CONSERVATION
TE PAPA ATAWHAI

CONSERVATION ADVISORY SCIENCE NOTES

No. 70

ALABTROSS RESEARCH ON (MOTUHARA) FORTY-FOURS ISLANDS 6-15 DECEMBER 1993

(Short Answers in Conservation Science)

This report is published by Head Office, Department of Conservation, and presents the results of scientific services or advice purchased from a consultant outside the Department or provided by Departmental scientific staff. All enquiries should be addressed to the CAS Coordinator, S&R Division.

Department of Conservation, P 0 Box 10-420, Wellington, New Zealand

ISSN 1171-9834

Reference to material in this report should be cited thus:

Robertson, C.J.R., and Sawyer S., 1994.
Albatross research on (Motuhara) Forty-Fours islands : 6-15 December 1993.
Conservation Advisory Science Notes No. 70, Department of Conservation,
Wellington. 10p.

Commissioned by: Canterbury Conservancy
Location: NZMS

ALBATROSS RESEARCH ON (MOTUHARA) FORTY FOURS ISLANDS 6 - 15 December 1993

C J R Robertson[1] and S Sawyer[2]
[1]Science & Research Division, Department of Conservation P O Box 10-420, Wellington
[2]Department of Conservation, Chatham Islands

PURPOSE

Following the failure of a similar attempted visit in 1992, this was the first of a series of specific island visits to check the status and breeding ecology of the albatrosses in the Chathams over the next 10 years and to compare data with results obtained in the 1970's.

Specific tasks on this visit related to the Northern Bullers Mollymawk *(Diomedea bulleri sp.)*, Northern Royal albatross *(Diomedea epomophora sanfordi)*, and Northern Giant Petrel *(Macronectes halli)* and included gathering nesting distribution and density data to attempt a more reliable population estimate of the Bullers; comparative data on the length of incubation stints and sizes of nests; times of day when non-breeding birds were most prevalent; relevant taxonomic data relating to bill colour for the revision of the species status of this form; collections of nest density and nest structure data for Royals as part of an investigation into the high nesting failures which have been recorded in recent years from air photographs; comparative measurements of shell thickness in failed eggs; verification of optimal time of day for air photographs; data on nest failures; establishing the breeding distribution of the Giant petrels plus likely numbers and nesting success; other bird observations as the situation arose.

LOGISTICS

The 2 man party was transported to and from Kaingaroa by 'Kuini Moana' (Ron Butterfield) and Alan Munn, and assistance with the departure from the island was provided by George White (NZ Police). A comfortable landing was made at the SW landing at the western and lowest end of the island. With some effort most equipment (except for reserve water supplies) was hauled up the cliff in three lifts and a good campsite selected at the western end between the 2 possible landing spots. The maximum wind during the stay would not have exceeded 40kts and only trace rainfall was experienced. The campsite used would be satisfactory in most conditions. Nest sites for 18 pairs

of Bullers were removed and levelled to provide the basic campsite. The sites were quickly reoccupied at our departure.

The island can be difficult of egress with dangerous slippery conditions when wet. The sharp spiky nature of the greywacke rock means that falls can expose personnel to the risk of abrasions and sprains. Departure was delayed by the unavailability of the vessel and subsequent bad weather which produced breaking seas along the landing. A relatively difficult offloading of gear to the Lancer standing off from the landing was successfully achieved without loss of gear, and personnel swam off. For long visits this is still the preferred landing in spite of the long haul for lifting the gear to the campsite, because of the ease of organising volumes of gear at landing and departure. The other landing (attempted unsuccessfully in 1992), if available because of sea conditions, is probably the best for short day trips as no serious climbing is involved. All personnel used wetsuits.

RESULTS

1. Northern Royal Albatross.

Figure One shows the nesting distribution of the Royals. This distribution has not changed significantly since the 1970's. On the basis of the air photographs and chick survival from the previous season, some 95 + % of the total breeding population for the 44's could be expected to have attempted breeding in the 1993/94 season. Prior to final counts being done from the air photographs taken after our visit the general impression from the photos supports this assumption.

As has been noted from the air photographs taken since 1988, there has been a substantial reduction in both vegetation and soils especially in the areas where Royals nest since the early 1970's. This is confirmed by comparison of ground photos taken then and during our visit. Analysis of climatic records (NZ Met. Service *pers. comm.*) shows a significant increase in the soil moisture deficits of land in the Chathams since about 1970. This is most likely to have had an even greater effect on the small outer islands which are mainly not physically shaped to collect and hold water, because of their basic rocky nature. There is little sign of permanent fresh water on the 44's and only one small seep was found in the Bullers area, while the 'lake' in the Bullers area also remained dry throughout our visit. Most of the Royal nesting areas on the 44's do not collect water, due to the more humped shape of the topography.

