MOTUTAPU

RESTORATION WORKING PLAN

This document has been prepared by the Auckland Conservancy of the Department of Conservation in consultation with Ngai Tai ki Tamaki Trust and interested groups in fulfilment of implementation policies 19.5.1, 19.7.1 and 19.10.1 of the Revised Draft Auckland Conservation Management Strategy 1994. It was endorsed by the Auckland Conservation Board on 31 August 1994

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FOREWORD

In the last glacial period when sea levels were lower, Motutapu was a low hill in the Waitemata valley near the junction of the ancestral Tamaki and Waitemata Rivers. At this time Motukorea erupted showering parts of the hill with ash. Later when the ice caps melted and sea level rose, the sea lapped and raged against these hills. Much of Motukorea was subdued and eroded, and now lies below the sea. Motutapu was isolated from the mainland and from the hills of Waiheke and Motuihe. Quickly the landscape changed to one we would recognise today: an island with high cliffs, rocky shore platforms, and small, swampy, steeply backed beaches. Later, Rangitoto erupted from the shallow seas to the west, showering Motutapu with volcanic ash, in many places burying or burning the vegetation and changing again the landscape. Lava flowed from Rangitoto's cone, spreading apron-like around this new island and almost connecting it to Motutapu.

By this time Te Motu Tapu A Taikehu had been a prized home of Maori for several generations. The place names record their ancestors, their deeds and their mana. Rangitoto's ash destroyed villages, gardens, and forests. In time the ash provided a new wealth of tillable soils on Motutapu, and settlement and use intensified. Perhaps 500 years passed before Pakeha arrived. With the introduction of grazing animals, the landscape of Motutapu changed again. Today Motutapu is a single pastoral farm, with a few 'remembered' hints of its former vegetation and with a wealth of historic sites and landscapes which reflect, layer upon layer, the richness and complexity of human settlement, use, and reverence for this place.

The history of Motutapu mirrors that of Tamaki-Makaurau, Auckland. The descendants of the Tainui crew settled on Motutapu and other islands, specifically the descendants of Taikehu, Te Keteanataua and his son Taihaua. They became known as Ngati Tai. They occupied Motutapu until the nineteenth century. Today the people of Ngai Tai still maintain mana whenua over Te Motutapu a Taikehu. They have a long association with the island and strong ancestral links with many other tribes. Representatives of Ngai Tai Ki Tamaki Trust have worked with the Department of Conservation in the preparation of this document. The restoration programme outlined in this plan will restore some elements of Motutapu's former landscape by revegetation, consistent with the protection and reverence of sacred historic sites. It is also to be an expression of rangatiratanga and ahi kaa which in meaningful ways will provide for the restoration of human relationships with wahi tapu and features of ancestral significance. At the same time it enables this and future generations of visitors to learn of the past and of the natural and cultural processes which contributed to the contemporary landscape and the mana of Te Motu Tapu A Taikehu.

1.0 INTRODUCTION AND WORKING PLAN CONTEXT

1.1 Background to Plan Development

In June 1992 the Department distributed a draft Working Plan for the revegetation of Motutapu Island for comment by individuals and groups with an interest in the future management of the island. Following receipt of submissions a series of meetings was held to discuss the issues raised and clarify areas of uncertainty. The programme of consultation culminated in a public workshop.

The ideas generated resulted in a recognition of the need to make the cultural and historical values of Motutapu the primary objective of management. The goal of this programme will therefore be the use of integrated conservation activities for restoration of the cultural and natural landscape. Restoration in this context means careful management to enhance the cultural landscape handed down to us, with particular emphasis on pre-European times; and active intervention and management to restore in part the ecological community that was once present on Motutapu after the Rangitoto eruption when the Maori community was present. These principles were incorporated in the Department's primary policy document, the draft Conservation Management Strategy.

This revised Working Plan is designed to provide practical guidance to those charged with implementing conservation programmes on Motutapu over the next five years. The pastoral areas will continue to be farmed by Motutapu Farms Ltd. The plan outlines the programme of conservation activities under the three headings of cultural landscape restoration, ecological restoration and community participation. In addition to plant propagation and planting it includes a programme of archaeological survey and site investigation that must precede any planting; historical research priorities; indigenous remnants to be fenced, areas to be retired from grazing and either planted or allowed to regenerate naturally; problem weed identification and control; animal pest control and eradication activities; education, interpretation and recreation opportunities; the resources needed to carry out the programmes and the opportunities for fund raising and sponsorship.

1.2 Planning Context

The Motutapu Restoration Working Plan does not exist in a policy vacuum, nor does it establish policy. The plans and policies which provide its context are set out in Appendix 1. The most important document is the Auckland Conservancy Conservation Management Plan, which provides objectives for the integrated management of all lands and marine areas administered by the Department in the Auckland Conservancy.

2.0 OBJECTIVES FOR THE CONSERVATION MANAGEMENT OF MOTUTAPU

The Conservation Management Strategy (Revised Draft June 1994) contains the following objectives in relation to the restoration of Motutapu.

Treaty of Waitangi

- Actively protect and provide for the interests of Ngai Tai, in particular by facilitating their links with the island and its taonga and wahi tapu.

Heritage Protection

- Achieve a restored cultural landscape through an integrated programme of the protection of archaeological sites, appropriate revegetation and the reintroduction of native animals.

- In all management of the island, give priority to the protection and understanding of its cultural landscape and historic features.

- Identify and protect significant geological sites and landforms.

- Protect existing natural habitats and restore appropriate areas as functioning indigenous ecosystems. Protect and enhance sufficient habitats for threatened species, in association with the cultural landscape.

Accessibility

- Strengthen the cultural and emotional links of the Auckland community with Motutapu through:

  - interpretation of heritage sites in their cultural landscape context, and
  - participation in a programme of conservation activities to achieve the progressive establishment of indigenous forests and wetlands on parts of the island.

- Develop Motutapu as a significant visitor destination.

- Promote the Motutapu Outdoor Education Camp as an opportunity to develop within individuals, a conservation ethos based on experiential learning.

- Maintain a sustainable farming operation demonstrating methods which are compatible with and integral to historic and nature conservation programmes, including landscape protection, revegetation, recreation and interpretation.

3.0 THE COMPONENTS OF THE RESTORATION PROGRAMME

Three major themes underlie the restoration working plan and touch almost every aspect of conservation work in the Auckland Conservancy. These themes determine the future direction of the restoration programme.

