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REPORT ON A VISIT TO GREAT ISLAND, OF THE THREE KINGS, 25 FEBRUARY – 6 MARCH 1989

by

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REPORT ON A VISIT TO GREAT ISLAND, OF THE THREE KINGS GROUP, 25 FEBRUARY - 6 MARCH 1989

by

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SUMMARY

Ten days were spent on Great Island in February-March 1989, in part, to report on the island's wildlife values. Twenty-eight species of birds were seen about the Three Kings group and on Great Island, all of which had been reported previously from the group. During the past 36 years several bird species have become scarce or gone from Great Island, perhaps as a result of forest regeneration. The Indian myna population has increased markedly in recent years. Given the predacious activities of mynas on the eggs and nestlings of small birds there will be a continuing need to monitor the status of the bird fauna of Great Island.

Part of the work involved collecting specimens for various institutions. The skeletal remains of a red-crowned parakeet and a blackbird spirit specimen were provided to the Auckland Institute and Museum (A.I.M.). Seven Three Kings bellbirds were collected for the National Museum. Heart, liver, muscle and blood samples from six fledgling red-billed gulls were collected for the Department of Conservation, Wellington for genetic studies. Blood samples were collected and deposited in the frozen tissue collection, Department of Conservation, Wellington, from the following species: one banded rail, eight red-crowned parakeets and three Three Kings bellbirds. Four Three Kings skinks, two egg-laying skinks, one shore skink and three pacific geckos were brought back for Dr Daugherty, Victoria University, for genetic studies. A banded rail and 13 Three Kings skinks killed in snap-traps set for rats were deposited in the A.I.M.

1. INTRODUCTION

The Three Kings group (34 10°S, 172 05°E) lies approximately 56 km north-west of Cape Reinga. The group consists of Great Island (685 ha), South West Island (28 ha), West Island (20 ha), North East Island (10 ha) and the Princes Islands (Figure 1). The Princes Islands are a chain of seven islets and several rocks lying between West Island and South West Island.

European discovery of the Three Kings group occurred in January 1643 by Abel Tasman, and he saw Maoris on Great Island. Much of Great Island was cleared and cultivated by the Maori. Maori occupation ended about 1840 and their pigs and goats were removed then too (Cheeseman 1888). However, in 1889 four goats were liberated on Great Island by the Marine Department (Ministry of Transport) to provide food for shipwrecked persons (McCallum *et al*. 1985).

Figure 1 : Map of Three Kings Islands and Great Island.