The most likely result of the reduction in moisture has been a progressive die-off of the primary woody vegetation *(Cotula renwicki ssp [variety specific to 44's])* which normally regrows each year from the basic root and stem, followed by the steady attrition of the peaty soils which were held by the root systems (see below under Bullers for contrary results in their wetter basin shaped nesting areas). Throughout the areas used by Royals, soils have been

depleted by at least 70% since the 1970's and little vegetation (previously used for nesting material) is evident at any time of the year.

The Royals are increasingly having to nest in marginal habitat with very rudimentary nests and eggs laid directly onto rocky substrate (rather than the softer soil or vegetation base), with sharp stone chips under the egg and little soil or vegetation to build a nest rim. All of these factors increase the probability of egg failure through crushing, damage to the shell or rolling out of the nest. During our visit, nest structures were almost non-existent except for a few nests at the *salicornia* patch where quite substantial and normal nests with soil and vegetation were present. The residual chick production in the past few years has been closely correlated with moist soil filled areas and fissures in the rocky substrate which have retained some soils and vegetation.

It is not known what direct or indirect effects the modification of moisture conditions in the nest may have on the normal moisture exchanges that occur through the egg shell during chick development. There have been some pointers from Taiaroa Head that death of large embryos before the hatching process commences could be related to the lack of moisture in the nest structure or direct exposure to high temperatures in the nest. Certainly the potential moisture differences between a nest predominantly of soil and vegetation and one primarily of solid rock would seem to be extreme.

The egg failures have been occurring before or during hatching and are related specifically to those areas where the birds have been forced to nest on a bare rocky substrate or with extensive quantities of sharp rock chips in the nest. This increases the likelihood of damage to the shell or crushing of the egg during the 80 days of incubation. At Taiaroa Head there has been evidence that very dry and warm conditions at hatching can cause the drying of membranes in the egg during the three days of hatching, which prevents the chick being able to break out from the shell. It is not known whether this factor is contributing to the overall nesting failure at the Forty-Fours.

We found no evidence of the presence of the introduced Australian blowfly *(Lucilia cuprina)* which has become a problem (flyblow of the hatching egg and very young chicks) at Taiaroa Head over the past 8 years.

Breeding birds failing to hatch chicks will renest the following season instead of being absent for a season like those who successfully rear chicks. Hence the reason for such a high proportion of the population attempting to breed at the same time.

Some 53% of this seasons Royal eggs had failed by December 10 1993 as evidenced by shell in the nest of sampled observed failures. The majority showed signs of failure through early death of the embryo rather than infertility (these eggs normally explode by late December at Taiaroa Head). A sample of shells measured for thickness showed a substantial reduction in mean thickness (also observed at the Sisters in similar circumstances of

increased nesting density in the 1970's) which would have further increased the chances of eggs failing through weaker shell strength.

Nesting density was significantly higher than normal (due to the higher proportion of the population trying to nest) with most nests being about 1 to 1.5 metres apart, compared with the 1970's when very few nests on the 44's were recorded less than 2 metres apart. This high density was similar to conditions observed on the Middle Sister from 1972-74.

The chick production figures (Table 1 here and Robertson, 1991) obtained from air photographs taken during August in the 1970's and since 1988, demonstrate the very dramatic effect on the annual production of Royal albatross chicks on the 44's which has been caused by the poor annual breeding success currently being experienced as the result of the changes in habitat detailed above.

Table 1. Annual chick production figures for the Forty-Fours Island.

YEAR	CHICKS PRESENT IN AUGUST	YEAR	CHICKS PRESENT IN AUGUST
		1989	719
1973	1829	1990	115
1974	1539	1991	400
1975	1734	1992	118
		1993	225

Though wind conditions were generally light during our visit, there was good confirmation that photographs taken between 0900 and 1300hrs on days where the wind is in excess of 15kts during early December will have few non-breeding birds present on the ground.

There was some evidence of tick infestation round the eyes and lower mandible of a small number of birds. At least 3 birds showed symptoms including the inability to walk and lack of coordination which seemed to be related to the most severe cases of infestation seen. Similar cases have been recorded with mollymawks at Albatross Island in Bass Strait, where some mortality of chicks (up to 10%) has been caused by tick infestations. Though ticks were found in the 1970's studies no birds as seriously affected were seen at that time. Some ticks were found in Bullers, but were confined to the skin below the lower mandible.