- **Motutapu is an historic and cultural landscape of high integrity and the primary goal of management will be its protection and enhancement.**

- **Together with Rangitoto, Motutapu represents an unrivalled opportunity for ecological restoration close to a metropolitan centre which can contribute significantly to threatened species survival in New Zealand.**

- **The restoration programme represents a unique opportunity for the community to participate in conservation programmes.**

3.1 The Cultural Landscape

Motutapu is one of the longest settled places in Auckland and much of the record of that occupation remains in the physical archaeological record, in the oral and written tradition, and in recorded history. The oldest investigated sites date from the earliest periods of Polynesian settlement. The first Maori settlers were attracted to the island by its stone which was used for adzes and other tools (Davidson 1987). The Rangitoto eruption probably destroyed much of the remaining forest and transformed the heavy clay soils into friable loams, well suited to gardening. This use in turn led to the progressive loss of trees that had survived the eruption. Those remnants of indigenous vegetation that survive today are a culturally determined selection of species and pattern of distribution rather than vestiges of a natural vegetation. Motutapu would have been a very desirable place in which to live and settlement was intensive. There is evidence of undefended settlements, terraced house sites, pits for storage, cooking areas, middens, stone working sites and pa. More than 300 archaeological sites have been recorded and others remain unrecorded.

The pre-European archaeological landscape then is the product of several centuries of Maori life on the island. Overlying it are the effects of one and a half centuries of European activity, principally farming, and the military occupation during World War II. In places these activities have destroyed or submerged the Maori sites; in other places sites ranging from pa and large villages to tiny hamlets are preserved in all their variety.

Today a unique and well preserved cultural, as distinct from natural, landscape survives which is of prime importance in understanding the human history of Auckland (Plan 4). Conservation of this very significant cultural heritage will be the primary objective of management.

An important initial part of the restoration programme will be to extend the knowledge and understanding of the prehistory through archaeological survey and research, and to assist in the management of sites.

Farming will be an integral part of the restoration programme, providing an important management tool for the maintenance of archaeological and historic sites.

The cultural landscape will be enhanced by a programme to protect the forest remnants from stock, encourage natural regeneration, and progressively plant selected areas compatible with the principal objective of protecting and managing the historic resource.

The planting programme will concentrate on the gulleys, the wetlands and the coastal perimeter, but will also aim to create larger areas of forest where this does not compromise the archaeological landscape. Although it is probable that forest resources were never widely present on the island after the Rangitoto eruption, the re-establishment of partial forest cover and the future re-introduction of threatened species is justified in that they reflect aspects of the early post-eruption phase on the island.

Other aspects of the past environment will also be catered for. Although most of the island would appear to have been gardened at some stage, large areas would have been allowed to revert to bracken and manuka as part of the gardening cycle. Re-establishment of similar vegetation could be an appropriate cover for some sites while providing interpretative opportunities. This aspect will be examined during the archaeological research programme, but in general it is anticipated that archaeological sites will be retained in pasture.

In keeping with the emphasis on the cultural landscape, attention will be given to planting species of particular value to Maori; plants such as flax and traditional medicinal resources that will be available for tangata whenua to harvest.

Whilst the emphasis of the programme will be centred around the Maori sites, the significance of European farming and military occupation will also be recognised. The Reid homestead and its environs at Home Bay will be retained as a late 19th century farm landscape and the major military features of the island will be progressively restored and interpreted. Careful consideration will be given to the retention and possible replacement of some exotic species of particular historic significance, but more recent plantings of exotics will be removed.

The contrast between Motutapu and Rangitoto, which has always existed, will be maintained. Motutapu will be interpreted as an ancient landform, which for the past 700 years, at least, has been managed and modified by human activity. Rangitoto will be interpreted as a young, predominantly natural landscape.

3.2 An Opportunity for Ecological Restoration

Motutapu has been intensively cultivated for generations and over this period its natural flora and fauna have been drastically depleted (Esler 1980). The island has been grazed since the mid-19th century and is largely in pasture. The pockets of indigenous vegetation which have survived in a few wetlands, in small forest clumps and around the coastal fringe, have all been seriously compromised by possum and wallaby browsing (Plan 3). The native fauna is relatively depleted as a result of extensive land modification and the impact of introduced predatory mammals. A range of exotic trees has been planted well beyond the areas of settlement. Inappropriate indigenous species have also been planted and their origin is unknown. The spread of problem weeds has reached a point where management is difficult and the integrity of the few remaining natural areas is threatened.

Alongside Motutapu is Rangitoto. The national and international ecological significance of Rangitoto is recognised by its status as a separate and entire ecological district. Its importance is as a living text book of the process of succession from barren lava/rock to a full vegetated cover. It is the largest pohutukawa forest in existence. Motutapu has been the primary source of indigenous biological material for Rangitoto. The islands are biologically linked and what happens on one affects the other. Any activities to enhance the ecological values of Motutapu must complement the indigenous character and future values of Rangitoto.

The two islands together provide an unrivalled opportunity for ecological restoration (Miller 1993). Their size (3842 ha), isolation, diverse geological characteristics and wide range of habitat types provide ideal conditions for the establishment of a haven of international significance for indigenous species. Pivotal to realising this potential is the eradication and continued exclusion of animal pests from both islands and the removal or control of problem weeds.

Plants for the revegetation programme will be propagated on Motutapu. In general the planting will complement the drainage pattern, linking the coastal vegetation via the gullies and stream beds inland to upper catchments. This will emphasise the undulating landform and retain the predominantly open ridge character of the island as viewed from offshore. It will also facilitate ready access and views out to the Gulf. This planting will provide a framework of natural habitats to the pasture, whilst carefully avoiding the archaeological sites. In places where sites are absent, larger blocks of forest will be established to provide a variety of habitats for the future introduction of fauna. Species present on the island after the Rangitoto eruption will be used.

High priority will be given to excluding stock from the forest remnants and wetlands. This will create considerable opportunities for natural regeneration. Steep and erosion-prone land will be retired from grazing. The majority of the island will however remain grazed providing a pastoral landscape suited to walking and allowing views of the surrounding Gulf.

Problem weed control will be an essential part of the programme, accompanied by the progressive removal of exotics and their replacement with indigenous species.

