dundas Island colony, and it is believed that the trampling hoofs of introduced cattle finally destroyed the Enderby colony.

White-chinned petrel

The white-chinned petrel, a widespread species with colonies on most of the circumpolar subantarctic islands, breeds in large numbers on Disappointment Island. Elsewhere on the Aucklands it nests in scattered localities only (it is recorded on Ewing, Adams and, in very small numbers, on the main island). Its plumage is uniformly blackish brown, with a small white patch of varying size under the chin; the bill is pale-yellowish to almost white. One of the largest of the burrowing petrels, this species with its heavy build is well capable of dealing with skua attack: this is clearly indicated by its behaviour, for the birds often come back to the breeding colony in late afternoon in full daylight, even landing unhesitatingly at the burrow entrance.

At the far western end of Adams Island on 5 November at about 6.30 p.m., in full daylight, one flew round us curiously as we worked on a survey station. White-chinned petrel burrows may be quite shallow, but end in a spacious nesting chamber, in which a nest mound is constructed of earth and tussock—at times quite necessary if the burrow is in a wet situation. Apart from the occasion mentioned, we saw little of this species; however, when we made a brief landing on Disappointment Island on 9 December, our first point of investigation, the shed with its partly decayed lifeboat, proved to be in use as a nest site for three white-chinned petrels. The birds were clearly visible under the boat in the dim light. Each was on a firmly built nest mound of dry tussock containing a single white egg. A strange clacking cry, one of the many calls of this highly vocal species, met me when I crawled in to investigate. On an adjacent slope were numerous burrow-mouths, mainly dug into the wetter slopes; out of several came the same loud clatter from the sitting birds.

Little shearwater

Although there were no noteworthy new discoveries, observations on two petrel species were of special interest. Previous parties had, at Bob Falla's request, made a special effort to check whether the subantarctic little shearwater bred on the Aucklands. This southern form of a species of almost worldwide distribution breeds, in the New Zealand region, on the Chathams and Antipodes. The species had been seen offshore in previous years, but no evidence of breeding could be found on the group. Again during our year a careful watch was kept on all trips offshore; our first record came on 15 August when, off the east coast opposite Norman's Inlet in the *Ranui*, I saw a single little shearwater flying rapidly away ahead of the ship. Then on the way back to Port Ross from Disappointment Island on 9 December, one appeared among the feeding diving petrels off Derry Castle Reef on the north coast of Enderby. Before we rounded Northeast Cape, 10 more had been recorded. It was interesting to see them flying close to the surface before plunging in; their gliding flight and more angled dive were quite different from the hurried movements of the diving petrels.

The second interesting occurrence now seems likely to have been just a straggler. At the time, however, it seemed quite possible that a new breeding species for the group had been found. On 22 January the headless body of a mottled petrel was discovered in a deposit of skua-killed remains along the coast from the station at Tucker Point. This species, a little smaller than the white-headed petrel but belonging to the same general group, breeds in considerable numbers in Fiordland, on islands off Stewart Island and at the Snares; it is known to range widely from its breeding grounds and would thus be quite likely to arrive as a stray at the Aucklands.

Storm petrels

The three species of storm petrel breeding on the Aucklands have been mentioned: all appear to be present in the group in only small numbers and none of the three appeared in our records of petrels in coastal waters. However, both black-bellied and grey-backed storm petrels have been seen regularly by recent expeditions close in to the Enderby north coast. Skua-killed remains of the black-bellied storm petrel have also been found on Enderby so that the island is almost certainly a breeding area; this species has also been found ashore at night on Ewing Island. The black-bellied is the commonest of the storm petrels in the waters surrounding the group; it is frequently recorded, too, on the adjacent deepwater trawling grounds. It is circumpolar in breeding distribution, with especially large colonies on the South Shetland Islands (South Atlantic) and Prince Edward Islands (South Indian Ocean).

Grey-backed storm petrel

Two apparently quite small colonies of grey-backed storm petrel were among the discoveries of the November 1972–March 1973 research expedition. Both occupied tussock slopes, one on the northern side of Adams Island below The Dome and the second on the main island near Southwest Cape. We made a record on 17 November that also indicated the presence of this species in the area to the north of The Dome—an egg found by George Easton out in the open near sea level, on the tussock-clad floor of the valley just to the west of Grafton Point (the egg was later identified by Edgar Stead as belonging to this species). It seems quite likely that further scattered colonies will be found, and that this species breeds fairly widely on Adams Island. Like the black-bellied storm petrel, the grey-backed storm petrel is of circumpolar distribution; it is,

however, more widely established in the New Zealand region (abundant on the Chathams and Antipodes, less so on the Aucklands and on islets off Campbell Island).

White-faced storm petrel

The third of the group's storm petrels, the white-faced storm petrel, was amongst the birds delivered into our hands at Ranui Cove by the station cat. On the evening of 22 February, Alan Paine took an almost undamaged specimen from the cat. It was in juvenile plumage, although showing no traces of down, and thus seemed likely to have been caught as it emerged from the burrow. Previous parties had found remains of this species in the Port Ross area; there are, however, no records from any other part of the group. Unlike the two previous species, the white-faced storm petrel is mainly subtropical and temperate in distribution. In the New Zealand region it is the common storm petrel of mainland coastal waters; there are also immense breeding colonies on the Chathams. Its breeding grounds extend into subantarctic waters at two widely separated points: the Port Ross area of the Aucklands and remote Gough Island in the South Atlantic.

Cape pigeon

Perhaps the most conspicuous and familiar of the petrels throughout the whole of our year was the chequer-board patterned cape pigeon. Cape pigeons are inveterate scavengers. The *Ranui* was never without a small satellite flock hopeful for a handout of scraps; they would even follow us on outboard trips about Port Ross and into the more remote arms of Carnley Harbour. Several would always be in sight on the longer journey between the mainland and the Aucklands.

Much interesting information has been obtained on this species since the days of the Cape Expedition. It is common and widely distributed from the antarctic continent northward to the circumpolar subantarctic, breeding all round the antarctic coast and on many subantarctic islands. The cape pigeons commonly seen in New Zealand seas probably include large numbers from these southern breeding grounds. It has long been realised, however, that some cape pigeons in the New Zealand region are of a slightly smaller subspecies. An expedition in 1947 to the Snares at last discovered colonies of this smaller race, now known as the Snares cape pigeon, on the Western Reef of that group. The breeding range of the Snares cape pigeon has since been extended to include the Bounty Islands and Antipodes; on the 1972–73 expedition to the Auckland Islands a colony of approximately 200 pairs was discovered on Beacon Rock, the outlier at the entrance to North Harbour. In 1987 it was found to have established new colonies at three localities in the Chathams. The cape pigeon, unlike most small and medium-sized petrels, is not a burrower, but nests in the open on rocky ledges, or sometimes in a crevice or small cave. The breeding season of the Snares cape pigeon extends from November to February; however, the season is some three weeks later at the great antarctic colonies.

Penguins

Three species of penguin breed on the Aucklands. The rockhopper and the yellow-eyed penguin are present in moderate numbers but the third, the erect-crested penguin, is represented by just a few pairs attached to the small rockhopper colony on Disappointment Island.

Rockhopper penguin

The rockhopper, the smallest of the crested penguin group, in most parts of its range forms dense colonies on exposed rockfalls or steep rocky slopes. Its name is an apt description of its remarkable hopping gait, often with flippers held back and head forward—quite different from the

waddling walk familiar in most penguins. Rockhoppers are amazingly active, climbing vigorously on steep slopes using a combination of claws, bills and flippers. They also use all three when scrambling ashore through the formidable surf of rocky coasts. We saw Snares crested penguins briefly on the journey down. Although smaller, the rockhopper has the same stout mahogany-brown bill and bright-yellow crest; however, instead of a single swept-back streak of yellow above the eye the crest in the rockhopper divides at the back into separate upwards and downwards tufts. It has slaty-black upperparts, white breast and abdomen and pink feet. A special rockhopper feature is the eye colour—instead of brown as in most species of crested penguin, a fiery red.

We saw only a few visiting groups of rockhoppers during the year. On 20 February a party of eight gave a quite spectacular display as we moved up Port Ross towards Erebus Cove. They were 'porpoising'—using their swimming speed to emerge in a series of graceful curves—and were moving so fast that they easily outstripped the outboard. It was only towards the end of the year on our brief visit to Disappointment Island on 9 December that we were able to examine rockhoppers at closer quarters. On the eastern side of the island just above the landing in Castaways Bay, a colony of scattered nests was situated amongst the dense megaherbs and other waist-high vegetation; in each was a rockhopper sitting on one or two eggs. There was even a single bird standing quietly in the shelter of the decaying lifeboat under the shed, where three pairs of white-chinned petrels had nested. Rockhoppers are generally described as aggressive, even ferocious, towards human visitors; the Disappointment Island birds seemed prepared to just sit quietly unless really disturbed, but this may simply have meant that they had not been continuously subjected to the intense interaction of a teeming, densely-packed colony.

In distribution the rockhopper is circumpolar—it is perhaps the most widespread of all penguins. There are vast colonies on subantarctic islands in the South Indian and South Atlantic Oceans, off Cape Horn and in the Australian and New Zealand subantarctic. In the New Zealand region, the two main centres apart from the Aucklands are Campbell Island and the Antipodes. At the time of the Cape Expedition, the Campbell Island colonies were estimated to contain some 800,000 pairs; although a drastic decline of this species throughout the New Zealand region has since occurred, Campbell is still the centre for large colonies totalling at least 50,000 pairs. The comparatively small breeding population of the Auckland Islands in contrast to Campbell has always been of much interest. While a number of factors are almost certainly involved, including perhaps the warmer sea temperature of the Aucklands, there would seem to be a good deal less suitable breeding habitat on the Aucklands than on Campbell. The Campbell Island colonies occupy mainly the tumbled rockfalls at the foot of exposed seaward slopes. On the other hand, on the Aucklands, the south coast of Adams and the western coast of the main island, which correspond most closely to the Campbell Island sites, consist largely of sheer cliffs.

The 1972–73 research expedition made a special effort to locate and count all the Auckland Island rockhopper colonies, obtaining an estimated total of roughly 3600 pairs. Four colonies each of up to 500 pairs were found at the foot of the western cliffs a little to the north of

Bristow Point; in addition, there were two colonies of about the same size on the north coast just round Northwest Cape. These colonies were quite inaccessible but could be counted in calm weather from the expedition vessel lying offshore. On the eastern coast several smaller colonies, accessible by land, were discovered on headlands between the fjord-like inlets. The amount of habitat available on the east coast, it should be noted, is limited as the shoreline here is mainly forested to the water's edge. To these totals must be added the apparently small number on the eastern side of Disappointment Island. Although in some parts of their range rockhoppers nest amongst tussock, the cover of dense vegetation on Disappointment probably effectively limits the size of this colony.

At the end of the nesting season, rockhoppers desert their colonies to spend the winter at sea. On Campbell Island, Jack Sorensen found that they were completely absent for at least four months; after breeding the birds spent most of the month of April undergoing their annual moult, and on its completion went off to sea returning again in the following spring.