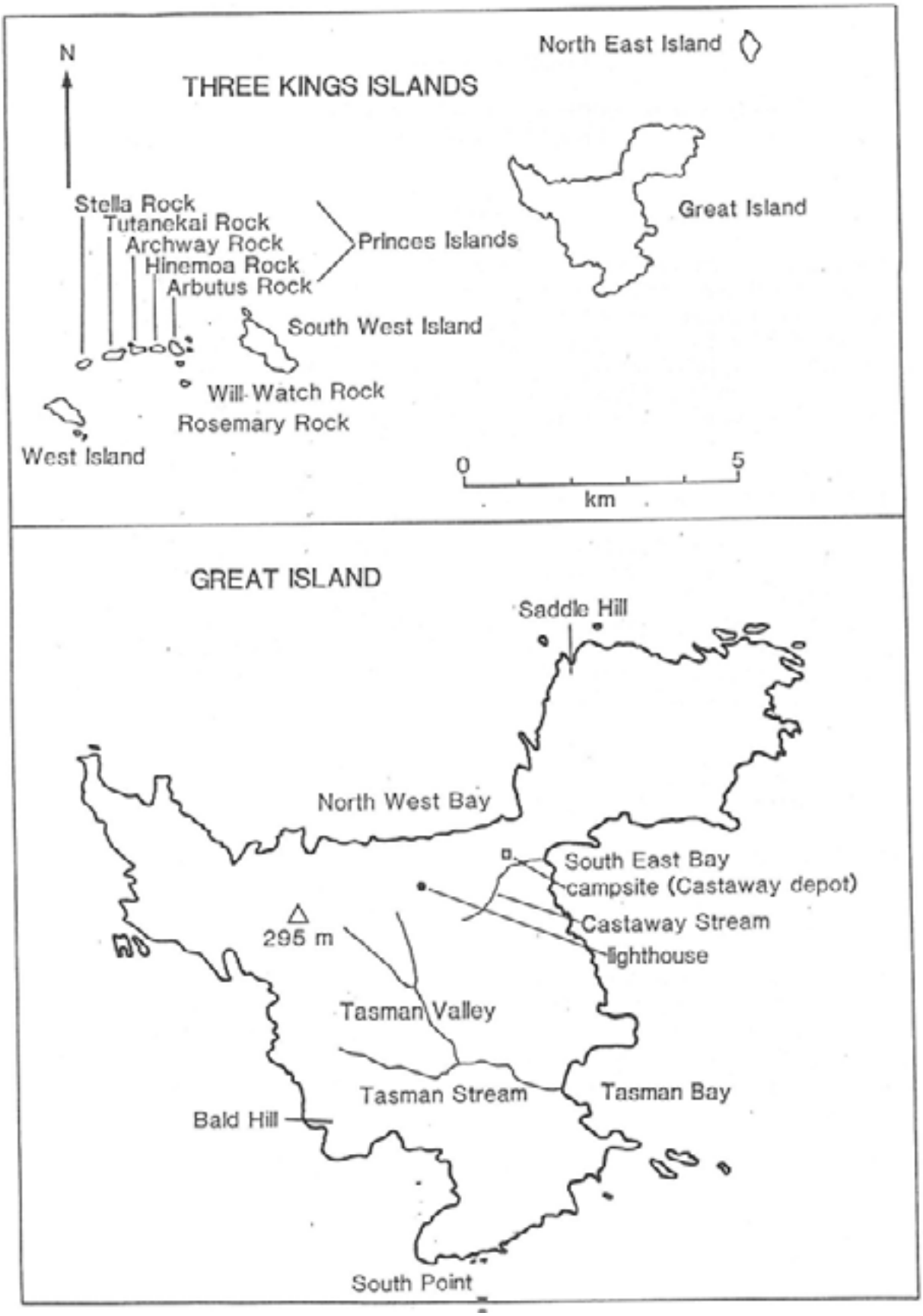

Table 1 The dates, durations and sources of information relating to visits to Great Island, Three Kings group, during which bird observations were recorded. Abbreviations: h = hour, d = day

Visit No.	Date of visit	Duration of visit	Source
1	August 1887	2-3 h	Cheeseman (1888)
2	November 1889	1.5 d	Cheeseman (1891)
3	12-15 December 1928	3 d	Fraser (1929)
4	20-21 February 1934	2 d	Falla (1934); Falla (1948); Turbott & Buddle (1948); Fleming 1946
5	30 November - 6 December 1945	7 d	Turbott & Buddle (1948)
6	13 April -16 May 1946	34 d	Turbott (1948); Turbott & Buddle (1948)
7	6 October 1948	4.5 h	Bell (1948)
8	27 February 1949	1 d	Buddle (1949)
9	10-15 January 1951	5 d	Turbott (1951)
10	29 December 1952 - 9 January 1953	12 d	Turbott & Bull (1954)
11	9-15 December 1963	7 d	Roderick (1964)
12	25-26 February 1969	2 d	Adams (1969)
13	6-30 November 1970	25 d	Ramsay & Watt (1971)
14	January 1976	? d	Jenkins & Cheshire (1982)
15	12-18 December 1982	7 d	McCallum (1982); Anderson (1983); McCallum, Potter & Bellingham (1985)
16	25 November - 2 December 1983	8 d	E.K. Cameron pers. comm.
17	19 January 1985	1.5 h	McCallum (1985); McCallum, Potter & Bellingham (1985)
18	8-21 November 1985	4 d	McCallum, Potter & Bellingham (1985)
19	13-14 February 1986	12 h	McCallum, Brook & Francis (1986)
20	25 February-6 March 1989	10 d	This report

Despite the geographical proximity of the Three Kings group to the New Zealand mainland, few visits by ornithologists or herpetologists to Great Island have been made (Table 1). Cheeseman visited the island in August 1887 and November 1889 (Cheeseman 1888, 1891). It is from his writings that we have an indication of the flora and of the island prior to the impact of the goats on the vegetation.

From 1945 to 1953, six scientific expeditions visited Great Island (Table 1). From observations during the November-December 1945 visit it was considered that the impact of the numerous goats was likely to result in the extinction of many of the plants and animals peculiar to the island (Baylis 1948). A comparison of the descriptions of the vegetation on Great Island given by Cheeseman (1888, 1891) with the photographs and descriptions of the vegetation in 1945-46 indicated that the island's flora had changed markedly because of Maori fires and cultivation, and goat browsing. Instead of being covered in puka (*Meryta sinclairii*) and mixed coastal forest, the vegetation was dominated by kanuka (*Kunzea ericoides*) forest with a sparse understory (Baylis 1948). In addition, much of the land south of the Tasman Stream was covered by a sward dominated by grass of the genus *Zoysia*. As a consequence of the damage the goats were causing a Department of Internal Affairs party shot the goats (c. 390) in April-May 1946 (Turbott 1948). During this expedition Turbott (1948) established three permanent vegetation quadrats and quantitatively described the vegetation within them. In December 1952 - January 1953, Turbott and Bull (1954) counted forest birds while walking over a quadrat measuring 200 m centred on vegetation quadrat no. II.

Unfortunately, subsequent ornithologists have not repeated the counts, presumably because of the interests of the personnel and most visits were short (Table 2). Ornithologists visiting Great Island in the 1970s and 1980s have recorded the bird species encountered and their numbers while walking about the island.

The reason for the 1989 visit to the Three Kings group was to survey the islands for vertebrates in order to report on the wildlife values of the islands and to indicate issues that may warrant future research. The more specific aims of Ralph Powlesland's (RP) work were:

a) To catch in mist-nets and take blood samples from up to 20 red-crowned parakeets (*Cyanoramphus novaezelandiae*) on behalf of Dr S. Triggs, Department of Conservation (DOC), Wellington.

b) To collect up to two specimens of each lizard species on Great Island on behalf of Dr C. Daugherty, School of Biological Sciences, Victoria University, Wellington.

c) To collect mummified specimens of any birds and lizards on behalf of the National Museum, and Auckland Institute and Museum (A.I.M.).

d) To collect up to six bellbirds (*Anthornis melanura obscura*) and up to three brown quail (Synoicus ypsilophorus)for J.A. Bartle, National Museum.

e) To collect up to six red-billed gulls (*Larus novaehollandiae scopulinus*) for Dr J.A. Mills, DOC, Wellington, and Dr. A.J. Baker, Royal Ontario Museum, Toronto, Canada.

f) To check that rats (*Rattus* spp.) were not present on the islands by operating snap-traps with tin covers for 100 trap-nights.