The eradication of possum and wallaby will be pursued to a successful conclusion and will be followed by a linked programme to progressively eradicate other pests. This will allow the natural vegetation succession to proceed unhindered.

3.3 Motutapu and the Community

Although Motutapu has been settled for generations, it has become in recent years a largely forgotten place. Shielded and outshone by its visually dominant and youthful neighbour Rangitoto, the island's resources and potential are unappreciated by most Aucklanders. Yet it encompasses the entire span of human occupation of the Auckland region and the interaction of people with the landscape. Motutapu has unique stories of its own to tell to those who would come to listen and share in its history and rich cultural past.

The Motutapu restoration programme is about breathing new life into this ancient landform, uncovering its secrets and celebrating its future.

The location of Motutapu close to Auckland presents an important dimension - people. The restoration programme is conceived as a community project, one that will provide opportunities for the whole community to be involved in conservation. Such participation is essential to its success and to engender a sense of belonging and attachment to Motutapu. Initially the project is expected to draw on the public of the immediate Auckland area but it is hoped that the level of interest will broaden and grow.

The community's support will also be sought to sustain the programme financially. The programme will rely on sponsorship and an essential aspect of the work of the Motutapu Restoration Trust, formed to generate funding, will be to attract sufficient resources to support all the aspects of the conservation activities proposed.

Marketing and publicity will be used to raise the project's profile and to generate public interest. Volunteer networks will be set up and promoted and key groups will be targeted to encourage their involvement.

The programme will provide unique opportunities for both Aucklanders and visitors to participate in conservation activities and to increase their understanding and appreciation of heritage values. Auckland in particular will be able to watch at close quarters, contribute to the project and enjoy the results.

A primary focus is the contribution which children can make. The planting of 'Children's Forests' is aimed both at their learning through involvement and developing a conservation ethic. Interpretation will introduce children to the island's heritage values. The Motutapu Outdoor Education Camp (MOEC), which receives over 8000 pupils a year and provides facilities for recreation, education and interpretation, will be a cornerstone of young people's participation.

Interpretation of the historic landscape will offer new recreational facilities including tracks to lead visitors to a variety of landmarks and scenic lookout points. It is expected that Motutapu will receive increasing levels of use and it is anticipated that the programme will ultimately generate the basis for increased conservation and heritage tourism.

4.0 CULTURAL LANDSCAPE RESTORATION - PROGRAMME OF ACTIVITIES

This section outlines the cultural landscape restoration programme of work to be undertaken within the five year life of this plan. Further funding will be required in order to implement the full programme. Refer to Tables 1-5 for a detailed list of activities and proposed timetable for implementation, subject to funding.

4.1 Cultural Restoration

Te Motutapu a Taikehu is a place of special interest to the Tainui tribal confederation and in particular to Ngai Tai who occupied it for over 400 years. Tangata whenua have the most enduring relationship with the island and have particular interests in both its history and future management. The involvement of tangata whenua with the restoration programme is therefore fundamental to the concept, and the approach is one of partnership between tangata whenua and the Department. This will facilitate the process of cultural restoration and allow for the former close links of tangata whenua to be re-established.

The customs, concepts, perspectives and values of Maori are to be respected. The maintenance and care of the land is of utmost importance and traditional sites and places of spiritual significance will be respected in their entirety.

The archaeological sites are Motutapu's most important conservation resource. They will be preserved and interpreted to enable them to be appreciated and understood in their landscape context. The advice of tangata whenua will be sought to ensure the appropriate management of sites.

The restoration programme will also restore some element of Motutapu's former natural values through a progressive programme of planting, the control of exotics and animal pests, and the eventual return of some of its former indigenous fauna.

The main elements of the programme to restore the cultural linkages of tangata whenua with the land in the first five years are as follows:

- Tangata whenua active involvement.

  An active working involvement of tangata whenua is anticipated in this programme which encompasses the ideas of restoration of kaitiaki and turangawaewae.

- Archaeological site management and interpretation.

  Tangata whenua support the investigation of pa sites so that their character, extent, function and detailed construction can be better understood, and the findings made available for education and interpretation purposes. Any work would need to be undertaken with appropriate tikanga and form part of the overall programme of scientific survey and research and may require an application to modify from the New Zealand Historic Places Trust (NZHPT).

- Medicinal plants and other materials for harvesting.

  Flax and other traditional and medicinal species that could be available for harvest will be planted and suitable sites will be assessed at an early stage in the programme. Medicinal plants will form part of the general revegetation programme, but in addition an area close to the nursery will be set aside where species can be grown both for harvest and educational purposes.

  The sources of plant material will be controlled as the Department has given an assurance to plant only species from the island or neighbouring islands.

- The use of traditional names on maps, information and interpretation leaflets.

- Cultural heritage/education programming and interpretation.

- The design, carving and erection of pouwhenua at the Causeway and/or Home Bay. These will re-establish the presence of tangata whenua and signify their special relationship with Motutapu at its gateway.

- The design, carving and erection of pouwhenua at pa and other significant archaeological sites. This will identify the special significance of these places.

  It will be necessary to obtain appropriate materials and a suitable base on Rangitoto or Motutapu for carving the pouwhenua.

4.2 Archaeological Survey Programme

Motutapu was subject to an extensive archaeological survey in the 1970s (Davidson 1987) resulting in the basic recording of archaeological site data for 331 sites, and the noting of a further 98 possible sites (Plan 5). A limited number of sites were excavated (Davidson, Leahy 1986) but knowledge of the extent, nature, and significance of the majority of the sites is still at a preliminary stage. Archaeological work was also carried out at the early pre-Rangitoto eruption Sunde site (Nichol 1988).

The main elements of the survey programme are as follows:

- Produce a comprehensive inventory of sites accurately mapped, described and recorded on plan. The condition of each site and the presence of vegetation

will be noted, together with options for its management. An analysis of the survey information will allow for better understanding of the island's settlement pattern and can be used for educational purposes and for the interpretation of sites to the public. It will also provide a sound basis on which to plan for planting beyond the life of this plan.

- All areas selected for fencing, planting and for natural regeneration have been identified on the basis of existing information as areas where the programme will have little or no impact on historic resources. However, these will be surveyed to confirm this and to define final fenceline routes.

- There are many places which have been identified as possible sites. The programme will begin by re-assessing these to ascertain their archaeological status. Whether or not they are sites they should yield information useful to understanding the vegetation history of the island.