Erect-crested penguin

The erect-crested penguin, a considerably larger species, is endemic to the New Zealand subantarctic. It breeds in large numbers on the Bounty group and on the Antipodes forms large mixed colonies with the rockhopper; a few formerly bred amongst the rockhoppers on Campbell. This species has also been found breeding in company with the rockhoppers on the eastern side of Disappointment Island, but the total number is unlikely to be more than two or three pairs.

Yellow-eyed penguin

The yellow-eyed penguin, a complete contrast to the rockhopper in both appearance and habits, was the familiar penguin of our year on the Aucklands. It does not, like the rockhopper, leave the breeding area on the conclusion of nesting. Its sedentary habits meant that anywhere about the coast or within the lowland forest zone we might meet penguins at different stages in their life cycle throughout the year. Handsome in their slaty-grey and white dress with brownish-red bill and pink feet, yellow-eyed penguins are most impressive; a band of yellow feathers beginning at the eye circles the back of the head, and the eye itself is pale yellow. Slender and quite tall—an average height of 30 inches [75 cm]—they walk on flat ground with a stately rolling gait, but are remarkably agile negotiating tree trunks and more rugged terrain.

With penguins it is almost impossible to avoid the sheerest anthropomorphism. Allan Eden in particular obtained much entertainment from the penguins met by the survey party in the course of various field camps. He says in *Islands of Despair*:

> We also found that our camp [on Enderby Island] was located on the established route of a number of yellow-eyed penguins. Every evening they would approach from the beach, and when they reached the camp they would stop abruptly and stare at us in utter disbelief, turning their heads slowly from side to side. After about fifteen or twenty minutes it would occur to them to make a detour, and off they would go. Sometimes, however, they would not think of that, and the whole contingent would silently return to the beach. On one such occasion I followed them and found that the whole party had formed a rough circle on the beach, and was discussing the matter with the seriousness that it undoubtedly merited. These

> penguins are quite attractive birds, but their appearance is rather spoilt by the pallid yellow eye with its tiny pupil… (p. 36)

Later while clearing a track on the south coast of Adams Island the party upset the routine of the local penguin colony:

> As we were returning to camp we met some of these birds on their way up their well-beaten and rather greasy track. They have a definite system about this. One bird appears to go ahead as a scout, and he is followed by others at intervals of about one hundred yards, while the main body of birds is a considerable distance back. Periodically the leading bird gives an 'all clear' signal, which is relayed down the line, and everyone is happy. However, on this occasion, probably for the first time ever, the leading bird encountered trouble in the shape of Les and me, and he emitted a piercing scream of alarm, which was echoed down the line. He then turned about and beat an undignified retreat to his followers down below (p. 121).

As in the case of the royal albatross, pioneer life history studies by the late L.E. Richdale on the Otago coast, followed by much intensive field research, have meant that the yellow-eyed penguin is now one of the world's most thoroughly investigated seabirds. A primitive penguin and endemic to the New Zealand region, its total range comprises only the southeastern South Island, Stewart Island and its outliers, and in the subantarctic the Auckland Islands and Campbell. Its characteristic habitat makes it unique among the world's penguins: it breeds not in immense, noisy colonies but in isolation, preferring hidden, shady forest sites. On the mainland this type of habitat is now, of course, greatly disturbed by settlement: as a result almost any reasonably sheltered nest site may be used, including coastal caves, burrows at the base of flax and tussock or even a fallen tree in open country.

The breeding season as recorded on the Otago coast begins with the occupation of nest sites in late August, followed by laying in early September to mid-October (records from the subantarctic suggest that the season there begins about a fortnight later). There are normally two eggs; the incubation period is variable, usually about 43 days. The chicks on hatching are clothed in a greyish-brown down. They remain in the nest area until fully feathered at the age of about four months, and throughout this period are fed regularly by the parents. There is a six-weeks guard period during which one or other of the parents is always at the nest, but after this the chicks remain alone on the nest site. Soon after the departure of the chicks (on the Otago coast this is usually during late February to early March), the adults begin their annual moult. As in all penguins this involves the replacement of the complete coat of feathers; the birds must fast throughout, for during the moult they are quite unable to go to sea.

The daily life of the yellow-eyed penguin includes excursions each day into the surrounding waters to feed, followed by long periods of preening and resting ashore. On a Ewing Island trip there would always be several resting at ease on the coastal boulders or just inside the *Olearia* forest; on an evening visit to the island on 2 January several landed at 9 p.m.—still quite light at this latitude—evidently in preparation for spending the night ashore. We met them regularly swimming and diving in the comparatively calm waters of both Port

Ross and Carnley Harbour. Sometimes they gave a display of 'porpoising', especially interesting to watch since their action was quite slow and leisurely compared with the spectacular leaps from the water of the more lively rockhoppers. On a visit in July to Derry Castle Reef on Enderby, we witnessed the emergence through the roaring surf of a couple of penguins, presumably just returning from fishing and clearly capable of handling the hazards of this fully exposed coast. They came ashore quite often on the stretch of sheltered coast leading north from Ranui Cove to Tucker Point. The full call—a not unmusical trumpeting delivered with wide-open beak stretched skywards—carried easily from the shoreline to the station, and even to the Lookout on the hill above.

The Otago research has shown that the moult of the breeding adults takes about three weeks: it evidently finished at the Aucklands in about mid-April, since from then on we began to see penguins in glistening fresh plumage. I met one in particularly fine dress on 28 April just as I reached the top of the hill during my routine visit to the Lookout. After leaving the nest site the young birds spend three to four months at sea, only occasionally coming ashore to some secluded beach; at the end of this period they join the adults in the neighbourhood of the breeding grounds, finally moulting into full adult plumage at some stage after the commencement of the new nesting season. On 5 March we found one such moulting juvenile, surrounded by most of its shed feathers, sheltering amongst the rocks of the south coast of Ocean Island.

Sadly it seems that the yellow-eyed penguin at present has only limited success in breeding in the forest fringe of the main Auckland Island. Although we met them wandering about in the neighbourhood of the station at Ranui Cove and on the nearby coast, we did not find nests. The larger Port Ross islands—Enderby, Rose and Ewing—were clearly important breeding centres. We were not on Adams Island long enough to locate nests, but birds were seen coming ashore in numbers and moving up to higher levels. The presence of cats is almost certainly a major deterrent to breeding by this species on the main island. This is borne out by all recent studies on the Otago coast, where among various threats to the breeding penguins wild cat predation has been found to be an especially serious threat to the young chicks. Even though a parent may be standing guard, cats have proved quite capable of snatching a chick without any serious interference on the part of the adult. Although extensive nesting grounds are available on the cat-free islands in the group, it is certainly much to be regretted that the forested main island, exactly the type of habitat preferred by this species, does not support larger breeding populations.

Auckland Island shags

The view at Crozier Point was to become thoroughly familiar. The point was about half a mile [1 km] from our station at Ranui Cove, just at the southern boundary of the comparatively sheltered waters of Port Ross. The tall cliffs of the eastern coast are broken by the indentation of Webling Bay, then rise steeply again towards Kekeno Point. Out to sea patches of white surf indicate the position of the reefs round little Dundas Island and, further out, of even smaller Green Island. The point was the site of the nearest breeding colony of Auckland Island shags, occupying the ledges below almost right down to the water's edge. A few ledges were accessible near the top.

The colony represented a chance to dovetail in some regular field observation as a relief from station routine. Earlier in the season the colony extended on to the neighbouring open ground, but Bob Falla had arrived here to find this section had been completely destroyed by pigs overnight. On my first visit on 2 January only a little scattered and dying scrub and a few rooted-over nests remained to indicate the position of the area attacked. However, on the ledges below the season was in full progress. In all nests to the south of the point and those on the lower ledges to the north there were well-grown chicks. I was pleased to find on several of the higher northern ledges a few nests containing eggs or recently hatched chicks. The pairs displaced by the pig attack had evidently re-nested on these ledges; and the nests, although quite inaccessible to pigs, could be fairly easily reached.

We met flocks of this handsome black-and-white shag all round the coast, roosting on headlands or fishing in lively 'rafts' offshore. There are numerous breeding colonies throughout the group, with perhaps the greatest concentration on the northern coasts of Enderby and Rose Islands. The species is endemic, one of a section of the shag (or cormorant) family of worldwide distribution on subantarctic islands and coasts; all are distinguished by pale pink feet and by a highly conspicuous eye-ring varying in colour from bright blue to pink. While mainly of subantarctic distribution, in the New Zealand region the group includes three species inhabiting more temperate waters: these are the king shag of the Marlborough Sounds, the Stewart Island shag and the Chatham Island shag.

As in most shags, a series of well-marked plumage changes correspond to the various stages of the breeding season. Full breeding dress in the Auckland Island shag is assumed in late winter and early spring, well before the re-occupation of the colonies in October. The blue-black to greenish-black feathers of the crown, neck and back take on a silky sheen. A conspicuous forward-curving, erectile crest of black feathers develops on the crown; there may also be an additional display of scattered white decorative feathers on face, neck and thighs. However, the most notable feature at this stage is the brightly-coloured facial skin which becomes a deep reddish-purple; there is also a yellow streak at the base of both upper and lower mandible. The eye-ring (the eyelid) is in most individuals pink or purplish-pink, although this is variable, ranging through mauve to violet. The throat pouch, visible when extended, is bright red. All this changes as egg laying and incubation get under way. There is a marked reduction in the sheen of the plumage, the facial colouring becomes less intense, and the crest disappears or is be represented by only a few remaining feathers.

An interesting plumage feature in the Auckland Island shag is the conspicuous white wing-bar, present in most individuals but sometimes completely absent; in some there is also a prominent white patch on the lower back. In two species of blue-eyed shags inhabiting the Cape Horn region and the adjacent Antarctic Peninsula, the white wing-bar and dorsal patch are assumed only after the commencement of incubation, but in the Auckland Island shag they seem to be purely individual markings retained throughout the year. The extent of black feathering in the region of the throat also varies greatly; this is sometimes almost joined across the throat, and in some individuals forms a complete black

band. The variation in these features helped us identify nesting shags during our observations. The Campbell Island shag, also an endemic species and similar in most respects to the Auckland Island shag, differs in always having a fully-developed black throat band.

Briefly, my programme of weighing and measuring the six chicks accessible on the upper ledges of the Crozier Point colony came to an abrupt halt when all were taken by marauding skuas. This is presumably a common fate for eggs and chicks appearing so late in the season, for the temptation to predators must be especially strong as food supplies dwindle. I had meant to continue the project with a more promising sample in the following spring, but was transferred to the party for the southern survey. My only subsequent opportunity to re-visit Crozier Point came when the party returned to Ranui Cove for a break of three weeks in early October. This was an opportunity to check on the re-occupation of the colony. From offshore on 12 October it was obvious that on all the lower ledges nest-building was in full swing, and we met many birds flying in with beakloads of seaweed from the direction of French Island. A few days later I found that the birds were also beginning to build on several of the upper ledges.