Table 2. The abundance and breeding status of bird species seen during visits to Great Island, Three Kings group

*Abundance (R=recorded, C=common, M=moderate, U=uncommon, S=straggler); breeding status (B=breeding, N=not breeding, U= breeding unknown). For information relating to each visit number see Table 1.

	Visit number																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Little Blue Penguin				R;U*																
Cape Pigeon												S;N								
Grey-faced Petrel					C;B	C;N					M;B		U;B		M;B	R;B		U;B	R;U	
Black-winged Petrel					U;U	R;U			U;B		U;U	M;B		M;U	M;B	M;U	M;U	M;U	U;U	M;B
Sooty Shearwater				R;B	U;U	R;B					U;U		U;U		R;B	U;B				
Fluttering Shearwater				R;B	C;B	R;N		U;U		C;B	C;B		C;B		C;B	C;B	R;B	C;B	R;N	M;N
Little Shearwater					R;U															
White-faced Storm Petrel					S;U															
Diving Petrel			R;B	R;B	C;B	U;U					C;B	R;U	M;B		C;B	C;B		U;U		
Gannet													R;U							U;U
Black Shag								U;U		U;U										U;U
Pied Shag						U;U					U;U		R;U		U;N					U;U
Little Shag															U;U		U;U			
Reef Heron															U;U		U;U			
Duck sp.																S;U				S;U
Grey Duck									S;U											
Harrier	R;U				U;B	U;U	U;U	R;U	R;U	M;B	U;U	R;U	M;U		U;U	R;U			U;U	U;B
Brown Quail	U;U	U;B	M;B		C;B	C;U	M;U		R;U	M;B	M;U	R;U	M;U		C;U	R;U		C;U	R;U	M;B
Banded Rail			R;U		M;U	U;U				U;U	U;U		R;U		C;U			C;U	R;U	U;B
Spotless Crake					U;U	U;U			R;U				U;U		R;U					

Table 2. continued

	Visit number																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Pukeko						S;N														
Whimbrel											S;U									
Red-billed Gull			C;B	C;B	C;B	C;N		R;N		C;B	C;B	R;N	C;B		C;B	R;B	C;B	C;B	C;N	C;B
White-fronted Tern					R;U						U;U		R;U						U;U	
Red-fronted Parakeet	R;U		R;U	M;U	U;U	U;U	U;U	R;U	R;U	R;B	M;B	R;U	C;B		M;B	C;U	C;U	C;U	R;U	M;B
Yellow-fronted Parakeet				R;U							U;U									
Shining Cuckoo											U;U		U;U		U;U			U;U		
Long-tailed Cuckoo				R;U	U;U					U;U	U;U				U;U					U;U
Morepork	R;U		M;U		M;U	M;U			R;U	M;B	C;B	R;U	M;B		C;U		C;U	C;B	M;U	M;B
Spine-tailed Swift															U;U					
New Zealand Kingfisher	R;U		M;U		M;B	M;U		R;U	R;U	M;B	M;B	R;U	M;U		C;U	R;U	C;U	C;U	R;U	M;B
Welcome Swallow																	U;U			U;U
New Zealand Pipit	R;U		M;U		M;B	M;U	C;U	R;U	R;U	M;B	M;U	R;U	M;U		R;U			M;U		U;U
Hedgesparrow						U;B						R;U			R;U					
Fernbird	R;U																			
Grey Warbler	R;U							S;U										S;U		
North Island Fantail	R;U		M;U	R;B	M;U	M;U	U;U		R;U	M;B	U;U	R;U	M;U		R;U	R;U		C;U	R;U	M;U
Song Thrush					U;B	U;U				U;U										
Blackbird				R;B	M;B	M;U		R;U		M;B	M;B	R;U	M;U		C;B	R;U		M;U	M;U	M;U
Silvereye	R;U					S;U	M;U													
Bellbird	C;U	C;U	C;U	C;U	C;B	C;U	M;U	R;U	R;U	C;B	C;B	R;U	C;B		C;U	C;U		C;U	C;U	C;U
Tui	R;U																			

Table 2 continued

	Visit number																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Yellowhammer						U;U														
Chaffinch					U;B			R;U		U;B	U;U				U;U			U;U		
Goldfinch						U;U	M;U													
Redpoll						R;U														
House sparrow					U;U	U;U				U;U	U;U									
Starling				R;U	M;U	M;U	M;U	R;U	R;U	M;B	M;U		U;U		U;U	R;U			U;U	U;U
Indian Myna													U;U		M;U	U;U	M;U	M;U	M;U	C;U