2. Bullers Mollymawk.

Figure Two shows the main nesting distribution of the Bullers. Scattered nests are also found outside the main areas where small pieces of suitable

habitat occur especially on the upper cliffs and on the 4 rock stacks found to the east of the main island. Bullers nests consist of a mix of peaty soils, rock chips and vegetation where available. Substantial nests can be built (up to 25 cm high) in habitats with most soil and vegetation, but averaging only about 5-10 cm where there was extensive rocky underlay and little material for nest building.

In spite of the dry conditions, the most extensive areas of cotula on the island were present in the Bullers nesting areas and related specifically to the mainly flat or basin shaped areas of greatest moisture primarily SW of the *salicornia* patch near the 'lake'. In spite of the higher density of Bullers nesting compared to Royals, their use of cotula had not affected its coverage in the moister areas. Even in the less moist areas, the root structures and woody stumps of the cotula still remained.

Successful Bullers nests do not have a rocky base to the nest bowl and the soil needs to be moist to allow them to build successful nests. During our stay there was a marked drying out of nests often leading to a partial disintegration of the nest structure. The main area of moisture without vegetation was NE of the salicornia patch at the narrowest part of the island where regular extensive sea spray is a by-product of the 'blowholes' in the big southern bay in rough (or heavy swell) conditions.

There was no evidence of a major failure (as in the Royals) of eggs in the Bullers nesting. Eggs most likely to have failed were usually found in areas where there were poor nests especially with solid rock under the egg. This is quite normal.

Though sample nesting densities for Bullers were obtained as a step in the process of producing a better estimation of population size, it is not possible to do more at present due to the lack of an accurate size for the island (not held by DOSLI). Certainly the density per square metre recorded by our samples of measurements is substantially lower than that done by visual estimate in the 1970's.

The occupants of 50 marked nests were checked twice daily during our stay to assess the changeover and incubation periods on the nest. While the majority of changeovers occurred in the latter part of the day (also shown by density of flying birds) there was a smaller peak of changeovers in the morning. Mean incubation stints were between 2-4 days long, with 9 + days being the maximum recorded.

Taxonomic work is continuing with the Bullers and material collected on the distribution of colour on the culmen confirmed earlier comparisons made with Southern Bullers material. The DNA analysis of bloods collected at the 44's in 1991 is expected shortly as part of a worldwide DNA analysis for albatrosses. There is an increasingly high probability that Bullers in the Chathams will warrant separate species status.

3. Northern Giant Petrel.

There is a substantial breeding population of Giant petrels and their distribution is shown in Figure Three. Two areas were closely sampled (Shown on map as sample areas A & B) with 619 nest sites recorded (A = 394; B = 225) but there was a very low nesting success with only 103 live chicks recorded, 170 dead chicks and 346 empty sites (this could in part be related to storms during late October and early November).

There is a close correlation of breeding areas between the Giant petrels and the Royals with the GP's being concentrated in rough rocky areas where there was some shelter, especially closer to the cliffs. Nesting close to the centre of the island was more sparse, but in the 1970's was widely used when the Petrels nested extensively under the shelter of the *cotula*. On the basis of our sampling there are possibly as many as 2000 breeding pairs on the 44's, which is higher than the quick estimate made in the 1970's. This is probably the largest single population of this species and certainly the only major population of Giant petrels not associated with penguin and major seal colonies. They are probably primary pelagic feeders and there was evidence from the pink oil of regurgitations of major feeding on *Gnathophausia ingens,* which is a mid water mysid or 'prawn'. This has also been recorded as a major food for mollymawks at Albatross Island in Bass Strait.

4. White-capped Mollymawk.

A pair of this species was recorded by R. Chappell and G. Robertson in 1991. They were still present at the same site in 1993 on an empty nest. Both birds were banded and measurements indicated that they belong to the Auckland Island population of *Diomedea cauta steadi*.

5. Other species.

No more than one pair of Southern Skua seen at any time - none banded - none seen nesting.

No Black winged petrel were found ashore though some were seen flying past.

Cape Pigeon were nesting[?] (26 counted), on the rock closest to the NE end of the main island.

Fulmar prions were mainly on eggs, but one nest seen with chick about 1 week old and 1/6th size of an adult.