Such details as fledging time and most other aspects of the life history of this species are still little known. However, the general sequence of events in the breeding season may be outlined on the basis of the records of the various Cape Expedition parties and the observations of more recent expeditions. The colonies are situated on open rocky headlands or on cliff ledges; the latter site is preferred, probably since it provides better protection against skua attack. The nest is a substantial bowl constructed of tussock and any other ground vegetation available, soon cemented by the addition of much guano.

The main laying period is November, but there is clearly an extended breeding season for fresh eggs may still appear in February. The usual clutch is three. The eggs when newly laid are pale blue with a chalky surface but they soon become much muddied as incubation continues through the constant squalls and rain. Incubation takes about 28 days and the chicks, blind and naked at hatching, are probably not ready to depart for at least 10 weeks. The chicks' eyes open at about five days and the first tufts of pale brown down appear; the wing and tail quill-feathers also begin to sprout. Some weeks later the first down is replaced by a second dark brown coat. Finally, the first plumage begins to show through, although a dense coat of down persists for some time on head and neck. The immature plumage is distinctive—dull brown above and whitish, generally with a good deal of brown mottling below. The season at Crozier Point came to an end in May, and my notes record that by the end of the month the colony was quite deserted.

As early as mid-March the young birds in their conspicuous brown dress began to appear in roosts on the coastal rocks and in groups with adults about Port Ross. Later right through the year until spring mixed groups of juveniles and adults were a common sight both in the Port Ross area and in Carnley Harbour. The immature plumage lasts all through the year until after the next breeding season. In Carnley Harbour where I spent much time in the spring months adults already in their striking breeding plumage were seen regularly in these mixed flocks with the brown juveniles.

The fishing flocks of shags offshore, appropriately known as 'rafts', were constantly entertaining. Groups of up to 100 swam packed tightly together, suddenly performing an almost simultaneous group-dive, probably after one or two of the group leaders sighted a fish school. Then at the end of the dive the group would emerge together, now as a widely scattered flock. Then they would quickly re-assemble to form a tight raft. The rafts became larger as the breeding season approached: those fishing in Carnley Harbour in late September numbered several hundreds. A flock of Campbell Island shags counted in the winter of 1960 in Perseverance Harbour, presumably a fishing raft, reached the remarkable total of 2000.

Auckland Island shags are reasonably strong in flight, although their wings are relatively short and the wing-beats rapid. On 6 August I watched a shag from Crozier Point flying into an extremely strong wind—force nine on the Beaufort Scale, a 'strong gale'—well offshore. A fiercer gust seemed to strike it, for it plumped down into the water for safety from a height of about 16 feet [5 metres]. Then later in the year at Victoria Passage, the narrow western entrance of Carnley Harbour noted for the violence of its wind gusts, both shags and red-billed gulls were circling above the churned-up waters just outside the entrance; although the gulls repeatedly had to drop to the surface, the shags seemed quite capable of maintaining a steady momentum. One shag appeared in the seething waters below, diving when particularly strong waves broke over it. Once it emerged with a food item, probably a crab, held aloft in its bill.

Most expedition members developed some kind of special interest in the shags, ranging from amusement at their complete tolerance of human visitors, to Alan Eden's often-expressed dislike of their messy housekeeping. Les Clifton especially seemed intrigued with the shags' habits. Les had been reading Musgrave's account in *Castaway on the Auckland Isles* of the use they were put to by the shipwrecked *Grafton* party: a number were shot and salted down 'in reserve for the winter, when we may not be able to go out to look for food' (p. 15). Musgrave always referred to the shags as 'widgeons', possibly in reference to their rapid wing-beats and prominent white wing patch. Les invariably used this term and, probably thinking of their often ungainly landings at the colony or on roosting rocks, would repeat: 'Can't help it—poor hopeless widgeons!'

Black-backed gull

The three most familiar seabirds of the mainland New Zealand coast—the black-backed gull, red-billed gull and white-fronted tern—range as far as the Auckland Islands. The black-backed gull is shared with South America (there known as the 'kelp gull'), South Africa, a wide range of other subantarctic islands and even the Antarctic Peninsula and its associated islands stretching towards Cape Horn. It has also fairly recently colonised parts of Australia, although it is outnumbered there by the slightly larger Pacific gull. As on the New Zealand coast this species nests both in colonies (relatively small compared with most colonies on the mainland) and singly along the coast. In Carnley Harbour during the southern survey I found isolated nests on Figure of Eight Island and on the north shore of Adams Island; there were also pairs at intervals round the coast of the Musgrave Peninsula. Several black-backs, together with a small group of red-billed gulls, were present on our visit on 20 September

to Lake Turbott on the southern coast of Adams Island. The black-back colony on the northwestern coast of Rose Island was regarded as a source of fresh eggs for the station at Ranui Cove: although in 1944 we used only a few, the colony had been raided regularly by our predecessors of the previous year.

Red-billed gull

The red-billed gull, like the black-back abundant and widespread on the mainland, is far from common on the Aucklands. Essentially of temperate zone distribution, ranging from New Zealand and Australia ('silver gull') to South Africa, it reaches the subantarctic only in the New Zealand region (Snares, Auckland Islands and Campbell). Breeding colonies are small, usually just a few pairs, and are scattered widely throughout the group. Pairs also occasionally nest singly: we found an isolated nest containing two small downy chicks on 2 January on the east coast of Ewing Island. Perhaps the most noteworthy feature of the colonies, apart from their small size relative to the huge packed colonies on the mainland, was their occupation of mainly hidden nest sites. Nests were commonly in caves and under overhanging rocks, sometimes entered through a narrow fissure. The contrast with the open sites typical of mainland colonies was marked. It was tempting to believe that the gulls, themselves of distinctly predatory bent, had learnt to use such sites to protect eggs and chicks against the marauding skuas.

I was much interested to find that at Cape Crozier red-billed gulls were attached as 'parasites' to the shag colony. On our 1937–38 expedition to the Chathams Charles Fleming and I had seen exactly this relationship well-established in Chatham Island shag colonies. At each colony a small group of gulls nested nearby and were quite clearly dependent for most of their food on by-products of the breeding season—accidentally broken eggs and the meals accidentally spilt or disgorged as the shag chicks were fed. We frequently saw gulls harrying the chicks until the latest meal was disgorged. The gulls at Cape Crozier, although similarly parasitic, seemed a little less aggressive than at the Chathams. We saw no active harrying, but a few gulls were always somewhere in the colony, alert and ready to fall on any discarded food. One gull was so intent on reaching a food item that I caught it easily by hand!

On the basis of measurements and slight colour differences, the red-billed gull of the Aucklands and Campbell is sometimes regarded as a separate subspecies. A further difference was noted in the gulls' voices. The strident screams so characteristic of their species on the mainland were never heard at the Aucklands. Their calls always seemed comparatively subdued and low in volume even when they were fighting over food.

Terns

Of special interest was the presence in the Aucklands of two species of tern: the familiar mainland white-fronted tern and the local antarctic tern. A third, the arctic tern—the world's most celebrated long-distance migrant—appears each summer as an occasional visitor.

White-fronted terns nest in fair numbers at several points round the coast of the Aucklands, notably in Carnley Harbour and on Enderby and Rose Islands. Young birds in their conspicuously mottled juvenile plumage were among the groups fishing offshore from the time of our arrival at Port Ross in December until mid-winter.

The antarctic tern is a good deal smaller, but of similarly streamlined and elegant build. The blood-red bill, red legs and wholly black cap are distinctive, contrasting with the white-fronted tern. In the latter the cap

is separated from the bill by the prominent white forehead, and bill and legs are black. In both species the tail is deeply forked and is spread as the bird hovers in preparation for the dive. Antarctic terns, rather than plunging fully, often just dip their bills below the surface to obtain smaller prey such as crustaceans and small fish. All terns change to a non-breeding plumage in late summer: in the antarctic tern the forehead becomes white and the bill fades to dull pinkish red. This is another species of circumpolar distribution throughout the subantarctic, with various subspecies on the islands of the South Atlantic and South Indian Oceans. The New Zealand subspecies occupies the Snares, Antipodes, Bounty Islands, Campbell and Macquarie as well as the Aucklands. A few also breed on Stewart Island and several of its outliers.

A visit to Enderby or Ewing in the nesting season was always a welcome opportunity to see antarctic terns in action. The nest is simply a hollow or scrape in the ground; on Enderby small groups nested well inland on open ground and even in stunted scrub, while many nests were sited along the clifftops and on cliff ledges. Defence at the nests was vigorous—we were invariably attacked with spectacular swoops and high-pitched screaming. It was remarkable to see the terns swooping at any skuas reckless enough to come within range of the colony. The chicks on hatching have a coat of mottled biscuit-coloured down; this is followed by a handsome juvenile plumage, grey with numerous dark cross-bars on back and wings, white shaded with pale brown below, and a blackish-brown cap.

This species clearly has a long breeding season at the Aucklands, laying having been recorded as early as November and as late as February. My notes record antarctic terns in the Port Ross area up to the end of April. Thereafter none was seen until 19 November when two flew past in Tagua Bay, below the station in Carnley Harbour. The species appears to disperse for the winter to more temperate waters from the Aucklands; however, it seems likely that in other areas including Stewart Island and its outliers the population stays in place throughout the year.

Skuas

The last of the seabirds here was perhaps the most memorable. None of us will ever forget the skuas. Birds of the strongest personality, they would be seen tearing apart dead sea lion pups or any other animal remains, and attacked us instantly and fearlessly if we approached the nesting territory.

The distribution of the brown (southern) skua is circumpolar on subantarctic islands and coasts. Its range in the New Zealand region includes the whole of the subantarctic (except the Bounty group)—Macquarie, the Snares, Antipodes, Aucklands and Campbell—and extends into temperate waters at the Chathams, Stewart Island and its outliers and (a few pairs only) southern Fiordland.

The group to which this species belongs, the 'greater skuas', is distributed over the colder regions of both hemispheres; the North Atlantic great skua (or 'bonxie') may in fact be no more than a subspecific relation of the brown skua, the species ranging so widely as to be truly 'bipolar'. A second quite distinct species, the South Polar skua, is a little smaller and has a shorter bill; it is restricted to the antarctic zone where it has become widely known as a predator on the huge Adélie penguin colonies. The greater skuas, powerfully-built and strong in flight, fill much the same role in the marine environment as that

performed on land by the birds of prey. In the breeding season they are major predators upon colonies of other seabirds. General scavenging provides a high proportion of their diet at all times.

All skuas are strongly territorial. Territories are established where possible near seabird colonies. In the Southern Hemisphere the immense colonies of subantarctic and antarctic penguins provide a ready food source in the form of eggs and chicks. In the New Zealand subantarctic the brown skua is a predator of the great penguin colonies of Campbell, the Snares and the Antipodes. Shag colonies are also attacked, but are less extensive and mostly located on cliff ledges where predation is more difficult.