2. PERSONNEL

Lisa Forester, DOC, Kaikohe
Ralph Powlesland, DOC, Wellington
Sid Roberts, DOC, Wellington
Adrian Walker, DOC, Kaikohe
Anthony Wright, A.I.M., Auckland

3. RESULTS

We travelled to Great Island on 25 February 1989 aboard "Tarquin" skippered by Alan Bowe. We left Houhora at 0745 h and reached North West Bay at about 1800 h. Because of the time it took to get the stores and equipment ashore we were forced to camp the night on a rock ledge about 30 m a.s.l. The next day we set up camp at the camp-site beside the old Castaway depot ruins overlooking North West and South East Bays. The climb up the steep hillside from North West Bay to the camp-site was eased considerably by a leaded synthetic seine rope left on the cliff by the Navy in November 1970 (McCallum 1985). There was ample (beginning of stay) to adequate (end of stay) flowing water in Castaway Stream about 100 m from the camp-site, so water taken to the islands was left near the landing site. Except for a couple of showers, weather during the visit was dry and warm. We were unable to visit other islands in the group because of a persistent swell and lack of suitable transport. However, on the return journey aboard "Tarquin" on 6 March, Alan Bowe took us along the northern sides of the Princes Islands and back to Rosemary Rock (known to fishermen as Albatross Rock), which we circumnavigated before heading south-east. We berthed at Houhora at about 0445 h on 7 March.

3.1 Birds

RP's fieldwork was mainly divided between mist-netting next to Castaway Stream for bellbirds and parakeets, and walking about the island to record the variety of species. Seabirds seen from Great Island and "Tarquin" when travelling about the Princes Islands were recorded.

Table 1 lists the previous visits to Great Island during which bird observations were recorded. Table 2 provides an indication of the abundance and the breeding status of each species during these visits. Observations of each species seen during the 1989 visit are described below.

3.1.1. BULLER'S MOLLYMAWK (*Diomedea bulleri*)

During two passes of the western side of Rosemary Rock three half to three-quarter grown, down-covered mollymawk chicks were seen on pedestal nests near the summit. In addition, four adults were flying about the islet. Nesting Buller's mollymawks were first found on Rosemary Rock in December 1983 (Wright 1984). I was unable to make an accurate count of the mollymawk chicks on the islet and so the count of three should not be compared with that of eight nests with eggs or chicks seen in January 1985 (McCallum *et al*. 1985).

3.1.2. BLACK-WINGED PETREL (*Pterodroma hypoleuca nigripennis*)
These petrels were seen most evenings just before dusk as they flew over the campsite, and they were heard calling each night. On 26 February at 1600 h two black-winged petrels flew along the cliffs just west of North West Bay. An adult and a young chick were found in a burrow on Bald Hill (Figure 1) on 4 March. The next day two pairs of black-winged petrels were found in burrows on the western face of Saddle Hill (Figure 1). Neither pair had an egg or chick and so were probably involved in pair-formation.

Black-winged Petrels were first found on Great Island by Dr P.C. Bull in December 1945, but it was not until January 1951 that the species was found breeding on the island (Table 2). Subsequently, most parties to Great Island during the petrel's breeding season (November-May) have recorded the species. McCallum et al. (1985) estimated that less than 1000 black-winged petrels inhabited the Three Kings group, with several hundred on Great Island.

3.1.3 BLACK PETREL (*Procellaria parkinsoni*)
Several black petrels were seen just offshore of Great Island feeding around a fishing boat on which hapuka (*Polyprion oxygeneios*) were being filletted. Similar-sized dark seabirds were seen during the voyages to and from Great Island, but distinguishing between black petrels and flesh-footed shearwaters (*Puffinus carneipes*) at a distance was difficult.

3.1.4. FLESH-FOOTED SHEARWATER (*Puffinus carneipes*)
Flesh-footed shearwaters, along with black petrels were seen near Great Island feeding on fish offal around a fishing boat.

3.1.5. BULLER'S SHEARWATER (*Puffinus bulleri*)
Frequently seen during the voyages between Houhora and Great Island.

3.1.6. FLUTTERING SHEARWATER (*Puffinus gavia*)
Seen in large feeding flocks offshore between Houhora and North Cape, and about the Three Kings group. Birds came ashore on Great Island most nights during the trip and pairs were heard calling in burrows. Visits by fluttering shearwaters to their burrows at night during the non-breeding season have been observed at other colonies (M.J. Imber, pers. comm.).

Fluttering shearwaters breed in large numbers on Great Island (Table 2), with most burrows being on the coast and under puka forest (McCallum et al. 1985). Several burrows were also found in the soil or rock crevices under kanuka forest. Most of these burrows were within 50 m of cliffs that the shearwaters used as take-off sites.

3.1.7. WHITE-FACED STORM PETREL (*Pelagodroma marina*)
Single birds seen between Houhora and Great Island. The only occurrence of the white-faced storm petrel on Great Island was a leg found in a morepork nest (Turbott & Buddle 1948).

3.1.8 AUSTRALASIAN GANNET (*Sula bassana*)
Occasionally seen during the voyages and near the coasts of Great Island. Large colonies occur on four of the Princes Islands and South West Island, totalling nearly 10,000 pairs in the 81 breeding season (Wodzicki *et al*. 1984). Only a few adults and fully-feathered young were seen on the Princes Islands on 6 March 1989, even though most young do not leave the colonies until March-April (Robertson 1985).