Westland Black/White-chinned petrels seen feeding at sea close to island (10/12)

Small numbers of Black-backed and Red-billed gulls

White-fronted terns were seen on nests breeding on southern and western cliffs.

Starlings - small numbers

Virtually no pipits seen.

ACKNOWLEDGEMENTS.

Thanks are due to the representatives of the Maori owners who gave permission for access to the island; the crew of the 'Kuini Moana', Alan Munn and George White for assistance with landings and departure; M J Imber for identification of the mysid. Bert Rebergen continued with his proficient counting of albatrosses from air photographs. R M Sadleir critically reviewed the manuscript.

REFERENCES

Robertson, C. J. R., 1991. Questions on the harvesting of Toroa in the Chatham Islands. *Science & Research Series No. 35,* Department of Conservation, Wellington. 105p.

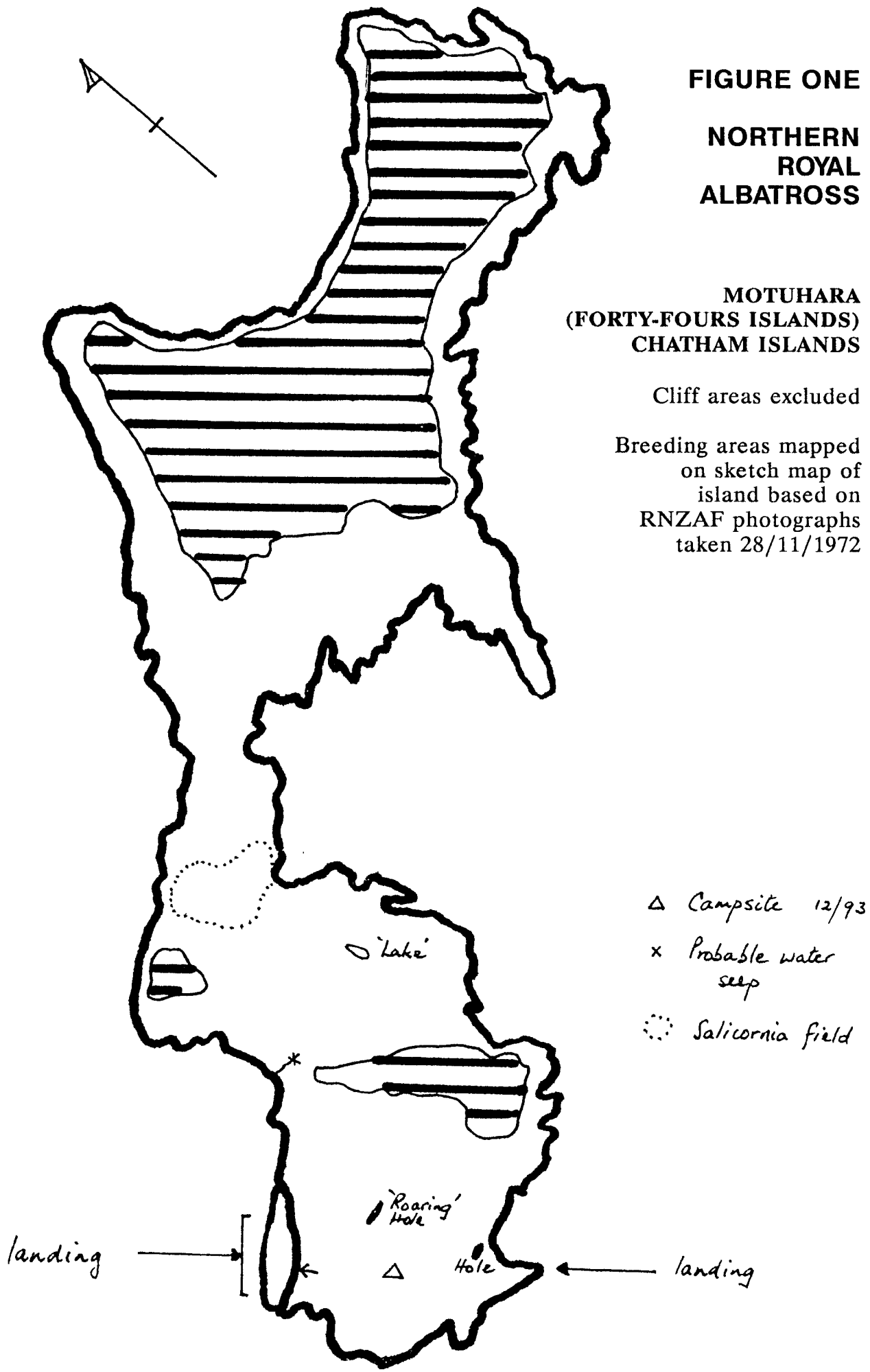

FIGURE ONE

NORTHERN ROYAL ALBATROSS

MOTUHARA (FORTY-FOURS ISLANDS) CHATHAM ISLANDS

Cliff areas excluded

Breeding areas mapped on sketch map of island based on RNZAF photographs taken 28/11/1972