Over much of its range the brown skua, however, must turn to another food source: predation upon the adults of various species of burrowing petrels. On the Aucklands these are clearly being taken in large numbers, as indicated by the remains in skua 'middens', especially on the cat-free outer islands. A field study by E.C. Young of the feeding behaviour and ecology of this species has now built up a detailed picture of its interaction with petrel populations.[21] Euan Young and his co-workers used radio transmitters to trace the movements of individual birds. The work, carried out on South East Island of the Chathams, showed that most skua territories were close to densely occupied petrel breeding grounds, the petrels being killed easily at night on arrival at their burrows. A territory without adjacent burrows might mean a long flight by the adults, but this offered no great difficulty. While similar research has not yet been carried out at the Aucklands, it seems likely that the skuas' feeding pattern there is much the same: at least on Enderby and the other cat-free outliers territories are likely to be in the close neighbourhood of petrel colonies. As they do on South East Island, some pairs may have to fly a considerable distance to obtain food. On the main island, however, where there are skua territories only on a few of the exposed headlands, most of their food probably has to be obtained at some distance. The only species of petrel still breeding on the main island in any numbers is the antarctic prion; although on the Chathams skuas do not hesitate to enter open forest to obtain their prey, much of the breeding habitat of the prions on the main Auckland Island is in forest undergrowth probably too dense to be penetrated.

The skuas' dependence upon penguins and petrels must, of course, end when the colonies are deserted at the end of the breeding season, and scavenging must then provide the main food supply. In the northern part of their range in New Zealand, brown skuas remain in or near their territories all through the year. At the Aucklands and Campbell, however, they are migratory, leaving in June and returning in August. My records show that some were still about in the Port Ross area at the end of May. A careful check around the area, including Enderby, in early July failed to find any sign of them. The first record at the end of winter was of a single bird that flew up to settle on the grass behind Sandy Bay on 3 August. None was recorded on our arrival at Carnley Harbour on 15 August. One

---

[21] E.C. Young 'Behavioural ecology of *lonnbergi* skuas in relation to environment on the Chatham Islands, New Zealand', *New Zealand Journal of Zoology* 5(1978): 401–416; with P.F. Jenkins, M.E. Douglas and T.G. Lovegrove, 'Nocturnal foraging by Chatham Island skuas', *New Zealand Journal of Ecology* 11 (1988): 113–117.

appeared flying low over Musgrave Peninsula on 31 August, after which the pair that ultimately nested there were seen regularly.

The destination of the migratory portion of the brown skua population is still unknown. It seems likely that they spend winter at sea in more temperate waters. Their food during this period may include fish; research on the related South Polar skua has shown that it regularly takes shoaling fish, the chicks being fed entirely on fish in areas without easy access to a penguin colony. Another feeding method may also be employed durng migration: this is piracy—chasing other seabirds to make them disgorge their meals. The habit is well known in the northern hemisphere great skua, but has only rarely been recorded in the brown skua.

Only a few of the skuas we saw were likely to be territory holders: until young skuas reach their breeding age of about eight years, they live in scattered groups (or 'clubs'), feeding mainly as scavengers. The 20 or so always to be seen about the Enderby sea lion colony, where afterbirths and miscellaneous debris such as regurgitated food were readily available, probably included a good proportion of such immatures. Skuas were always on hand for offal when we killed a sheep, sharing the feast with red-billed and black-backed gulls. Scraps from the *Ranui* were pounced upon eagerly; the birds on Musgrave Peninsula, too, came regularly to the station for scraps, evidently accustomed to waiting about for anything thrown out by the previous party, probably including food put out for the camp cat and the pet pigs.

The sheer size of the items the birds could swallow was quite amazing—Allan Eden once saw a skua manage to gulp down a beef bone some 8 inches [20 cm] long. Jack Sorensen describes seeing one of a number of skuas attracted by the skinning of rabbits shot on Enderby Island swallow five rabbit heads, each still with ears and fur, in quick succession.[22] Perhaps the skua's most remarkable scavenging habit was recorded by the survey party, who found that they would tear off the red calico used to make trig poles, possibly mistaking it for a food item. An incident on Enderby Island on 29 February could well have been just a territorial chase, but seemed to be a typical instance of skua opportunism. I watched a falcon flying past at high speed with a skua in close pursuit. The skua was in the end outpaced: it seemed possible, however, that it had disturbed the falcon at its kill and would have returned later to enjoy the stolen food.

Although so commonly feeding upon dead remains and offal, skuas are typically preoccupied with bathing. We would see them bathing vigorously in the numerous freshwater pools whenever we visited Enderby. The survey party were surprised on several occasions to find skuas bathing in the remotest pools on the open rocky tops.[23]

A pair of skuas appeared to have established themselves in the Flagstaff area on Musgrave Peninsula, Carnley Harbour, from 31 August onwards; numerous last season's petrel bones scattered about indicated the site of a former 'midden' and probably a nesting territory. I was busy elsewhere during much of September and October, but confirmation that the

---

[22] *Wildlife in the Subantarctic* p. 13.

[23] *Islands of Despair,* p. 127.

territory was in full occupation came on 30 October, when the surveyors visiting the Flagstaff trig were met with a fierce aerial attack. On 2 November George Easton found the nest on the crest of the ridge just before the final ascent to Flagstaff Hill, and for the following month I visited the site regularly.

The nest occupied a fairly deep depression in the turf and was well lined with grass and moss. A stunted *Dracophyllum* on the western side provided some protection from the prevailing wind. There were two eggs, both warm brown in colour with darker brown blotches, but one quite pale and the other dark. The adults swooped and dived as soon as I entered the territory and seemed about to strike with their feet. This pair, however, were remarkably tame, always returning quickly to resume incubation. Various observers have noted that skua pairs differ markedly in their reaction to intruders: this became obvious when we later visited a nest at the western end of Adams Island where the owners were totally implacable, swooping and trying to strike repeatedly during our stay. As well as attacking from the air, the birds would face intruders on the ground with their wings raised. This, often called the 'heraldic' display, is most effective for the white at the base of the flight feathers forms a conspicuous patch against the dark brown plumage. Much harsh calling—'charr-charr-charr'—accompanied all the displays.

On most of my daytime visits both adults were present. Their behaviour at the nest could be followed easily since one, presumed to be the male, was a little smaller and much darker. The larger bird was also distinguished by a collar of yellow-tipped feathers on the back of its neck. Skua pairs share the work of incubation; I found that when disturbed they would often change over, the bird which had been standing by quickly replacing its mate on the eggs.

The pair seemed so trusting over the first ten days of regular visits that I decided to camp beside the nest for the night, partly to check on their incubation routine, but especially to see whether they would take time off to feed. There had obviously been some feeding in the nesting area, presumably at night, for a few feathers and remains of antarctic prions (and even some of a black-backed gull and of an Auckland Island shag) were scattered about; but neither bird was seen to leave the territory for more than a very short period during the day.

My night at the nest (passed thoroughly comfortably in a sleeping bag with a tent fly for shelter) produced little new information; as was perhaps to be expected the pair remained at the nest site all night almost without interruption. The larger, collared bird, which I thought to be the female, had taken over incubation when I arrived in late evening. Although it was difficult to observe by torchlight, she apparently remained on the nest throughout the night. Her mate spent most of the night crouched on the ground about a foot [30 cm] from the nest in the lee of the *Dracophyllum*. He disappeared for about 10 minutes shortly before midnight and since he reappeared with wet, presumably bloodstained feathers, had probably made a feeding excursion. He left again twice, first just after daybreak and again shortly before my departure at 5 a.m., possibly for shorter foraging trips.

For quite long periods the birds remained quiet, but regularly, especially after being disturbed, they would for some minutes maintain a 'conversation' of deep, almost duck-like, quacking notes; sometimes the

sounds rose to a higher pitch or were replaced by a harsh croak. I had shone the torch on them at intervals without any apparent reaction until about midnight, when both suddenly rose up screaming. They returned only after much sailing overhead, followed by scolding as the male coaxed his mate back on to the nest.

The pair continued their routine steadily until 28 November, when at 10.30 am I found that one chick had hatched; the other was about to emerge, its bill being visible through the hole appearing at the large end of the egg. This species has a nearly 30-day incubation period, so that the discovery of the nest had come just three or four days after laying. The parents showed considerable alarm when I arrived, swooping vigorously; however they finally settled and allowed me to approach the nest and to take close-up photographs as before. On the 30th the second chick, distinctly smaller than the first, had hatched. The eggshell was still in the nest, flattened out at the bottom of the cup. Light rain was falling and the male remained covering the chicks in the nest; his mate stayed close by during my visit, only leaving to give chase to a stray skua that appeared over the Flagstaff summit.

The down of both chicks was dark grey with a strong tinge of brick-red above and paler grey below; their occasional call was a weak whistle. The chicks were active and able to run quite strongly; they were coaxed back to the nest by their parents whenever they wandered away.

The visit on 30 November was to be my last. Only a few days now remained before we returned to Port Ross, and there was no opportunity to observe on the chicks' feeding routine. The research mentioned earlier has shown that the brown skua has one of the longest periods of parental care known among seabirds. The chicks are fed in the breeding territory until they reach the flying stage in about two months; then feeding is continued by the parents for at least a further two months.

Mention must be made of a second highly distinctive section of the skua family, three species of small skua (sometimes known as 'jaegers'): arctic, pomarine and long-tailed. All are distinguished by their streamlined build, a strong contrast with the massive lines of the greater skua. They are birds of swift, remarkably agile flight, which serves them well for their food is obtained almost entirely by piracy. Other seabirds are victimised, the often spectacular aerial pursuit ending only when the object of the chase disgorges or drops its stomach contents or billful of fish to be caught by the marauder in mid-air. All three species breed in the far north, including the most remote polar regions, of the northern hemisphere. After breeding they perform a remarkable migration to spend the northern winter in temperate southern hemisphere waters; the arctic skua, the species most often present in the New Zealand region, is a common sight as it chases white-fronted terns from about November to April. While the range of the arctic skua reaches the Chathams, none of the three species of small skua has yet been recorded from the Aucklands or Campbell.

Stragglers

Like those of the land and freshwater birds, the Auckland Islands seabird list includes various stragglers: king penguin, Fiordland crested penguin and reef heron. (Note that several species already mentioned in the freshwater list also inhabit the coast: white-faced heron, white heron, little shag and black shag).

Marine mammals

The seals, both eared (sea lion, fur seal) and earless (elephant seal, leopard seal), were unfailingly interesting to our parties, as they are to present-day visitors. The sea lions were residents and soon became familiar. Of the other three, the leopard seal and elephant seal were rare visitors to the Aucklands. The distribution of the leopard seal ('sea leopard') is more southern: its range centres upon the antarctic pack ice and the shores of the Antarctic continent, only strays reaching the New Zealand subantarctic, mainly in winter. Elephant seals ('sea elephants') were recorded regularly, visitors from the then well-established Campbell or Macquarie Island colonies. Few fur seals (the main target of the early sealers) were seen at the Aucklands throughout the Cape Expedition. With full protection this species has been staging a recovery since the late 1940s; colonies in the Aucklands believed to total about 1000 were recorded by the 1972–73 research expedition. During the Cape Expedition Jack Sorensen found that there were a number of small colonies of fur seals on Campbell Island; these were in typical rock-fall sites at the foot of exposed cliffs, most reached only with difficulty.