- A complete resurvey of recorded sites will commence at the north eastern end of the island. This area contains many sites, several remnants and wet valley bottoms that are a priority to protect. It also includes the area of protected coastal land most suited to enrichment planting because of the relative absence of weed species.

- The north western side of the island will then be surveyed. This contains a large number of sites, many of them very significant. The western coast of Billy Goat Point has a series of sites which are traversed by the coastal fence and where stock tracking is causing damage to surface features. Parts of this coastline are also susceptible to erosion and have priority for improved management.

- Finally the southern part of the island will be surveyed. This area is the focus of a parallel Auckland University study of site relationships which may provide necessary data on the sites here.

- A final report will be prepared on the results of these surveys.

4.3 Archaeological Research Programme

A programme of archaeological research, building on previous work, will be carried out jointly by the Department of Conservation, the tangata whenua and the Auckland University Anthropology Department. The working plan proposals are as follows:

- A research strategy to guide work over the next 4 years.

- Auckland University's work to examine inter site/feature relationships using Global Positioning Systems (GPS) and Geographic Information Systems (GIS) and interpretation of surface field evidence. One focus will be on the southern part of the island where there are striking contrasts between catchments with a high incidence of recorded sites, and catchments with apparently few sites

or possible sites. The impact of factors such as ploughing on site distribution will be investigated.

- Auckland University's conductivity survey work to locate, define and gauge the nature of sites without excavation.

- In consultation with tangata whenua and DOC and with permission to modify from NZHPT, limited investigations of selected archaeological sites may be undertaken as required to help establish conservation priorities. Such information may then be available for education and interpretation purposes (see 4.1).

4.4 Archaeological Site Management

The programme and method of management of sites will be decided by agreement between tangata whenua and the Department.

Although farming has caused damage to archaeological sites in the past, pastoral farming carried out with proper understanding of the resource is one of the most satisfactory regimes for preserving sites while enabling their surface features to be viewed. It also prevents the establishment of trees whose root action can lead to the eventual destruction of sites. The great majority of sites will therefore be managed under grazing.

While the emphasis of the plan is on expanding the knowledge of sites through survey and research there are opportunities for improving currently unsatisfactory management of certain sites.

- Many sites are traversed by fencelines, particularly on ridgelines and around the coastal perimeter. Apart from the initial damage done to the subsurface strata by the posts, fences can encourage stock tracking and damage to surface features, compromise the visual integrity of sites, and result in a variable vegetation cover over different parts, making effective presentation difficult. In some instances trees have become established on sites. Priority will be given to realigning fences around the most significant sites where stock damage or tree growth is actively occurring. Where existing fencing is to be renewed as part of the maintenance programme it will be rerouted around sites.

- In certain instances the exclusion of stock from sites may be the best solution to their management and in these circumstances it may be desirable to encourage an alternative grass cover. Much of the coastal slopes are covered by low-growing native grasses (*Microlaena stipoides*) and trials to establish this on specific sites will be carried out. If successful it will provide a valuable alternative management tool for sites.

- Water tanks and stock troughs tend to concentrate animal activity and in the past this has resulted in damage to some sites. When changes are made by the farm to the stock water reticulation system the opportunity will be taken to relocate tanks and troughs.

4.5 Conservation of Historic Features

European farming dating back to the 1840's has left extensive marks on the landscape. Eleven historic sites have been recorded, all associated with farming activities (Brassey 1992). The two main settlements were at Emu Bay, which retains a row of Norfolk Island pines, remnants of an orchard and other exotic trees; and Home Bay where the old homestead and some of the original plantings still stand (Plan 4). There are also individual historic trees scattered around the southern part of the island and clumps of fig which were probably planted by Maori. These historic features and vegetation remnants (other than invasive species) will be preserved. It is intended that the Reid homestead and its environs will be interpreted as a late 19th century farm landscape.

The working plan proposals are:

- Conserve the historic vegetation at Emu Bay and Home Bay. In the first instance an arborist will be engaged to advise on appropriate tree surgery and other measures.

- Conserve the Reid homestead and environs, ideally with some appropriate uses in mind. Commission a conservation architect to prepare a conservation plan. Carry out remedial work according to the conservation plan as accommodation requirements dictate and financial resources allow.

4.6 Conservation of Military Features

Numerous defence installations were built on Motutapu during World War II as part of the coastal defences of Auckland which also included North Head and Waiheke. The installations at Motutapu are the only ones on the DOC estate that were fully functional. They contain gun batteries, searchlight installations, pill boxes and the ancillary support services. The locations and functions of almost all the military structures and features are known. The Motutapu sites are therefore an important example of how a fully staffed coastal defence establishment worked and they provide an excellent opportunity for interpretation. In addition there are underground ammunition stores built by the United States Navy on the western side of Motutapu overlooking Gardiner's Gap. It is intended that the major military features will be protected, progressively restored and interpreted.

Working plan proposals are as follows:

- All structures are in need of urgent attention. The proposed conservation work for the 6" battery is covered by the draft Motutapu Military Sites

Maintenance Plan (Veart 1993). The plan divides the military sites into three areas and gives a detailed breakdown of conservation priorities for each area together with a summary sheet. Overall priorities for the areas are also included and these form the basis of the conservation activities recorded in Tables 1-5.

- The programme of conservation activities, if fully implemented, would involve considerable time, labour, and materials. The major labour component is in removing many years of accumulated dung and rubbish. The main requirements for materials are for the restoration of doors and shutters and the provision of stock-proof gates.

- Conservation management proposals are also available for the complex of underground ammunition magazines and roading above Gardiner's Gap (Coster 1987).

- Conservation management proposals are required for the former barracks (MOEC) at Administration Bay to ensure that future development there is in keeping with its military character, whilst allowing the camp to operate in its contemporary educational role. This work will be carried out by the Department.

4.7 The Protection of Indigenous Forest Remnants

The surviving pockets of forest, containing species such as taraire, puriri and karaka, are a living record of the pattern of forest and cleared areas determined by generations of Maori habitation. They are an important part of the cultural landscape and also make a significant visual contribution. In general, remnants are located on south-facing slopes of catchments close to the coast on the eastern side of the island. This distribution may complement the use of more desirable north-facing slopes for living sites and gardening. The remnants are also a valuable source of seed for ecological restoration.