3.1.9. BLACK SHAG (*Phalacrocorax carbo*)
Single birds were twice seen flying along the northern coast of Great Island on 4th and 5th of March. Black shags have rarely been seen there (Table 2), so this individual(s) may have flown from the mainland.

3.1.10. PIED SHAG (*Phalacrocorax varius*)
One seen near North Cape, North Island, and another from Great Island. Pied shags have been seen irregularly at Great Island by previous parties (Table 2).

3.1.11. DUCK SP. (*Anas* sp.)
A duck, appearing to be a mallard rather than a grey, flew from stream-side vegetation near the mouth of Tasman Stream. There are only two other records of a duck on the island; a grey duck (*Anas superciliosa*) in January 1951 and another probable mallard in November 1983

3.1.12. AUSTRALASIAN HARRIER (*Circus approximans*)
Harriers were seen each day flying above Great Island. The most seen at once were two adults and a juvenile. Although harriers have been regularly seen on Great Island, and two nests found (Turbott & Buddle 1948, Turbott & Bull 1954), only a few pairs seem to inhabit the Three Kings group.

3.1.13. BROWN QUAIL (*Synoicus ypsilophorus*)
Quail were heard calling most days at dawn near the camp-site. Although not frequently seen, they were observed at widely separated sites; along the route from North West Bay to the campsite, near Saddle Hill, by the lighthouse, at South Point and on Bald Hill. On 2 March a half-grown chick was seen with an adult. All quail were observed under 3-4 m high forest, which had little understorey and had clearings nearby.

As regeneration proceeds the area of semi-open shrubland and forest is likely to diminish (see Cameron *et al.* 1987). It is these habitats that support much of the fruiting and seeding species, such as *Carex testacea*, that provide food for brown quail (Turbott & Bull 1954). Whether the regenerating vegetation has adversely affected the quail's distribution and numbers on Great Island is unknown.

3.1.14. BANDED RAIL (*Rallus philippensis*)
On three occasions banded rails were startled into flight, including an adult accompanied by a three-quarter grown juvenile. One adult was killed by a snap-trap baited with cheese under a metal cover. The specimen, stored in alcohol, is now in the A.I.M. and a blood sample from it is in the frozen tissue collection housed in the Conservation Sciences Centre, Wellington. This collection is administered by Dr S.J. Triggs. The bird visited the trap within 30 minutes of it being set at about 2000 h. The trap was about five metres from camp. No rails had been seen from the campsite, presumably because they were hidden from view by the dense understorey of mainly *Coprosma rhamnoides*.

Banded rails have been heard or seen by several other parties, particularly close to the campsite before regeneration of the understorey occurred (Table 2).

3.1.15. RED-BILLED GULL (*Larus novaehollandiae scopulinus*)
Nesting was almost complete when we arrived, with just a few chicks still incompletely feathered and unable to fly. Hundreds of gulls returned to the shoreline each night to roost. Large feeding flocks of gulls were seen around Great Island. A regurgitation from a chick was composed entirely of *Nyctiphanes australis.* This planktonic euphausiid is an important food of breeding red-billed gulls elsewhere in New Zealand (Mills 1969).

Six red-billed gulls, mainly large chicks unable to fly, were collected from North West Bay. Heart, liver, muscle and blood samples were taken from these gulls for Drs Mills and Baker.

It is evident from the records of parties visiting Great Island when much of the island was denuded of vegetation by goats that large numbers of red-billed gulls bred on open ground well inland (Turbott & Bull 1954). Recent observations indicate that most red-bills now nest along the coastline amongst boulders and short vegetation, and probably fewer gulls nest on Great Island than formerly. Gurr and Kinsky (1965) estimated the total red-billed gull population of the Three Kings group at about 6000 pairs, while McCallum et al. (1985) estimated that 10-15,000 pairs were present during the 1985-86 breeding season.

3.1.16. WHITE-FRONTED TERN (*Sterna striata*)
White-fronted terns were seen offshore between Houhora and North Cape, but none were seen about the Three Kings group. This species has been recorded irregularly about Great Island (Table 2), and other islands in the group (McCallum *et al*. 1985). It was seen nesting on Hinemoa Rock in November 1983 (McCallum 1985).

3.1.17 GREY TERNLET (*Procelsterna cerlea*)
Some ternlets were seen roosting on either Tutanekai Rock or Stella Rock on 6 March. Grey ternlets were first seen at the Three Kings group in 1976, and have been seen during most subsequent summer voyages past West Island and Princes Islands (McCallum *et al*. 1985). In January 1985 two flocks of totalling about 200 birds were roosting on West Island or feeding nearby. Although the have not been seen nesting at the Three Kings, they nest in small cavities and may have been overlooked. At the Kermadec Islands the birds start laying in August and the last chicks fledge in January (Powlesland 1985).

3.1.18. RED CROWNED PARAKEET (*Cyanoramphus n. novaezelandiae*)
This parakeet was seen frequently each day on Great Island, usually as pairs or groups. A nest was found on 1 March because of the lone chick's loud and incessant calling. The nest was in a mamaku (*Cyathea medullaris*). The chick seemed rather skinny and its primary quills had started to develop. The skeletal remains of a parakeet were collected in Tasman Valley on 1 March and are now in the A.I.M. (registration no. 01481).