Sealing

Sealing played a momentous, if short-lived, part in the human history of the Aucklands—in the end the only instance of successful exploitation of the group's resources. Bristow's discovery in 1806 came just as the need was urgent for fresh sealing grounds, following upon the elimination of all Australian fur seal stocks. Sealing gangs began work at the Aucklands immediately after discovery. Sealing was then a highly secretive and completely ruthless occupation. Anything available was killed—males, females and young. Most ships were seeking both skins (mainly those of the more valuable fur seal) and oil. The oil might come from sea lions and elephant seals as well as from fur seals, any species being taken to make up a full cargo.

Within the short space of 20 years the fur seal, already targeted on the southern mainland, had been greatly reduced in the New Zealand subantarctic, until in 1826 continuous sealing was no longer considered profitable. The take of fur seals in the subantarctic during this period, as recorded in the few published accounts, represents almost incredible slaughter: one cargo of 13,000 skins came from various groups including the Aucklands, and another from the Aucklands alone of 2000. Even higher totals were reached elsewhere in the area: 60,000 were obtained in 1804–05 from the Antipodes, and in 1810 Hasselbourgh brought back 15,000 skins after his discovery of Campbell Island. On the Aucklands the original fur seal colonies were probably on the exposed western and northern coasts. The sealers did not hesitate to descend formidable cliffs using spikes and ropes. The gangs probably worked the outer coast mainly from anchorages in the two main harbours; there may also have been some sealing in calmer weather from ships lying offshore. The colonies of sea lions on the Aucklands and Campbell, and of elephant seals on Campbell, would have been more accessible: these, too, must have been greatly reduced.

The distribution pattern today in the New Zealand subantarctic of the three resident species of seals undoubtedly still reflects this period of ruthless exploitation. Some sealing went on into the 20th century, but the New Zealand government finally saw the need for regulation, instituting the first closed season for fur seals in 1875. All three species

are now fully protected. The recovery of the fur seal is now widely recognised and apparently proceeding rapidly. The sea lion was probably the earliest of the three species to show recovery: healthy colonies have existed since the early 1900s on the Aucklands (Enderby, Dundas and Figure of Eight Islands) and, in smaller numbers, on Campbell and the Snares.

Elephant seal

The elephant seal, which suffered a major reduction in numbers on Macquarie and Campbell Islands, has apparently returned on Macquarie in large numbers. On Campbell, however, its status is unfortunately still doubtful: although present in fair numbers (about 400) in Cape Expedition days, it has recently undergone a decline to just a few scattered groups. While this may be a temporary setback due to changing feeding conditions offshore, its chances of continued survival are cause for concern. On Campbell the elephant seal may, in fact, have been totally eliminated by the sealers, for according to Jack Sorensen there is no evidence of breeding on the island during the whole of the farming period (1880–1929).[24]

Sea lion

To return to the sea lion, the Enderby colony at the height of the season and something of the breeding cycle have been described earlier. Dundas Island, lying a little out to sea at the southern entrance to Port Ross, was visited only once during the Cape Expedition. On this visit on 28 October 1943, Bob Falla noted just a few bulls in occupation of territories. It appeared from observations made from the Lookout above Ranui Cove that these were joined later by a number of females and that a small breeding colony was in occupation. The Dundas Island colony has been checked in detail by later expeditions: it has clearly increased substantially since Cape Expedition days, totals of over 3000 having been recorded. This is now the largest breeding colony on the Aucklands, far outnumbering the Enderby colony. We visited a third sea lion breeding location, Figure of Eight Island, in Carnley Harbour, and we saw a few mature bulls but our visits were too early in the year to give any indication of the size and extent of the colony.

In early February it became obvious that a change had taken place at the Enderby colony for females began to be seen regularly about Ranui Cove with their pups; there was much bellowing and bleating as mother and pup kept in touch. We met them surprisingly far inland, right up to the summit at the Lookout. Bob Falla had noted on a visit to Enderby on 6 February that the harems on Sandy Bay had completely broken up, the beach containing only scattered females and a few sub-mature males. On our later visits to Enderby we found females and pups at various stages of growth scattered over the island. The pups are suckled for nearly a full year. They delighted in endless chasing and diving games, and were wonderful to watch as they obviously revelled in the streams and the small muddy pools behind Sandy Bay. Their play was accompanied by much growling and barking; mother and pup maintained contact by repeated calling, a loud bellow (or 'moo') from the female and a bleat from the pup. The rabbit burrows then honeycombing the peaty ground above Sandy Bay gave the pups an additional playground. This, however, was something of a menace for if a pup went in too far it might be unable to work its way out.

---

[24] *Wild Life in the Subantarctic*, p. 10

Once we knew that the Sandy Bay colony had broken up, we wondered about the destination of the highly conspicuous 'beachmasters' and the equally large mature bulls who were their opponents. Before we had learned of the breakup of the harems, on a visit to Rose Island on 29 January we found a large group of mature bulls lying in the tussock near the northwestern point. We now realised that these were likely to have come across from Enderby. Rose Island, it seemed probable, provided a base for much-needed feeding excursions and a resting ground after the strenuous breeding regime. Later we had confirmation that Rose Island was important as a base for the mature males. On 15 July we again found numbers of males, including several of 'beachmaster' size, in a group towards the centre of the island; there was also a group at the original spot near the northwest point. Most were resting, probably after feeding trips out to sea, but a few fights were seen. Little is known of the winter distribution of the mature bulls, but it seems likely that at least part of the non-breeding season is spent well out to sea.

We saw immature males regularly all through the year. Some were already of quite massive proportions, but still lacked the shaggy manes of the 'beachmasters'. They tended to be a little aggressive, like one almost always about in Ranui Cove, rising half out of the water and barking defiantly as we approached. When I visited Camp Cove in Carnley Harbour in October, one even left the water and dashed towards me with a roar as I photographed it from the top of the beach. We had learnt long before this to treat such attacks by the sea lions as merely threats, the only action required being a swift retreat.

Early in the post-breeding season adult sea lions undergo an extensive moult. Groups of females and sub-mature males noted on the north coast of Enderby on 19 April were all in full moult, the old fur hanging in untidy patches from their new coats. The moult was evidently complete on a later visit on 8 July, all the animals seen having sleek, fresh fur.

Several sea lions with severe injuries were recorded. An ancient bull found on 28 July lying on a secluded beach had extensive open wounds on the underparts, much too deep to have resulted from harem fighting. The animal was clearly in the last stages of exhaustion and unable even to roar as we approached. The cause of such major injuries is likely to be the great white shark, a species widespread in the New Zealand subantarctic and known in other parts of its range to include seals in its prey.

Leopard seal

The leopard seal, highly predatory and solitary in habits, evidently roams widely and the few recorded during the expedition were believed to be stray visitors from antarctic waters. A leopard seal ashore is identified easily: the body especially in younger animals is slim and tapering, with comparatively large head and a fearsome display of sharp teeth. The dark grey coat is liberally spotted with silver and black. Our first sea leopard visitor appeared a few days after our arrival, having just come ashore at the head of Ranui Cove. On taking to the water it swam off rapidly, pausing for a brief and apparently amicable encounter with the resident sub-mature sea lion. One found lying on the sandy beach inside Kekeno Point on 12 October had fed recently on diving petrels, from the flocks we had just passed through offshore; its droppings contained feathers and wing bones readily identifiable as those of this petrel. Penguins form a major food throughout the sea leopard's range: the captured penguin

is brought to the surface and shaken so vigorously that it is at least partially skinned. We once had a spectacular view of this process as the *Ranui* cruised southwards to the Carnley Harbour entrance. The seal's lithe body appeared suddenly at the surface, its jaws gripping the penguin, which after a couple of violent twists appeared to be totally skinned.

Elephant seals

Our few records of sea elephants were mainly of plump juveniles. However, on 5 February a fully mature male, huge and with a prominent proboscis, swam past the coast below 'Fort Dorset', apparently searching for food amongst the kelp. We later circled him in the outboard, but he continued to feed quite undisturbed. An adult male was found ashore on Enderby at the western end of Sandy Bay on 29 February. The animal was evidently much exhausted and had several deep gashes along the back, no doubt further evidence of the threat posed by the great white shark.

Whaling

Whaling was at its peak when the Aucklands and Campbell were discovered. Captain Abraham Bristow was the master of a deep-sea whaler belonging to the whaling firm Samuel Enderby and Sons when he discovered the Aucklands in 1806. This led to the occupation of the group by sealers; and in 1810 Hasselbourgh, in search of new sealing grounds, discovered Campbell. Both deep-sea whaling and shore whaling were at this stage operational in New Zealand waters. The deep-sea whalers took right and sperm whales, while right whales were the main quarry of the shore stations. Not only was the right whale accessible to small boats from the shore, since it came inshore to breed, but unlike other species it floated when dead; it provided the best whalebone and an abundance of oil and as indicated by its name was certainly the 'right' whale to catch.

Overkilling of right whales by the many shore stations in the New Zealand area was probably mainly responsible for the disastrous failure of the Enderby settlement at Port Ross (1849–52): plans for the settlement incorporated equipment for a shore-whaling industry and facilities for visiting deep-sea whalers which, it was hoped, would come in to refit[25]. Even the sperm whale had apparently by this time been much reduced. For whatever reason, few whales appeared—just one whale was killed in Port Ross in the final few months before the settlement's abandonment—and whaling in the surrounding waters produced little result. Right whales apparently continued to come inshore to breed in small numbers throughout this period at Campbell Island. There were enough right whales in the area in 1909–16 to support two small shore-whaling ventures, respectively centred at Northwest Bay and North East Harbour. The total catch at both stations was some 60 whales. Full protection was finally afforded to the right whale by the New Zealand Government in 1936.

Whales

During the Cape Expedition sperm whales, blue whales and several species of dolphin were recorded offshore at both the Aucklands and Campbell. Jack Sorensen's records on Campbell included regular visits in early spring by right whales; on at least two occasions the whales came into Perseverance Harbour and could be approached closely by outboard.

---

[25] P.R. Dingwall et al. eds. *Enderby Settlement diaries*. Wild Press Wellington, Wordsell Press Auckland (1999).

Some, at least, had evidently survived from the brief period of shore-whaling at Campbell in the early 1900s.

The southern right whale, once widely distributed in all southern seas, and reduced almost to extinction by 18th- and 19th-century whaling, has been staging a well-marked recovery since Cape Expedition days. The population revival is especially evident on the southern coasts of Australia and New Zealand and the coast of Chile; in the New Zealand region the most substantial increase seems to be in the neighbourhood of Campbell Island where observers and scientists at the post-war weather station were able to watch the whales congregating for mating in Northwest Bay. Visiting scientific parties have also recorded sightings of groups of as many as 70 right whales at the Aucklands, including within Port Ross. Campbell evidently formed one of the ancient breeding centres of the species, which needs the relative shelter of coastal waters to mate and give birth; in the breeding season between April and September the bellowing and blowing of mating right whales in Northwest Bay was a familiar sound to the weather station staff. There now seems every likelihood that the southern right whale, although still a rare species, will with protection recover much of its former status.