All unfenced remnants (Plan 8) are a priority for protection. The ability to fence all of them in the first year is limited and priority will be given on the basis of the following criteria.

- The ecological value i.e., size, location, health, diversity of species content.

- The location of cultural, historic and archaeological sites nearby which may determine management decisions.

- The visual value and contribution to the quality of recreational experience.

- The potential for incorporating the remnant within a larger area of planting at a later date.

- The cost of fencing.

Data sheets and photographic records have been prepared for each remnant. The fencing programme is primarily aimed at protecting remnants according to their priority. For example, the largest and most species diverse remnant will be protected in Year 1. It is intended that all the most significant remnants be protected by Year 5. (See Plan 10 and fencing summary Appendix 3). All fencing will be preceded by a thorough survey of proposed fencelines to ensure that no sites are affected. If necessary fencelines will be rerouted to avoid sites.

5.0 ECOLOGICAL RESTORATION - PROGRAMME OF ACTIVITIES

This section outlines the ecological restoration programme of work to be undertaken within the five year life of the plan. Further funding will be required in order to implement the full programme. Refer to Tables 1-5 for a detailed list of activities and proposed timetable for implementation, subject to funding.

5.1 The Nursery

5.1.1 Nursery facilities

The Motutapu nursery will be a primary focus for revegetation activities. In addition to its plant propagation and growing-on functions it will provide the work station for the project co-ordinator and will be the point of contact with the public/volunteers.

The current facilities consist of a small glasshouse, shade house, propagation shed, and standing-out areas well protected by shelter. There are no toilets or washing facilities. WWF-NZ are funding some upgrading ($25,000) and operational costs ($5000 p.a.) up to year 5. To date power and water have been installed and standing out areas set up. The expectation that the Trust would purchase the school building did not eventuate. Without it the project lacks an adequately sized visitor reception space. When resources permit a new propagation shed could be built to enable the existing shed to function solely as an office/reception facility.

5.1.2 Plant production

Plant needs for Year 1 (25000 plants) will be supplied by outside nurseries using Motutapu seed. From Year 2 the majority of plants will be propagated on Motutapu. Additional plants may from time to time be purchased to supplement the nursery's production. Annual production will be gradually increased to an anticipated 40,000 plants in Year 5 (Appendix 4). The nursery, when fully upgraded, has the capacity to produce all anticipated plant needs but will require additional funding to operate effectively.

The working plan priority is:

- To produce appropriately sized plants sufficient to meet the needs of the planting programme.

5.1.3 Seed source

The significance of the vegetation colonisation on Rangitoto and the influence that Motutapu plantings will have on the process means that it is essential to plant only species indigenous to the island and nearby islands (Appendix 5). Seeds will be obtained in the first instance from Motutapu and Rangitoto. Where seed supply is inadequate for species known to have existed on Motutapu, seed may be obtained from the closest or best island source within the ecological district up to 12 km distant.

Provision will be made for re-introducing or establishing populations of threatened plants once or still present in the ecological district, e.g. *Lepidium flexicaule*.

Research into the island's vegetation history can provide potentially valuable guidance to the selection of appropriate species and help interpret the island's past (Appendix 6). The Department will encourage such research and intends to give support to palynological work currently being done.

Many indigenous trees have been planted over the years in the settlement areas of Home Bay, Administration Bay, the Quarantine and in certain gullies. There is no record of their ecological source and some species have been planted outside their natural geographical range. It is important to ensure that seed is collected only from plants natural to Motutapu.

The priorities of this plan are as follows:

- Collect seed to propagate plants for the programme.
- Update research to obtain the best possible information about plant species which were indigenous to Motutapu. (Appendix 6)
- Prepare clear guidelines to ensure that seeds collected from Motutapu are from trees and shrubs which have grown naturally on the island.

5.2 Planting Strategy

Planting areas have been chosen so as to have little or no impact on historic sites. Notwithstanding this all planting will follow a set procedure for site identification, and departmental archaeologists will mark out any sites together with a buffer zone to ensure they are not planted. Staff and volunteer co-ordinators will be trained on how to recognise archaeological deposits. In the event that sites are discovered during planting the area will be left unplanted and be subject to a full archaeological investigation held in conjunction with Tangata Whenua.

This section outlines the role of volunteer planters and the range of different types of sites for planting. Plan 9 illustrates the distances between ferry access points and MOEC and potential planting sites.

5.2.1 Volunteer planters

Potential planters fall into the following categories.

School children
This category would generally be subject to the limitations of a regular school day and would probably have less time to spend on the island than other groups. Average numbers in school parties are expected to be about 90. Being physically less capable they would need to be set smaller tasks and ideally planting sites would be located as close as possible to ferry access points.

Public
This category is likely to comprise the majority of planters responding to regular weekend planting days advertised throughout the planting season. It would comprise a wide cross-section of ages and physical capability and numbers could be in excess of 100. Although this group is generally reasonably mobile and capable of walking longer distances from the ferry to the planting site, planting sites would preferably be available within 1½ km.

Groups
This category can be expected to be more focused in its interests and to offer a range of skills to the programme. Its members may wish to stay overnight at the MOEC lodge or camp. If the group is small enough it could be transported by vehicle to planting sites well away from ferry access points.

MOEC
Students spend extended periods at the camp but experience planting as one of a number of recreational pursuits. It is intended that they should concentrate their efforts on the camp environs in order to build up a sense of attachment to the area. Planting will be in accordance with the overall planting programme.

Planting Sites
Planting sites will be allocated in accordance with the capacity of each group.

The fenced areas in paddocks 69 and 37 close to Islington Bay will be reserved for schools planting (Plan 10). At the anticipated rate of planting this area will be available until the end of year 4, after which schools can move to Paddock 63 near Home Bay.

In order to provide for large-scale public planting reasonably close to the wharf two paddocks in the Home Bay catchments, 14 and 63, will be retired from the farm. This area was chosen primarily because the number of recorded archaeological sites is low, but there are a number of other factors which support its selection. Shelter and toilets are available at Home Bay. It is a very large area with the capacity to cater for anticipated plantings for the duration of the plan. It is an inland site as opposed to coastal and offers a range of planting sites - ridge, slope, valley bottom and wetland. It contains two remnants. There are no problem weeds and the site is distant from concentrations of the invasive weed rhamnus. Planting here will have

a high profile alongside the road and be visible offshore. In the long term there is potential to expand planting westwards to incorporate the adjacent gully now planted with exotics, thereby creating a large heartland forest. This potential will need to be confirmed by the archaeological survey and research programme. In the interim no areas containing sites will be planted.