A mist-net was set up beside Castaway Stream, where parakeets regularly came to bathe. Eight parakeets were caught and a blood sample was taken from each. Preliminary analysis of these samples using starch-gel electrophoresis shows that the red-crowned parakeets of Great Island are very similar genetically to those on the Poor Knights and Little Barrier Islands (S. J. Triggs, pers. comm.).

Parakeets have been recorded by most parties to Great Island (Table 2), which is to be expected given the species' abundance, conspicuous flights above the canopy and distinctive calls. Red-crowned parakeets feed on seeds, berries, fruits, buds, flowers and shoots (Taylor 1985), and so, presumably, the revegetation of the island has favoured this species by providing a greater variety and quantity of foods (see Cameron *et al*. 1987). Although tree nest-sites seemed scarce because there were few large old trees, the parakeets probably find ample nest cavities in cliffs and by using seabird burrows, as occurs elsewhere (pers. obs., Bellingham 1987).

3.1.19. LONG-TAILED CUCKOO (*Eudynamis taitensis*)
Twice, lone cuckoos were seen in Tasman Valley. Since there are no known hosts of this cuckoo on Great Island, presumably the bird(s) were en route to its wintering islands, mainly from Fiji to Iles Tuamotu (Cunningham 1985). This cuckoo has been recorded by five of the 19 parties on Great Island (Table 2).

3.1.20. MOREPORK (*Ninox n. novaeseelandiae*)

Moreporks were quite vocal each evening at dusk. One juvenile, with down adhering to its mantle and scapulars, was frightened from a fairly open roost beside Castaway Stream. Most previous parties have also seen moreporks. In addition, four nests have been found, all at ground level, presumably because of the absence of trees with suitable holes (Ramsay & Watt 1971, McCallum et al. 1985).

3.1.21. NEW ZEALAND KINGFISHER (*Halcyon sancta vagans*)
Kingfishers were seen most days, particularly at North West Bay. A juvenile and an occupied nest burrow in a stream bank were seen. Other parties have found kingfishers nesting along Tasman Stream (Turbott & Buddle 1948, Turbott & Bull 1954).

3.1.22. WELCOME SWALLOW (*Hirundo tahitica neoxena*)
Twice on 27 February two swallows were seen flying above the forest next to the cliffs of North West Bay. Swallows were not seen during the rest of the visit. The species has been seen only once previously on Great Island, when two birds were seen at North West Bay in January 1985 (McCallum 1985).

3.1.23. NEW ZEALAND PIPIT (*Anthus n. novaeseelandiae*)
Lone birds were seen along the shoreline of North West Bay, and on mat plants near South Point. During the 1940s to 1960s pipits were regularly seen in open sites and even in the open spaces beneath the kanuka canopy (Turbott & Buddle 1948). However, the regeneration of the forest following the extermination of the goats in 1946 now restricts pipits to a few inland sites covered in mat plants, and open habitats on cliffs and shoreline.

3.1.24. NORTH ISLAND FANTAIL (*Rhipidura fuliginosa placabilis*)
Fantails, although not numerous, were seen each day and at widespread locations on Great Island.

3.1.25. BLACKBIRD (*Turdus merula*)
Blackbirds, rather than being seen, were usually heard giving alarm calls after being disturbed. No full song was heard. As noted by previous parties, the blackbird was widely distributed and in moderate numbers on Great Island (Table 2).

One adult male was collected for the A.I.M. and is a spirit specimen (registration no. 01471). Blood, liver and muscle samples were taken from this bird for the frozen tissue collection.

3.1.26. THREE KINGS BELLBIRD (*Anthornis melanura obscura*)
The bellbird was the most common passerine on Great Island. On one occasion in open kanuka forest there were up to 25 birds in view within a radius of about 20 m. Casual observation suggested their predominant foods during the trip were invertebrates and *Coprosma rhamnoides* fruit.

One of the main tasks was to collect bellbirds for the National Museum because only six specimens of this subspecies were previously available in museums. Bellbirds were frequently caught in the mist-net beside Castaway Stream, where they drank and bathed. Several were measured (Appendix 1) from 28 February to 5 March. Adults were distinguished as those birds with an emarginated ninth primary, while immatures were those not in adult plumage and that did not have an emarginated ninth primary (Bartle Sagar 1987, figure 2). It was noted whether the remiges and rectrices were in moult. The tip of an outer tail feather was removed to distinguish birds that had been measured. Head-bill, bill and tarsus were measured with vernier calipers (0.1 mm), and the wing and tail with a ruler (1 mm). Measurements were taken as specified by Gurr (1947) and Bartle and Sagar (1987).

In total, 33 bellbirds were measured, the majority (25) of which were adult males (Appendix 1). The measurements confirm the large size of the Three Kings subspecies compared with other extant populations (see Bartle & Sagar 1987). While the few measurements of females indicate the population is sexually dimorphic, as are all bellbird populations (Bartle & Sagar 1987), more measurements of females and immature males are needed for statistical comparisons.