Introduced mammals

The Aucklands have not escaped the conservation problems associated with introduced herbivorous and predatory mammals, yet some of the worst of the disasters so familiar on the New Zealand mainland have been avoided. Most importantly two major members of the group, Adams and Disappointment Islands, remain essentially unmodified and pest-free. Almost unbelievably, the group has escaped perhaps the worst of the possible introduced mammalian invasions—no species of rat has ever become established. Campbell Island has been less fortunate for, in addition to wild cats, the island had a thriving brown (Norway) rat population, responsible to date for much damage to the bird life. In 2001, the Department of Conservation undertook a major rat eradication project on Campbell Island which may see the end of these species on the island.

Numerous early attempts to establish goats on the Aucklands failed almost completely, the only long-term survivors being a small, apparently stable herd occupying a limited area on the northern shore of Port Ross: the last of these were removed in 1995. On Enderby and Rose Islands, both already much modified by settlement, the residual populations of cattle and rabbits on Enderby, and of rabbits on Rose were removed along with mice on Enderby Island, in 1993. All the Port Ross islands are now entirely pest-free. The most severe environmental impact on the main island has been by pigs and cats. Both are still present and both still greatly affect bird populations, perhaps most notably the breeding populations of burrowing petrels.

Pigs, introduced almost immediately after the group's discovery in 1806, are distributed almost everywhere on the main island, although nowhere as abundant as they are in many areas on the New Zealand mainland. We saw them almost daily about the station and they were often to be seen on the shore as we passed in the outboard dinghy or the *Ranui*, fossicking about in the masses of stranded kelp. When George Easton and I climbed the rugged Tower of Babel above Carnley Harbour during the

southern survey, we found pig tracks and rootings right to the summit. All Cape Expedition parties shot quite a few pigs for food, although this could never be regarded as a dependable resource.

Pigs

The introduction of pigs and goats as food for future castaways was very much in the tradition of sailing ship days. Captain Abraham Bristow of the whaler *Ocean*, on discovering the group on 18 August 1806 evidently regarded the new, uninhabited land as an ideal place to release pigs. On his return in another whaler, the *Sarah*, he duly liberated a consignment of pigs round Port Ross the following year. The climate and vegetation proved highly suitable—Ross of the British Antarctic Expedition found pigs 'very numerous' in the Port Ross area in 1840; Ross also noted with regret that the vegetation, especially the megaherbs *Stilbocarpa polaris* and *Pleurophyllum criniferum*, was suffering greatly from pig attack.[26] The Antarctic Expedition, although mainly scientific in purpose, also carried pigs for release, presumably for the sake of shipwrecked sailors. In spite of the damage obviously being done to the vegetation, more pigs were put ashore. There were additional introductions a few years later by the Enderby settlers and by the Chatham Island settlers. A population explosion inevitably followed, and subsequent records show that the pigs had reached Carnley Harbour by the 1880s. The invasion presumably greatly reduced, or completely eliminated, megaherbs and other vulnerable ground plants, at first over the northern and central areas and then in the southern section. The exhaustion of this readily available food would have finally lowered the pig population to its present comparatively low, and presumably stable, level.

It must be imagined that, as well as the devastation to the ground vegetation, the environment had been greatly altered for all ground-inhabiting birds, and especially for petrels which need soft soil for burrowing; disturbance by pigs was accompanied by cat predation so that all ground-dwelling bird populations must have been greatly reduced. The combined effect of pigs and cats on the bird life can only be surmised, for there are no records of the original distribution of the ground-dwellers, including the petrels. However, there is today an obvious contrast between the abundance of ground-dwellers on Adams, Disappointment and the smaller outliers, and their distribution on the main island. On the pest-free islands the main petrel species—white-headed petrel, sooty shearwater, diving petrel, antarctic prion and all three storm petrels—breed abundantly; only the prion still breeds in any numbers on the main island.

It has often been asked whether the larger seabirds—especially the wandering albatross—might originally have nested widely on the main island and have been reduced or eliminated as the result of disturbance by pigs. The main wandering albatross breeding ground is today on the southern slopes of Adams Island. It seems unlikely, however, that much of the higher ground of the main island would provide the necessary accessibility or terrain suitable for take-off. Rather, the original breeding distribution of this species on the main island is more likely to have been much as it is at present, restricted to a few scattered nests on the tussocky slopes above Carnley Harbour. These apparently are just an outpost of the main Adams Island colony. Above Carnley Harbour we

[26] Ross, *A Voyage of Discovery,* p. 150

found no evidence that pigs, which had evidently passed close to the albatross nests, had attempted to disturb the chicks.

Another of the larger seabirds, the white-capped mollymawk, breeds in huge numbers on Disappointment Island: there is also a smaller colony at Southwest Cape, but disturbance by the pigs seemed likely to be due to their searching for megaherbs rather than attacking the nesting birds. The effect of pigs on the Auckland Island shag has, on the other hand, probably been quite drastic. This was shown in the 1943 breeding season when Bob Falla found that the accessible section of the colony at Crozier Point, near No. 1 Station, had been completely destroyed overnight. Many eggs had been eaten and several nests obliterated by rooting. This part of the colony was quite deserted when I saw it in January 1944. On the main island this species nests today only on a few cliff sites; there are, however, large breeding colonies on the Port Ross islands, especially on Enderby.

Cats

Cats, like pigs, reached the group shortly after its discovery, probably released by whalers or sealers who carried cats to control shipboard rats. The 1840 Antarctic Expedition saw wild cats at Port Ross, while introductions were probably also made at Carnley Harbour for a cat was caught and tamed at Musgrave's camp in 1864 after the wreck of the *Grafton*.[27] They are now present almost everywhere on the main island—we were amazed on the third day of our most remote field camp at Western Harbour, at the far northwest end of Carnley, to find a large black cat sheltering in Allan Eden's tent. Most of the Cape Expedition parties had tame cats; ours at Ranui Cove, inherited from the 1943 party, was an exceptionally keen hunter who brought in prions regularly, as well as occasionally silvereyes and once, sad to relate, a yellow-crowned parakeet.

Perhaps a ban on camp cats would have been in order, but as well as catching a few mice they contributed to station life as pets; and they were clearly only part of a very substantial wild population. The effect of cats upon bird life can—like that of pigs—be judged only on the obvious contrast today between bird populations on the main island and the outliers. The cumulative effect of cat predation, combined with the disturbance of soil by pigs, upon breeding petrels must have been devastating. The antarctic prion still manages to breed on the main island in fair numbers. Cats, however, continue to take a heavy toll: a dramatic recent record by Phillip Thomson, a member of the February–March 1982 expedition, notes the remains of over a hundred cat-killed prions between Erebus Cove and the head of Laurie Harbour, on the northern side of Port Ross.

Dogs

Several early accounts mention the presence of wild dogs on the main island and on Enderby; while they survived they must have made considerable inroads into numbers of petrels and other ground nesters. The *Grafton* castaways (1864) saw dogs on the shore of Carnley Harbour and repeatedly heard them barking in the distance. According to Charles Enderby the Chatham Islands Maori party had dogs at their Port Ross settlements, and some of these had already run wild.[28] Fortunately the dogs had apparently all died out at Port Ross and Carnley by the 1880s.

---

[27] Musgrave, *Castaway on the Auckland Isles* (London, Lockwood, 1866), p. 92.

[28] C. Enderby, report in *The New Zealand Pilot* 4th Ed., (London, Admiralty, 1875), p.315.

Mice

The house mouse, the third of the main island's introduced mammals, is found in every type of habitat from the shoreline to the highest tops. This distribution is typical of the species on the New Zealand mainland—it is, in addition to its familiar role as a household pest, the widespread 'field mouse' of the countryside. Mice probably reached the Aucklands with the first whaling and sealing vessels and almost certainly again in the Enderby settlers' shipping and stores. They must have spread rapidly: Musgrave's hut at Carnley Harbour in 1864 was quickly swarming with mice but the cat tamed by the castaways soon had the mice under control.[29] They were formerly common on Enderby as well as on the main island. Strangely enough, tiny Masked Island some 50 metres offshore near Camp Cove, in Carnley Harbour, has a mouse population, but since mice can swim, crossing to the island would probably have presented no difficulty.

Mice are commonly regarded as neither a major threat to vegetation nor large enough to be active predators. However, they clearly have some environmental effect as they destroy seeds and reduce insect populations, and these environmental effects still require much research. At the Aucklands their availability as an additional food item may be a factor in keeping cat numbers high, even though the bird populations of the main island have been so greatly reduced. My only close encounter with the Auckland Islands mice quite possibly deprived the entomological world of a striking new species. Among the previous day's bag of specimens brought in by George Easton, I found a large and particularly handsome green beetle, which I left pinned out on the lab bench while I went in for a cup of tea. On my return, to my great horror, only the legs remained—a mouse had darted in and was finishing off its meal just as I arrived!

Goats

Goats—well-known as the most destructive of introduced mammals on islands round the world—fortunately failed almost completely on the Aucklands. They were carried almost as a matter of course on the government vessels servicing castaway depots (1877–1927); releases were made regularly at this stage on inshore and outlying islands in the New Zealand area. Perhaps the most spectacular success was on Great Island, of the Three Kings, where the goat population—finally exterminated in 1946—completely transformed the vegetation, causing the extinction, or near extinction, of most species of palatable plants. Introductions were made also to Campbell Island and to the Antipodes but without success. Attempts at the Aucklands were made in at least ten localities (one was Adams Island). A typical release was described by F.R. Chapman (mentioned as a witness to one of the last captures of the merganser) who was in Carnley Harbour with Captain Fairchild of the *Hinemoa* in 1890. On a previous trip Fairchild had placed a few sheep and goats on Figure of Eight Island: now when the island was checked 'the sheep were found dead, but the goats were alive and thriving'.[30]

The earliest introductions to the Aucklands were, in fact, made a little before the start of depot servicing. Musgrave, on his escape after the *Grafton* wreck, had made an approach for assistance to the Australian and New Zealand governments in the interests of future castaways. This

---

[29] *Castaway on the Auckland Isles*, p. 92.

[30] *The outlying Islands of New Zealand*: 491.

resulted in goats and other livestock being liberated in the north and south of the main island in 1865. Except for three in the Port Ross area the early releases all failed. The goats on Enderby Island had some success—they remained, competing for food with the cattle and rabbits, until the 1880s; however, conditions appear to have been marginal and they finally died out, probably through starvation. A second population on Ocean Island also at first appeared to thrive—they were reportedly numerous on the island in 1903—but by the start of the Cape Expedition numbers were down to about 20: these were shot out by successive parties to encourage a little rough grazing for the expedition's sheep (a couple remaining in 1944 were shot by our party). It seemed likely that on Ocean Island, too, the goats would have finally starved.