Areas available for group planting include parts of the eastern coastline from Billy Goat Point to Home Bay.

The catchment which drains into Administration Bay Paddock 9 will be fenced to increase the area of protected land in the vicinity of MOEC for the students to plant.

5.2.2 Open pasture sites

Plant species will be chosen to suit different ecological conditions and it will be necessary to carry out field trials to determine the most effective methods of planting in different types of pasture. Shrub species of the genera *Coprosma*, *Pseudopanax*, *Pittosporum* and *Leptospermum* will be used extensively to provide initial shelter and food for birds, to which forest tree species can be added at a later stage. The result of research carried out on Tiritiri Matangi by Auckland University Environmental Sciences Department into the performance of various species in different geographical situations will be applied as appropriate on Motutapu.

Some emphasis will be given to planting species known to be unpalatable to rabbits, such as kanuka, flax, pohutukawa and mahoe.

5.2.3 Wetlands

Streams and extensive wet valley bottoms are a characteristic feature of Motutapu. They are potentially valuable habitats and provide an opportunity for landscape enhancement. As a general rule they could be revegetated without compromising archaeological sites or values. In addition they are unproductive as farmland and a nuisance to stock managers (see Plan 7). At present streams are generally pugged by stock, but as the riparian vegetation matures they may eventually return to a stony base. Catchment protection will aim to rehabilitate whole stream systems so that the process of natural restoration can proceed.

Many catchments have good potential as wetland habitats for threatened species such as spotless crake, bittern, and fernbird. Ecological values will be diversified in certain catchments by creating open water for waterfowl. In many cases this can be provided by repairing existing breached earth dams.

The priority given to protecting wetlands will depend on the following criteria:

- The location of archaeological, historic and cultural sites which determine management decisions.

- The existing ecological value based on an evaluation of size, linkages to other protected areas, diversity of species, presence of weeds.

- The potential habitat value based on an evaluation of size, linkages to other protected areas, and capacity for open water creation.

- The visual value and contribution to the quality of recreational experience.

- The potential for incorporating the remnants within a larger area of planting at a later date.

- The practicality of achieving protection.

Data sheets and photographic records have been prepared for each catchment. Using the above criteria particular catchments have been identified for inclusion in this plan. The priority for protection is catchment 7, a very large catchment with a long and sizeable stream already fenced on one side. Its existing values are limited but the potential is high.

A number of potential wetlands will also be fenced in association with remnants 5, 10, 11 and 13 (Plan 10).

It is anticipated that fencing wet areas will be the main priority for Years 6 - 10, i.e. beyond the life of this plan.

5.2.4 Unproductive farmland

Unproductive farmland on Motutapu is of three main types (Plan 7). Valley bottoms which are too wet for good pasture and a trap for stock; steep slopes susceptible to erosion (some of these areas also have a remnant forest cover); areas where apple of sodom predominates - this weed is a problem all over Motutapu but has reached such densities in some western paddocks that they are effectively retired from grazing.

The priorities of this plan fit well with the objectives of the farm.

- Large areas of the steepest slopes covered by remnants will be fenced off together with some of the wetlands associated with them. Wet areas in Catchments 7 and 13 (Plan 2) will also be protected. Two small areas of eroding steep land in Catchments 2 and 11 will be retired and planted.

5.2.5 Remnants

Fencing of remnants will in some instances incorporate large of areas of pasture with potential for planting. While some remnants will be left to regenerate naturally others will be actively encouraged using a variety of techniques. These could include planting shrubs at close intervals to achieve a rapid cover; or planting widely spaced pohutukawa to provide an initial canopy under which natural regeneration can occur; or broadcasting the seed of shrub species.

5.3 Fencing

The Department has responsibility for establishing all new boundary fences and sharing maintenance equally with the farm. Boundary fences include the perimeter coastal fence and all stock exclusion fences to planted areas. Maintenance of fencing will be an ongoing requirement. All proposed fencelines will be surveyed to ensure that sites are not damaged.

The priorities for fencing are summarised as follows (see also Appendix 3, Summary of Fencing):

- The protection of indigenous remnants (see Item 4.7). This also includes some associated wetlands in paddocks 7, 15, and 43.
- The protection of wetlands (see Item 5.2.3), paddocks 19 and 65.
- The realignment of fences for archaeological site management purposes (see item 4.4), paddocks 37, 47, and 52.
- The retirement of unproductive farmland (see Item 5.2.4), paddocks 41 and 60.
- The realignment of the coastal fence to provide better protection to the coastal remnant adjacent to paddock 3.
- The creation of planting opportunities (see Item 5.2.1), paddocks 14 and 63.

5.4 Natural Regeneration

Natural regeneration processes can contribute significantly to the restoration of vegetation cover, thereby freeing up resources for other activities (Wright and Cameron 1990). On Motutapu the process is likely to be slow because of the general paucity of seed sources and the presence of rodents and rabbits. The most suitable areas are those adjacent to indigenous forest remnants but other areas, including a range of different habitat types, e.g. stretches of coastal margin, paddock and wetlands, have also been identified. Periodic inspection will be necessary to measure progress, to monitor and if necessary control weed growth. These areas will not be allowed to become a weed source to threaten the progress of regeneration elsewhere.

The management of archaeological sites within the fenced areas will be subject to a comprehensive review as part of the Archaeological survey programme (4.2).

The priorities in this plan are as follows:

- The fencing of remnants generates opportunities to set aside areas for natural regeneration. An important factor in the selection is their location relative to ferry access. Remnants 2, 3, 4 and 12 are difficult to access and will be set aside for natural regeneration (Plan 10). Similarly, stretches of coastal cliffs

associated with remnants and adjacent to paddock 3 and 16 will also be set aside. A small part of remnant 18, which is an example of a sheltered inland site, will be left to regenerate.

- As part of the programme to measure progress and control weed growth groups will be encouraged to 'adopt a remnant'.