Most adult males had completed tail and primary moult, but had a few secondaries in moult. By comparison, the flight feathers of immatures were not moulting, although an occasional one was being replaced. However, most immatures were undergoing contour moult, particularly on their heads. Thus, the timing of the moult of the Three Kings population is probably similar to that of the Poor Knights population (October mid-February), rather than like mainland populations (late December – mid April) (Bartle & Sagar, figure 3).

From an examination of the specimens collected during the trip, it seems that Three Kings bellbirds attain adult plumage when about 15 months old, as do Poor Knights bellbirds. In contrast, mainland bellbirds moult into adult plumage when about four months old (Bartle & Sagar 1987).

Blood and liver samples were taken from three Three Kings bellbirds. The samples are in the frozen tissue collection, DOC, Wellington.

3.1.27. STARLING (*Sturnus vulgaris*)
On one occasion two starlings were seen in flight. This contrasts markedly with the observations of Turbott & Buddle (1948) who recorded "fair numbers on all parts of the island" and Turbott & Bull (1954) who reported a flock of 200 birds in Castaway Valley. Even in 1970, Ramsay and Watt (1971) often saw starlings above the cliffs. No doubt the regeneration of scrub and forest since the removal of the goats has reduced the area of foraging habitat available for starlings.

3.1.28. INDIAN MYNA (*Acridotheres tristis*)
This species was seen each day, with flocks of about 10 birds encountered foraging in the canopy. Each evening mynas flew over the campsite to roost in five-metre high forest near the clifftops of North West Bay. It was estimated that at least 500 birds left the roost after dawn on 4 March. Whether other roosts were being used elsewhere on Great Island at the same time is unknown.

The myna is a relatively recent colonist of Great Island, being first seen there in 1970 (Ramsay & Watt 1971), and its numbers seem to be building up gradually. Given the scarcity of suitable-sized holes in trees for hole-nesting birds on Great Island, and the reports of mainland mynas destroying eggs and chicks of other species (Bull 1985), the burgeoning myna population on Great Island may adversely affect some bird species there, such as the starling and red-crowned parakeet. Since mynas on the mainland forage mostly in pasture and on relatively bare ground for invertebrates and fruit (Bull 1985), what sustains the Great Island population during the breeding season and when fruit is unavailable would be of interest.

3.2 Lizards

When walking about Great Island sightings of lizards were recorded. In addition, plastic plant-pots (185 mm deep x 170 mm square) were set into the substrate as pit-fall traps, and baited with either fruit or a combination of fruit and cooked sausage to attract and capture lizards. Five traps were situated near the high-tide line of North West Bay; three among low-growing vegetation and rocks, and two among rocks and seaweed. The traps were operated for two nights. On the first morning at 0830 they contained 13 *Leiolopisma suteri,* one *L. fallai* and one *L. smithi.* At 0730 the same day the traps contained five *L. suteri,* and one *L. fallai.* Next moring 33 *L. suteri* and one *Hoplodactylus pacificus* were in the traps.

Two traps sited near the lighthouse in white clover (*Trifolium repens*) next to scrub and operated for two nights caught no lizards even though skinks were seen there. Similarly, two traps set under puka forest failed to capture lizards.

Eighteen rat snap-traps baited with cheese at 2000 h on 2 March were sited about the campsite in kanuka forest. The next morning the traps contained 13 killed *L. fallai.* All the specimens were stored in alcohol and deposited in the four *L. fallai,* two *L. suten,* one *L. smithi* and three *H. pacificus* were brought back alive for Dr C. Daugherty, Victoria University for genetic studies. Once he has finished with these specimens they will be given to the National Museum, Wellington.

During previous visits to Great Island five other lizard species were identified; *Hoplodactylus maculates, H. granulatus, Leiolopisma moco, Cyclodina ornate* and *C. aenea* (C. R. Pickard, pers. comm.).

3.2.1. THREE KINGS SKINK (*Leiolopisma fallai*)
This large skink was seen in all habitats, from seashore to the summit. It was most evident on the ground in puka groves. Several *fallai* were seen at seabird-burrow entrances which they retreated into when approached closely. However, others were foraging some distance from obvious retreats, including in trees up to a metre above the ground. They were also active at night, as also noted McCallum *et al.* (1985).

Of the 13 *fallai* killed in rat-traps, two (15%) had intact tails. The mean snout-vent length of the 13 animals was 128.3 mm (range = 121-142 mm, S.E. = 1.9).

3.2.2. EGG-LAYING SKINK (*Leiolopisma suteri*)
This distinctively coloured skink (red-orange belly) comprised the majority (94%) of the 54 skinks captured along the seashore. Most *suteri* were seen near the high-tide line apart from an occasional small individual along the lower third of the cliff track above North West Bay. Of the 33 caught in the pit-fall traps on 3 March, eight (24%) had intact tails. These eight individuals had a mean snout-vent length of 83.1 mm (range = 72-95, S.E. = 2.8), and a mean tail length (vent-tail tip) of 70.9 mm (range = 60-80, S.E. = 2.2). The mean snout-vent length of all 33 *suteri* was 90.9 mm (range = 72-105, S.E. = 1.4).

3.2.3. SHORE SKINK (*Leiolopisma smithi*)
I positively identified only four shore skinks. They were seen in relatively open habitats on the track above North West Bay and by the lighthouse. One suspected juvenile brought hack alive to Wellington has been tentatively identified as a juvenile *L. fallai*!