The population which has aroused most interest is one—apparently previously overlooked—found by the first Cape party in 1941, occupying a small area at the northern entrance to Port Ross to the west and south of Dea's Head, a prominent landmark. Here the goats seemed to be a well-established and stable population; they kept to one limited area, none being seen at any stage to the east in the neighbourhood of the station at Ranui Cove, or anywhere inland. It seemed likely that the Dea's Head herd were descendants of one of the early introductions at Erebus Cove, possibly the original release of 1865. The goats provided recreational shooting for successive expedition parties and a small supplementary supply of fresh meat.

The Dea's Head herd was removed in 1995 as a conservation measure. Concern over possible damage by the goats to the vegetation and their potential to spread led to a ten-year field study in 1973–83: the results give much insight into the reasons that the population on the main island is limited to this restricted area, and into the failure of goats over most of the Aucklands and elsewhere in the subantarctic.[31]

The Dea's Head herd remained stable throughout the study period at about 50, probably much the same as on its discovery in 1941. Features of the area recognised as favourable to goats were the climate—the location is one of the driest and warmest on the group—and clearing during the early settlement period, which had resulted in scattered patches of fine grasses and herbs. Of much significance was the fact that the lower reaches of Grey Duck Creek, at the head of Laurie Harbour, restricted the goats' movement southward. The goats appeared to find the stream quite impassable for some distance inland, although it was comparatively shallow. Some limitation on wandering uphill existed in the form of the dense zone of *Myrsine* scrub, impenetrable even to goats!

However, the main factor preventing any movement inland seemed to be the rapid change to a colder, wetter climate—conditions completely unacceptable to goats. A further finding was that the soft peaty ground probably helped to make even this area marginal; although the animals were apparently well-nourished, most proved to have badly split, overgrown hooves, some even moving with difficulty. The study found little evidence of permanent damage to the rata forest, but a good deal of browse damage to understorey trees and shrubs. Along the shoreline, some shrubs and ground plants had been damaged or even eliminated.

---

[31] M.R. Rudge and D.J. Campbell, 1977, *N.Z. Journal of Botany* 15, 221; D.J. Campbell and M.R. Rudge, 1984, *N.Z. Journal of Ecology* 7, 103.

Towards the end of the study goats were seen on several occasions moving through the upper catchment of Grey Duck Creek, even straying on to the upper tussock slopes, which suggested that they might in future use this route to reach the east coast in the area round Ranui Cove; here the climatic conditions and food supply would be roughly comparable with those at Dea's Head. In view of this, and to save the Dea's Head area from any further damage, it was decided that the herd should be destroyed. An adequate sample of the Dea's Head goat herd was returned to the mainland and now forms the basis of a breeding project.

Enderby wild cattle

When planning control measures for such ancient introductions as the Auckland Islands mammals, the importance of saving enough stock for breeding purposes must in all cases be recognised. This has, of course, been highlighted recently by the cloning of 'Lady', the last of the Enderby wild cattle rescued almost by chance when the herd was destroyed. The project in progress at the Ruakura Research Centre includes breeding using the sperm collected post-mortem from the dead bulls. The Enderby cattle are of special interest both as representatives of early breeds (they are believed to have been of either shorthorn or Shetland stock) and because they had developed various local characteristics during their stay on Enderby, including regular feeding on seaweed.

Enderby 'French Blue' rabbits

In the case of the Enderby 'French Blue' rabbits, a special effort was made to preserve the breed: descendants of the rabbits saved are now thriving in the hands of the Rare Breeds Association. Similarly, the current project to remove the main island's pigs includes plans to save a breeding stock. In a small way the Auckland Island pigs have already contributed to breeding research. Dr C.P. McMeekan, then Director of the Ruakura Research Station, sent word to our party that if a pig could be obtained he could possibly use it in his major research project on meat quality improvement. We duly made the capture and saw the pig off on the *Golden Hind*.

General natural history

Seaweed

Subantarctic coasts as elsewhere have a rich seaweed flora. Two species especially were a feature of the Aucklands, the giant bull kelp *Durvillea antarctica* of more exposed coasts and the bladder kelp *Macrocystis pyrifera*, responsible for the regular seasonal transformation of comparatively sheltered waters. Bull kelp, which attaches its 'holdfast' firmly to even the most wave-battered rocks, could be helpful when landing from a boat in calmer weather. Its long strap-like fronds of rich golden-brown added a touch of colour to the outer coast: when writhing under the impact of a storm these were a spectacular sight at such exposed points as Derry Castle Reef or Victoria Passage. Specimens of detached bull kelp cast up after a storm gave an indication of the length and massive proportions of the individual plants.

Bladder kelp (widely known as 'butter-fish kelp' round the southern mainland) is highly seasonal. The beds of floating fronds could be dense enough in summer to impede our outboard as we passed through such sheltered areas as the stretch between Ranui Cove and Ewing Island. Each kelp plant is attached by a holdfast to rock or massed pebbles many fathoms down on the seabed, the floating fronds buoyed up by an air-filled bladder at the base. Individual plants up to 130 feet [40 metres] in length have been measured. The beds were at their highest density on

our arrival in December, but throughout March great masses of the wrinkled brown floating fronds began to be washed ashore. At this stage examination of the kelp beds towards Ewing showed that many of the long stems coming from deep down were merely frayed remnants, only the blade-bases with their air-filled floats remaining attached. On 16 April around French's Island, just off Crozier Point, hardly any floating fronds remained; the die-off of fronds, however, seemed to vary from area to area, the beds close in to Ewing and Enderby being at this stage quite dense.

Re-growth of the floating fronds apparently began soon after mid-winter: there were new fronds on kelp beds that we passed through on 27 July on a trip to Kekeno Point.By September and October the beds off Ranui Cove had again become dense; at the tips of the long underwater stems new fronds with immature floats—just small swellings at the bases of fronds—began to appear, and the beds were soon thick enough to make boating difficult. We found similar re-growth in the kelp beds of Carnley Harbour in October-November. The distribution of this species of kelp is interesting: round the mainland it grows commonly in Cook Strait and on the east coast, but not on the west coast of the South Island except for Fiordland; its range includes Stewart Island and the subantarctic. Elsewhere it is distributed along the southernmost coasts of Australia, South Africa and South America. On the coast of America it continues northwards as far as California: there the floating fronds are harvested as a source of alginate by barges equipped with mowers.

Insects

To conclude these notes on Auckland Islands natural history, brief mention may be made of a group of insects that were of much interest to all Cape Expedition collectors, although their full significance was not realised until they were examined by specialists some years later. The stoneflies (*Plecoptera*) are a widespread and quite primitive Order, the most familiar being medium-sized four-winged insects with a typically stream-dwelling larva. The adults, although capable of reasonably strong flight, do not normally stray far from the larval stream and lake habitat. The first stonefly to be recorded in the New Zealand subantarctic was a winged species, *Aucklandobius complementarius*, discovered at Port Ross by the German Scientific Expedition in 1874; the larvae were collected during the Cape Expedition and proved to be of the normal aquatic type living under stones in streams.

Stoneflies

Of particular interest to the Cape Expedition collectors were wingless insects recognisable as stoneflies, found widely on both the Aucklands and Campbell beneath constantly-damp stones and rocks at higher levels. No wingless stoneflies had at that time ever been discovered, nor were adult or larval stoneflies known to live in habitat of this type. Measuring two-fifths to four-fifths of an inch [10–20 mm] in length and of a brownish colour, the stoneflies were evidently well adapted for life in the damp fell-field and bare rocky habitat.

The entire Cape Expedition stonefly collections were finally allocated by the Reports Committee to J. Illies of the Ploen Hydrobiological Centre (later of the Max Planck Institute) in Germany. Professor Illies' report appeared in 1963 (*Cape Expedition Bulletin* No. 26), describing several species from both the Aucklands and Campbell in which the adults as well as the larvae were wingless. Since the Cape Expedition a new group of flightless stoneflies had been discovered in alpine localities in the

South Island mountains by B. Wisely, who placed them in a new genus *Apteryoperla.* Wisely's results were published in 1953. Illies considered that the wingless species from the Aucklands and Campbell were members of this genus. He argued strongly, too, that since they appeared to be members of an ancient group and incapable of flight, their presence in the two subantarctic groups could be explained only by the former linking of the islands and the mainland by a land bridge. Recent geological research has produced no evidence for a land connection between the islands and the mainland at any stage. Illies' views on subantarctic biogeography have therefore received much attention in recent years.

A new approach to the problem of the wingless stoneflies of the Aucklands and Campbell has recently become possible as a result of new research on the New Zealand members of the group by I.D. McLellan.[32] Following Wisely's discovery, wingless stoneflies were found to be widely distributed in New Zealand and southern South America. In some cases both winged and wingless species belonged to the same groups. McLellan has found a number of wingless species in the South Island mountains. He has also re-examined the Cape Expedition stoneflies along with much material obtained by later expeditions; they prove to be quite distinctive and not merely close relations of the mainland forms.

The Auckland Islands wingless stoneflies are now all placed together in the same genus with the winged *Aucklandobius complementarius*; the Campbell Island stoneflies belong to a separate genus *Rungaperla*. A new species belonging to the mainland genus *Nesoperla* has also been found on the Snares. It is short-winged as an adult and has an aquatic larva. There seems little doubt in view of McLellan's discoveries and of the re-assessment of the Cape and later collections that winged ancestral forms gave rise to the stonefly faunas of the Aucklands and Campbell: subsequent evolution into groups comprising both winged and wingless forms would have occurred as it has in comparable stoneflies in other parts of the world. McLellan, commenting on the trend towards winglessness in so many New Zealand alpine species, suggests that harsh environmental conditions during the Ice Age (2 million to 10,000 years ago) probably led to the abandonment of aquatic life: the damp, cool fell-field habitat would then have been widespread. Both the Aucklands and Campbell were severely affected by Ice Age glaciation, probably leading as on the mainland to the adoption of terrestrial habits.

The airborne transport of insects and other invertebrates has been the subject of much attention in recent years. Rising convection currents over the land may carry small insects aloft, after which they are likely to be transported by horizontal currents at higher altitudes for considerable distances. A research programme carried out in the Southern Ocean as far south as Antarctica by J.L. Gressitt and K.A.J. Wise, of the Bishop Museum, Honolulu, in the 1950s and 1960s, obtained a wide range of airborne insects, spiders, mites and other invertebrates. The work was carried out using nets set on ships at sea and on US aircraft flying to Antarctica.

---

[32] 'New Alpine and southern Plecoptera from New Zealand, and a new classification of the Gripopterygidae', *New Zealand Journal of Zoology* 4 (1977): 119–147.

Lin Gressitt also participated in the 1961–62 New Zealand subantarctic expedition, and, assisted by K.P. Rennell, carried out an elaborate trapping experiment at Campbell Island. Rows of large nylon nets were set up above Perseverance Harbour near the weather station and others on high ridges inland. Good numbers of invertebrates (including spiders and insects—even one amphipod crustacean!) were trapped, but these were almost entirely of Campbell Island species, and apparently in the process of being blown *off* the island. Although the results with respect to incoming insects were largely negative, trapping at sea and at high altitudes is likely to produce better results and it is to be hoped that further work of this type will be carried out in the New Zealand area.