5.5 Management of Exotics

5.5.1 Problem weed management

Motutapu is host to a remarkable number of weeds. The most significant, as far as the restoration programme is concerned, are those which can out-compete indigenous species, e.g., evergreen buckthorn (*Rhamnus alaternus*), or create serious problems for pastoral management and possibly reduce management options for historic sites, e.g., apple of sodom (*Solanum sodomeum*). It is clear that weeds pose a major challenge to the success of the programme and that substantial resources will be needed to contain or eradicate them.

A survey of the island (Cameron 1993) identified several aggressive terrestrial weeds which are a major threat. In some cases these are not yet well established, e.g., bone seed (*Chrysanthemoides monilifera*), and the report recommends that initial efforts should be directed towards eradicating their existing small populations. Other species will have a much larger impact than they currently do and these also require urgent management, e.g., moth plant (*Araujia sericifera*).

Many of the weeds on Motutapu are also present on Rangitoto, Rakino, Motuihe and Motukorea and in terms of weed control these islands must be managed together.

Very little is known about the biological characteristics of some of the plants or the prospects for controlling them. Rhamnus is a major concern on both islands. Field tests into chemical controls have been initiated and clearance of scattered bushes in the coastal cliff zone has been undertaken. An MSc research project into the ecology of the plant and a strategy for its control is in progress (Fromont 1993)

The priority in this plan is as follows:

- Prepare a weed eradication/control strategy to determine the priorities for action and identify the resources needed to carry it out.

- Implement the weed eradication/control programme using volunteers where appropriate. Monitor and document progress.

- Continue with field trials to determine the most effective control method for problem weeds, especially evergreen buckthorn.

5.5.2 Exotic tree management

Motutapu supports a range of exotic trees associated with different periods. Historic remnants associated with early farming and settlement are concentrated mainly at Emu Bay and Home Bay. Vegetation planted in association with military activity during the 1940s still remains at Administration Bay and in the Quarantine area. Shelter/woodlots have also been planted at various times as part of the farming operation. The Department of Lands and Survey planted exotics with indigenous species in the 1960s and 70s in several catchments, including Home Bay.

The protection and management of historic trees is covered in section 4.5. As part of the programme to restore the indigenous character of the island, exotics elsewhere will be progressively removed.

The priorities of this plan are as follows:

- Assess the timber value/potential value of all exotic shelter belts/woodlots. In the light of this assessment prepare management proposals for these areas.
- Prepare a management plan for the Quarantine area providing for the removal of the ageing macrocarpa shelter belts and their replacement by pohutukawa.
- Remove the pines growing along the clifftop near Emu Point.
- Remove individual and groups of exotics around the coast, concentrating first on those areas where the natural values are least modified.
- Remove exotic trees identified in the weed survey as having a high potential to naturalise and infest.

5.5.3 Introduced indigenous plants

In the past a number of indigenous species have been planted outside their natural geographical distribution. These include *Griselinia littoralis, Olearia paniculata* and *Pittosporum ralphii*.

Species found within their geographical distribution but probably sourced outside Motutapu include *Myoporum laetum, Pittosporum crassifolium* and *Prumnopitys ferruginea*. Exotics, probably mistaken for native plants, include *Myoporum insulare* Australian ngaio.

In terms of this plan the priorities are as follows:

- Map the incidence of introduced indigenous plants.
- Remove those species growing outside their range.
- Draft guidelines for residents covering the importation of plants to Motutapu.

5.6 Animal Pest Management

There are eight species of introduced browsing and predatory mammal species on Motutapu and Rangitoto including the rock wallaby, possum, rabbit, ship rat, Norway rat, mouse, stoat and cat. The eradication programme for wallaby and possum will be continued in accordance with the operation plan. Eradication of the remaining pests is essential prior to the reintroduction of most native animal species once thought to have inhabited the islands. The islands are considered to be sufficiently far offshore to prevent self-colonisation by stoats. However it is important that any eradication programme be implemented in a linked and co-ordinated manner for the benefits to accrue (Smitheram 1992).

It is technically possible to remove cats, but rabbits, stoats and rodents have not been removed from islands of this size. Techniques are now being developed which within five years should enable the eradication of rabbits and rodents from islands as large as Motutapu/Rangitoto. Experience gained with campaigns against stoats on Motuihe Island will be applied to Motutapu as soon as appropriate techniques are available.

- The priority is to control rabbits.

  The rabbit population on Motutapu is expanding rapidly. As they have the capacity to seriously damage archaeological sites and young plants an island-wide rabbit control programme is necessary to contain their population to a manageable level. To prevent predation on particular sites and planted areas it may also be necessary to carry out localised control.

6.0 COMMUNITY PARTICIPATION: PROGRAMME OF ACTIVITIES

This section outlines the community participation programme of work to be undertaken within the 5 year life of this plan. Further funding will be required in order to implement the full programme. Refer to Tables 1-5 for a detailed list of activities and proposed timetable for implementation, subject to funding.

6.1 Sponsorship

While some staffing and administrative requirements will be provided by the Department, the programme will be funded entirely from outside sources through sponsorship, donations and grants. In this regard the Auckland region, with its large population and business infrastructure, is considered well placed to sponsor and support the programme.

To this end the Motutapu Restoration Trust has been established to generate and administer public and corporate funding. It will provide the administrative framework for public sponsorship and the Trustees will actively encourage other companies and organisations to contribute to the Trust's work.

The priorities in the initial establishment period are:

- Develop a Motutapu Restoration Trust Strategy. The plan identifies the prime tasks which require funding.

- Other initiatives will include establishing 'Friends of Motutapu' as a support group for the restoration programme and liaising with sponsors.

Early sponsorship has come from WWF-NZ, Elders Pastoral Ltd, and Johnson and Johnson Pacific.

6.2 Project Advocacy

The vision for restoring Motutapu can only be realised if sufficient numbers of people take part in and support the programme of conservation tasks. The level of support attained will rely heavily on effective publicity for the project.

The priorities for action in this plan are as follows:

- The purchase and retention of the school and school house for the programme's use.

- The launch of the Motutapu Restoration Trust which will provide a media opportunity to promote the project and the essential funds for action.

- Promote the core conservation activities of nursery work, planting, weed control and management of planted areas and archaeological sites so as to generate enthusiasm and support; keep them in the public eye using a variety of promotional methods.

- Promote special events as they occur and utilise annual conservation events (such as Walk Week) to draw attention to Motutapu.

- Publish a new brochure featuring the restoration programme.

- Refurbish the Quarantine house as a base for participants.