3.2.4. PACIFIC GECKO (*Hoplodacylus pacificus*)
This species was found in all habitats, from the seashore to the high-point of the island. By day geckos were found sheltering under rocks, in rotten logs and under litter. A large concentration of geckos was found amongst the lighthouse's old batteries next to the forest edge. At least 20 geckos were between or underneath the closely-packed batteries. Many geckos were seen foraging at night on vegetation.

4. CONCLUSIONS

From the former records of the Great Island vegetation (Baylis 1948, Turbott 1948) and the re-survey of the three vegetation quadrats in 1982-83 (Cameron *et al.* 1987), it is evident that the island's vegetation is gradually reverting to a puka and mixed coastal forest, albeit slowly. The extent of puka groves is increasing and broad-leafed species are establishing under the kanuka canopy. These floristic changes and the absence of mammalian predators will help to ensure the conservation of the island's lizards and birds, particularly the endemics. The census of forest birds in a quadrat in 1952-53 (Turbott & Bull 1954) soon after the goat eradication, provides an opportunity to quantify the effects of the forest regeneration upon the avifauna. During the past 36 years several bird species have become scarce or gone from Great Island, for example the New Zealand pipit, chaffinch, house sparrow and starling (Table 2), perhaps as a result of the regeneration. However, without a quantitative study it is difficult to assess from the records whether other species present in 1952 have increased in numbers or not, such as the brown quail, red-fronted parakeet, North Island fantail and blackbird. Given the predacious activities of mynas on the eggs and nestlings of small birds, there will be a continuing need to monitor the status of the bird fauna of Great Island.

5. RECOMMENDATIONS

1. As a result of the accidental capture of a rail and lizards with the rat snap-traps, it is recommended that cage-traps or tracking pads be used in future to determine whether rats have gained access to rat-free islands inhabited by lizards and rails.

2. Since few female and immature male Three Kings bellbirds were captured and measured during the 1989 visit, future parties should be encouraged to continue this work so as to fully document the variation in the morphometrics and plumages of the bellbird.

3. The vegetation cover of Great Island has changed markedly since the extermination of the goats in 1946. From the observations of various parties since that time it seems that the composition of the avian fauna and the numbers of some species has changed over the past 43 years (Table 2). To quantify this change a repeat of the forest bird census carried out by Turbott and Bull (1954) in January 1953 near vegetation quadrats I and II (Turbott 1948) should be made.

4. Future ornithologists to Great Island should be encouraged to document:
   (a) the number of nesting black-winged petrels at some locations to determine whether numbers are increasing, and
   (b) the number of mynas since an increasing myna population may adversely affect other passerines through competition for cavity nest-sites or by interference at nests.

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Appendix 1 Size and moult status of Three Kings bellbirds from Great Island, 28 February to 5 March 1989.
Key: M - moulting, C - moult completed. * National Museum registration numbers.

Age & Sex	Length (mm)					Moult	
	Head-bill	Bill	Tarsus	Wing	Tail	Remiges	Rectrices
Adult male							
	44.0	17.3	30.0	93	90	C	C
	44.9	17.1	29.8	94	90	M	-
NMNZ 23995*	43.6	16.9	29.1	98	85	M	M
	42.8	17.0	28.7	93	86	M	C
NMNZ 24010	42.6	17.4	27.9	92	86	C	C
	43.9	17.2	29.4	95	91	C	C
	43.1	17.0	29.2	95	90	C	C
	44.6	17.0	28.4	95	89	M	C
	44.2	17.2	29.8	92	91	M	C
	43.3	16.9	29.5	93	90	C	C
NMNZ 24011	43.3	17.5	29.1	96	93	C	C
	43.9	17.6	30.3	95	88	C	C
	45.1	17.5	29.8	93	89	C	C
	43.3	17.8	29.2	91	84	M	C
	44.2	17.6	30.0	94	86	C	C
	44.4	17.6	29.7	93	87	C	C
	41.7	16.2	29.8	90	84	M	C
	44.6	17.7	29.2	95	83	M	C
	44.4	17.0	29.5	93	87	C	C
	43.0	16.6	29.5	87	84	C	C
	43.5	17.0	28.7	93	89	M	C
	44.1	17.8	28.5	94	86	C	C
	45.6	16.9	30.1	93	88	C	C
	43.3	17.3	30.0	93	89	C	C
	44.6	17.4	28.3	92	88	M	C
Mean	43.8	17.2	29.3	93.3	87.7		
S.E.	0.17	0.08	0.13	0.42	0.52		

Appendix 1 continued

Age & Sex	Measurements					Moult	
	Head-bill	Bill	Tarsus	Wing	Tail	Remiges	Rectrices
Immature male							
	44.9	16.4	30.2	90	81	C	M
	43.4	16.9	30.6	90	85	C	C
NMNZ 23993	44.4	16.8	28.8	90	82	M	M
NMNZ 23994	44.1	17.5	28.1	88	79	C	C
Adult female							
	40.4	15.4	27.2	82	74	M	C
	41.4	15.7	27.3	83	70	M	M
Immature female							
NMNZ 24013	40.6	15.7	26.1	81	72	M	C
NMNZ 24012	40.3	15.1	26.0	82	74	M	C