Appendix 1

CAPE EXPEDITION COASTWATCHING PARTIES

1941

No. 1
G Jones i/c, Ted Doley, A. Duthie (later transferred to *Ranui*), Colin Young (radio)

No. 2
A Fletcher i/c, Doug Knowles, Laurie Pollock, Bruce Evetts (radio)

No. 3
Leo Stannaway i/c, Ted Mitchell, Ray Wilson, Norman Trustram (radio)

Ranui
Captain W.R. Webling i/c Relief, A. Duthie, Jack Ohlsen, T. Pook

1942

No. 1
H.P. Hanify i/c, Norman Hart, R. Lopdell, Geoff Prichard, Lou Seabeck (radio)

No. 2
A.D. Crookenden i/c, George Anderson, B. Challis, Charles Fleming, J.F. Douglas (radio)

No. 3
Les Clifton i/c, Tom Cameron, Bill McDougall, Jack Sorensen, E. Cahill (radio)

Ranui
Captain George Lindsay i/c Relief, Bob Preston, C.S. Wright

1943

No. 1
R.A. Falla i/c and i/c Relief, Ted Doley, Laurie Pollock, Ron Balham (met.), John Jones (radio)

No. 3
Doug Knowles i/c, Jack Sorensen, J. Trigger, A. Duthie (met.), W. Ineson (radio)

No. 2
Stan Blow i/c, Bill Dawbin, Alan Paine, Don McNabb (met.), Sid Hancox (radio), Ted Mitchell

Ranui
Captain S. Lindsay, Charlie Carlson, George Lindsay (part year), Otto Ottersen (part year)

1944

No. 1
Alan Paine i/c, Geoff Prichard, Graham Turbott (met.), Len Hoskin (radio)

No.2 (disbanded in May)
Bob Pollard i/c and met., Norman Hart, Basil Stallard, Jim Orange (radio)

No. 3
Laurie Pollock i/c, Robin Oliver, Ron Balham (met.), Jack Carlyle (radio), Arnold Stanbury (ionosphere)

Ranui
Captain Noel Worth, Charlie Carlson, George Bish, Alec Lund

Survey Party
F/O A.W. Eden i/c Relief, Les Clifton, George Easton

Notes
In May Bob Pollard transferred to No. 1 as met. observer; in January 1945, he joined the survey party, remaining until the completion of the survey on 3rd June 1945. Graham Turbott joined the survey party as field assistant on 15th August 1944, remaining until December. Tubby Wenham was added to the survey party as an extra field assistant in January 1945.

No. 1 Station was maintained until 3rd June 1945, to allow the survey to be completed and was then closed. John Jones (radio and met. observer) and Jim Orange (radio) joined the No. 1 party in January 1945. John Jones returned to New Zealand on 26th April, but Jim Orange remained until the end of the survey in June. Alan Paine transferred to the *Ranui* crew in May, remaining until June.

1945

Only No. 3 (Campbell Island) was continued in 1945 as a wartime operation. From the end of World War II (2nd September 1945) it was maintained as a meteorological and ionosphere research station, continuing as a manned station until 1995 when it was replaced by an automatic weather station. The 1945 party was as follows: Jack Sorensen i/c, Eric Clinker, Jack Copp, Lou Sharman, Hugh Atkinson (ionosphere).

Appendix 2

SCIENTIFIC NAMES OF MAMMALS AND BIRDS MENTIONED IN THE TEXT

Mammals

Seal, leopard	*Hydrurga leptonyx*
Seal, New Zealand fur	*Arctocephalus forsteri*
Seal, southern elephant	*Mirounga leonina*
Sea lion, New Zealand	*Phocarctos hookeri*
Whale, blue	*Balaenoptera musculus*
Whale, southern right	*Eubalaena australis*
Whale, sperm	*Physeter macrocephalus*

Birds

Albatross, Auckland Island wandering	*Diomedea exulans gibsoni* (now treated as a separate species, Gibson's albatross *Diomedea gibsoni)*
Albatross, light-mantled sooty	*Phoebetria palpebrata*
Albatross, southern royal	*Diomedea epomophora epomophora*
Bellbird	*Anthornis melanura*
Blackbird	*Turdus merula*
Cape pigeon	*Daption capense capense*
Cape pigeon, Snares	*Daption capense australe*
Chaffinch	*Fringilla coelebs*
Cuckoo, long-tailed	*Eudynamis taitensis*
Cuckoo, shining	*Chrysococcyx lucidus lucidus*
Dotterel, Auckland Island banded	*Charadrius bicinctus exilis*
Dotterel, banded	*Charadrius bicinctus bicinctus*
Duck, grey	*Anas superciliosa*
Falcon, New Zealand	*Falco novaeseelandiae*
Godwit, bar-tailed	*Limosa lapponica*
Godwit, black-tailed	*Limosa limosa*
Goldfinch	*Carduelis carduelis*
Goose, Canada	*Branta canadensis*
Gull, red-billed	*Larus novaehollandiae scopulinus*
Gull, southern black-backed	*Larus dominicanus*
Harrier, Australasian	*Circus approximans*
Heron, reef	*Egretta sacra*
Heron, white	*Egretta alba modesta*
Heron, white-faced	*Ardea novaehollandiae*

Kaka	*Nestor meridionalis*
Knot, lesser	*Callidris canutus*
Mallard	*Anas platyrhynchos*
Merganser, Auckland Island	*Mergus australis*
Mollymawk, black-browed	*Diomedea melanophrys*
Mollymawk, Chatham Island	*Diomedea cauta eremita*
Mollymawk, grey-headed	*Diomedea chrysostoma*
Mollymawk, Salvin's	*Diomedea cauta salvini*
Mollymawk, shy	*Diomedea cauta cauta*
Mollymawk, southern Buller's	*Diomedea bulleri bulleri*
Mollymawk, white-capped	*Diomedea cauta steadi*
Parakeet, red-crowned	*Cyanoramphus novaezelandiae*
Parakeet, yellow-crowned	*Cyanoramphus auriceps*
Penguin, eastern rockhopper	*Eudyptes chrysocome filholi*
Penguin, erect-crested	*Eudyptes sclateri*
Penguin, Fiordland crested	*Eudyptes pachyrhynchus*
Penguin, king	*Aptenodytes patagonicus*
Penguin, yellow-eyed	*Megadyptes antipodes*
Petrel, mottled	*Pterodroma inexpectata*
Petrel, northern giant	*Macronectes halli*
Petrel, southern giant	*Macronectes giganteus*
Petrel, South Georgian diving	*Pelecanoides georgicus*
Petrel, subantarctic diving	*Pelecanoides urinatrix exsul*
Petrel, white-chinned	*Procellaria aequinoctialis*
Petrel, white-headed	*Pterodroma lessonii*
Pipit, Auckland Island	*Anthus novaeseelandiae australis*
Plover, Pacific golden	*Pluvialis fulva*
Plover, spur-winged	*Vanellus miles novaehollandiae*
Prion, antarctic	*Pachyptila desolata banksi*
Prion, fulmar	*Pachyptila crassirostris crassirostris*
Redpoll	*Carduelis flammea*
Sandpiper, curlew	*Callidris ferruginea*
Shag, Auckland Island	*Leucocarbo colensoi*
Shag, black	*Phalacrocorax carbo*
Shag, Campbell Island	*Leucocarbo campbelli*
Shag, Chatham Island	*Leucocarbo onslowi*
Shag, little	*Phalacrocorax melanoleucos*
Shag, New Zealand king	*Leucocarbo carunculatus*
Shag, Stewart Island	*Leucocarbo chalconotus*
Shearwater, subantarctic little	*Puffinus assimilis elegans*
Shelduck, chestnut-breasted	*Tadorna tadornoides*
Shoveler, New Zealand	*Anas rhynchotis variegata*

Silvereye	*Zosterops lateralis*
Skua, arctic	*Stercorarius parasiticus*
Skua, brown	*Catharacta skua lonnbergi*
Skua, long-tailed	*Stercorarius longicaudus*
Skua, pomarine	*Stercorarius pomarinus*
Skua, south polar	*Catharacta maccormicki*
Skylark	*Alauda arvensis*
Snipe, Auckland Island	*Coenocorypha aucklandica aucklandica*
Sparrow, hedge	*Prunella modularis*
Sparrow, house	*Passer domesticus*
Starling	*Sturnus vulgaris*
Stint, red-necked	*Callidris ruficollis*
Storm petrel, black-bellied	*Fregetta tropica*
Storm petrel, grey-backed	*Oceanites nereis*
Storm petrel, New Zealand white-faced	*Pelagodroma marina maoriana*
Swallow, welcome	*Hirundo tahitica neoxena*
Swan, black	*Cygnus atratus*
Tattler, Siberian	*Tringa brevipes*
Tattler, wandering	*Tringa incana*
Teal, Auckland Island	*Anas aucklandica aucklandica*
Tern, arctic	*Sterna paradisaea*
Tern, New Zealand antarctic	*Sterna vittata bethunei*
Tern, white-fronted	*Sterna striata*
Thrush, song	*Turdus philomelos*
Tomtit, Auckland Island	*Petroica macrocephala marrineri*
Tui	*Prosthemadera novaeseelandiae*
Turnstone	*Arenaria interpres*
Yellowhammer	*Emberiza citrinella*

About the Author

Evan Graham Turbott was born in Auckland on 27 May 1914 and educated at Takapuna Grammar School and Auckland University College (MSc in Zoology, 1938), then trained as a teacher at Auckland Teachers' College. In 1937 he was appointed Assistant Zoologist at the Auckland War Memorial Museum, finally holding the position of Ornithologist and Entomologist until 1957. He was Assistant Director and Keeper of Zoology at Canterbury Museum, Christchurch, from 1957 to 1964; Director of the Auckland War Memorial Museum from 1964 to 1979; and upon his retirement was appointed Director Emeritus.

Graham is a past President of the Ornithological Society of New Zealand and of the Art Galleries and Museums Association of New Zealand. He is Past Chairman of the Auckland Branch, Royal Forest and Bird Protection Society, and of various other scientific and conservation bodies. He is also a past member of the Fauna Protection Advisory Council (Dept of Internal Affairs), the Animal Ecology Research Committee (Dept of Scientific and Industrial Research), Freshwater Fisheries Advisory Council, and Hauraki Gulf Maritime Park Board. He is a Fellow of the Art Galleries and Museums Association of New Zealand (FMANZ) and of the Ornithological Society of New Zealand (FOSNZ).

Graham received the QSO for public services in 1977 and the Queen Elizabeth II Silver Jubilee Medal (1977).

Graham's main research interests have been the birds and ecology of offshore islands (which he furthered with the Cape Expedition); also the ecology of Fiordland and other remote mainland areas. In addition to numerous scientific papers and articles, he is the author or co-author of several books on New Zealand birds and wildlife—notably, with R.A. Falla and R.B.Sibson, the classic *Field Guide to the Birds of New Zealand* (Collins 1966, 1978).