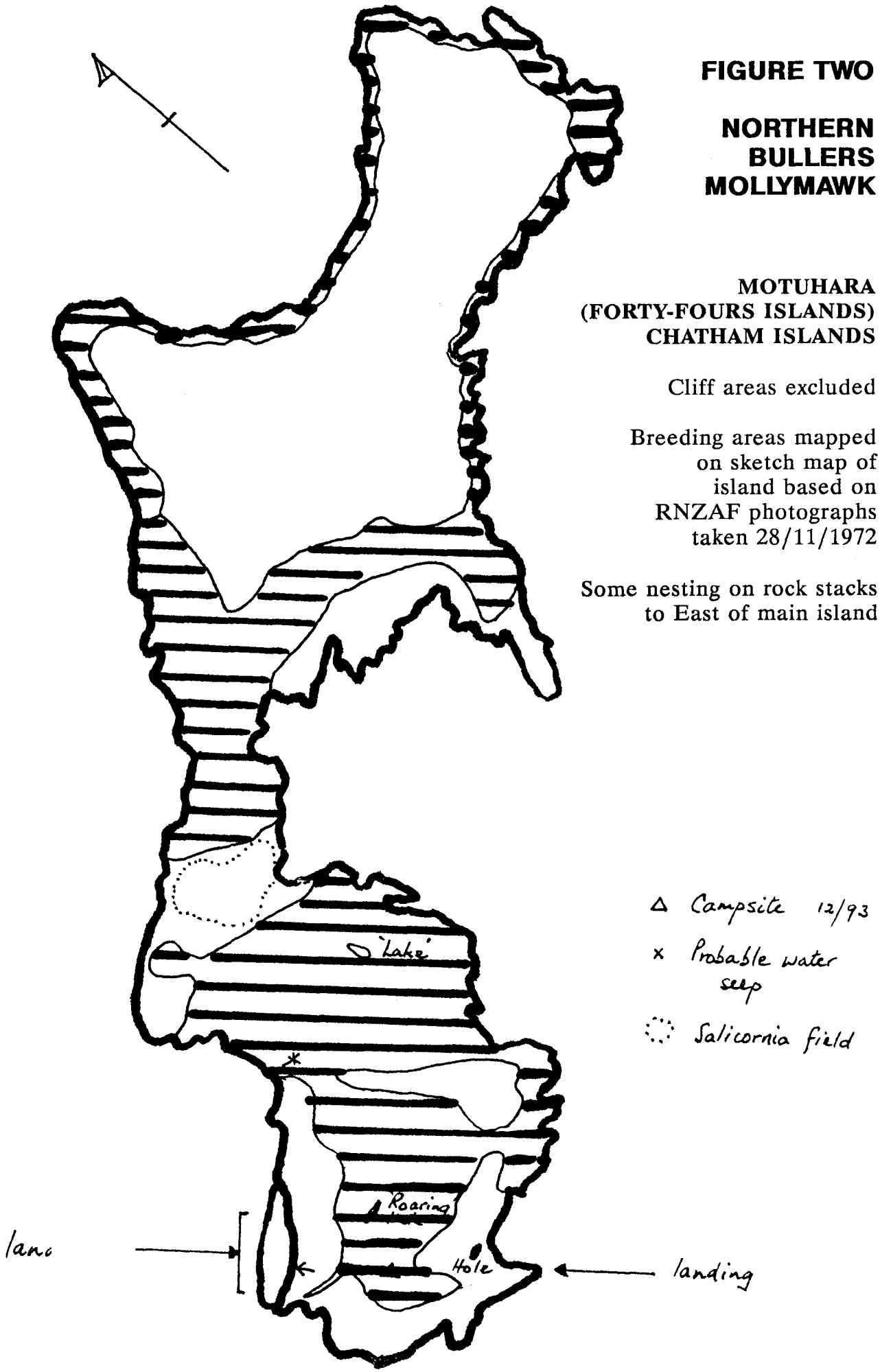

FIGURE TWO

NORTHERN BULLERS MOLLYMAWK

MOTUHARA (FORTY-FOURS ISLANDS) CHATHAM ISLANDS

Cliff areas excluded

Breeding areas mapped on sketch map of island based on RNZAF photographs taken 28/11/1972

Some nesting on rock stacks to East of main island

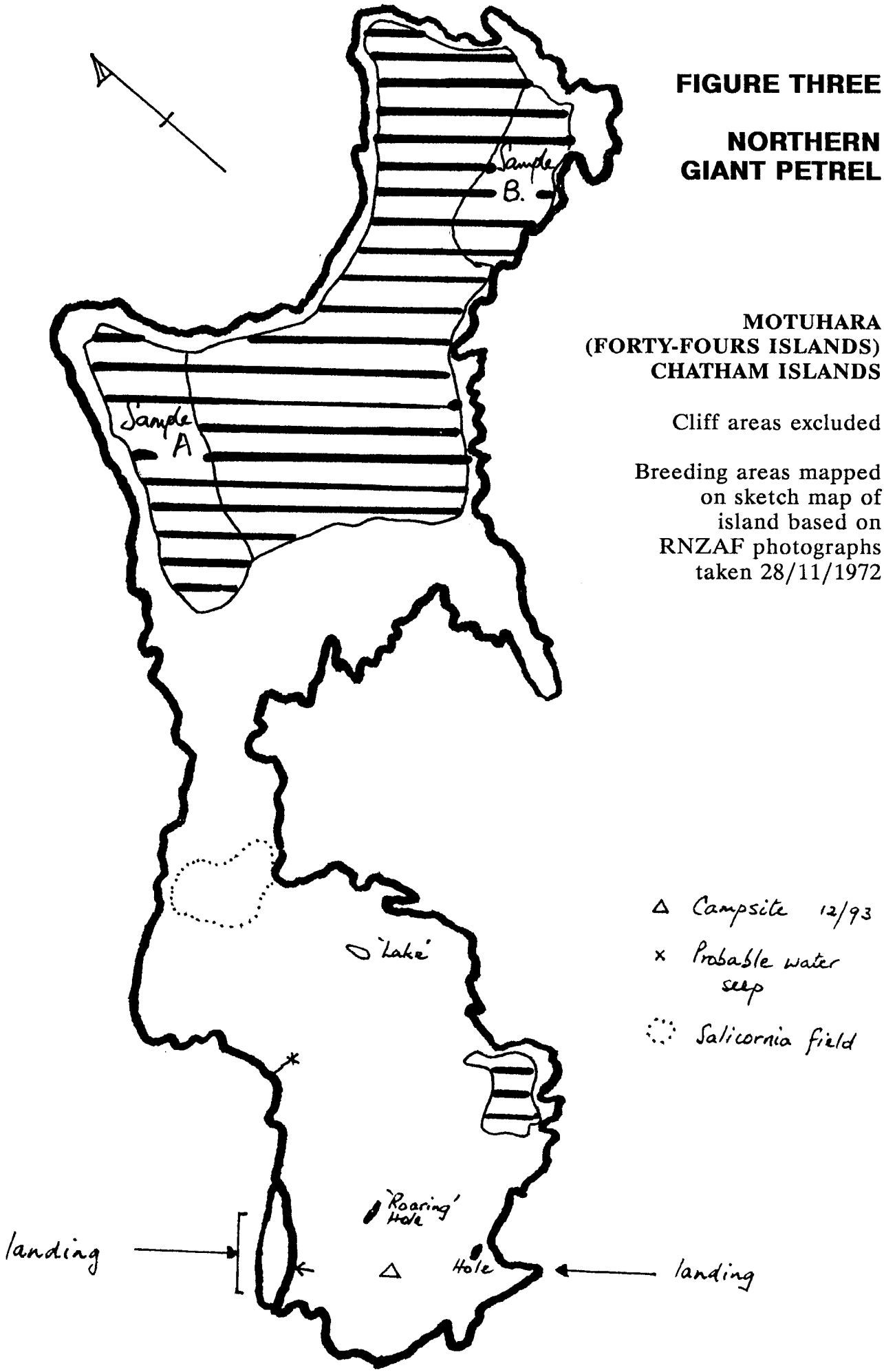

FIGURE THREE

NORTHERN GIANT PETREL

MOTUHARA (FORTY-FOURS ISLANDS) CHATHAM ISLANDS

Cliff areas excluded

Breeding areas mapped on sketch map of island based on RNZAF photographs taken 28/11/1972