- Develop a network of volunteers able to promote the programme to the community through service clubs, companies, etc. Provide resource kits for speakers.

- Liaise with ferry companies, major tourism agencies and in-bound tour operators to promote Motutapu as a destination for conservation volunteer activities/holidays, and as part of the package promote the Lodge at MOEC for accommodation.

6.3 Interpretation

Interpretation has a critically important role to play in stimulating visitor appreciation and understanding of Motutapu's rich cultural and natural history. The interpretation of Ngai Tai material will be subject to tangata whenua approval. Detailed draft guidelines have been prepared (Edge 1993).

Key themes have been identified as follows:

- Maori settlement (pattern, use, lifestyle, fortification)
- Restoration (conservation of historic sites and revegetation)
- Military (military sites)
- European settlement (early farm features)

Secondary themes will include the farm, the island's link with Rangitoto, geology and special habitats.

Interpretation will concentrate on those areas which, because of their attributes and significant features, are considered to be a focal point for visitors. There are three main areas: Gardiners Gap, Home Bay and Administration Bay. In interpreting for instance Gardiners Gap, the key features are Hukanui pa site 115 (Maori settlement/restoration), the nursery (restoration), magazines (military) and habitat (swamp, mudflat, mangrove).

Interpretation through participation is the approach to be adopted, supported by personal interpretation, printed matter and signage. The priorities for the first five years are as follows:

- Develop and implement high quality visitor programmes interpreting the cultural history of Motutapu.
- Training and monitoring the effectiveness of staff and concessionaires in interpretation.
- Educational and promotional events.
- Pamphlets for visitor use and information describing the project at the Causeway.
- Signs interpreting key areas.

6.4 Education

The restoration programme, through hands-on involvement, offers an excellent opportunity to convey primary conservation messages to the people of Auckland and thereby increase understanding, knowledge and commitment to caring for the wider environment. Opportunities to educate will extend beyond schools to the wider community through media contact, interpretation, support for and involvement with

the programme. Schools, tertiary institutes, and community groups will be encouraged to participate on a long-term basis and to identify with particular areas of Motutapu. There will be opportunities for education through direct involvement in a wide range of activities, for example, plant propagation in the nursery, cultural events, and observation and recording of induced and natural changes. The priorities for action in this plan are:

- Ensure that a bi-cultural approach is taken to all aspects of the educational programme.
- Establish working relationships with schools, tertiary institutions, community groups, and families with an interest in the programme.
- Encourage, through the restoration programme, a wider spectrum of society, e.g. tourists, to be involved in conservation.
- Integrate the MOEC teaching and activities programme with the restoration programme.
- Develop a range of supportive teaching programmes and resource material.

6.5 Recreation/Tourism

Public access and the provision of a wide range of conservation-oriented recreation opportunities facilitated by appropriate interpretation are an important component of the restoration programme. These will be integrated with existing complementary recreational facilities on Rangitoto.

There are two main entrance points to Motutapu, the causeway at the head of Islington Bay, and Home Bay. At the causeway, presently dominated by exotics, it is important to create an environment which is welcoming to the public and which provides an introduction to the restoration programme. Home Bay, which functions as a public recreation area and campground needs upgrading to optimise its potential.

Access is fundamental to the full enjoyment of the island's amenities and values and walking will be promoted as the primary recreational activity. A network of walking tracks will be developed to enable visitors to explore and discover the island, its history and surroundings and to experience elements of the project as it progresses.

For Motutapu's full recreational value and potential to be realised it will be necessary to plan and provide for tourism's growing interest in heritage and nature conservation. This would involve marketing the island as a destination and its restoration programme as a recreational activity. The target market would include both domestic and international tourists who would not only experience something of New Zealand's traditional culture, history and landscape in an island setting, but could also contribute directly to the programme through practical assistance and sponsorship.

Priorities in the plan are as follows:

- Upgrade the standard of the walkways by providing interpretative material and a more user-friendly system of gates and stiles.
- Improve the quality, presentation and organisation of recreation facilities at Home Bay.
- Design and implement measures to enhance the Causeway entrance to Motutapu.
- Liaise with tourism agencies and operators to promote Motutapu as an eco-heritage tourism destination.
- Investigate the use of concessions for activities such as guided tours to further the objectives of the restoration programme.
- Develop a visitor programme of seasonal farming activities such as sheep mustering, shearing, etc. in association with Motutapu Farms Ltd.

7.0 PROGRAMME SUPPORT

7.1 Staff and Accommodation

All staff report to the Regional Conservator through the Conservancy management structure.

A number of new staff will be required to help implement the working plan and those positions will have to be funded from outside the Auckland Conservancy budget. These programme staff will need to live on the island for part or all of the year, but at present there is a shortage of accommodation. One of the options is the former school teacher's house at the Quarantine area and this is a priority for purchase (6.2).

As the programme is established and volunteer involvement increases there will be a need for a multi-purpose facility to provide a base for volunteers, display space for interpretational material and related education programmes. The existing school building would be well suited to this purpose and would require little modification.

In addition contractors involved in weed control, fencing and other work, and volunteers staying overnight will require accommodation. Motutapu has a range of buildings which can be used. The Quarantine House is conveniently located close to the nursery and other facilities and as it is in a rundown condition it will be upgraded in year 1, and further upgraded as the needs of the programme dictate and funding permits.

7.2 Annual Budget

It is considered that an annual figure for sponsorship of between $150,000 - 250,000 will be needed to implement the full programme of cultural, ecological and community activities anticipated in Tables 1-5. The programme can be expanded or accelerated as more funds are made available. The sum of $107,000 has been assured for the first year, and this will go part way to establishing the necessary staff and facilities infrastructure on which to found the restoration programme. However a more meaningful programme of activities could be achieved with a higher level of funding.

7.3 Community Links

Strategic policy for the next 10 years is confirmed in the Conservation Management Strategy.

A Motutapu Restoration Advisory Committee could be formed at an early stage to advise the Department on strategic policy implementation. Membership of the Committee may include:

- Motutapu Restoration Trust
- Auckland Conservation Board
- New Zealand Historic Places Trust
- New Zealand Archaeological Association
- W W F New Zealand
- Royal Forest and Bird Protection Society
- University of Auckland
- Auckland Institute and Museum
- Motutapu Farms Ltd
- DOC Managers: Operations, Advocacy and Protection

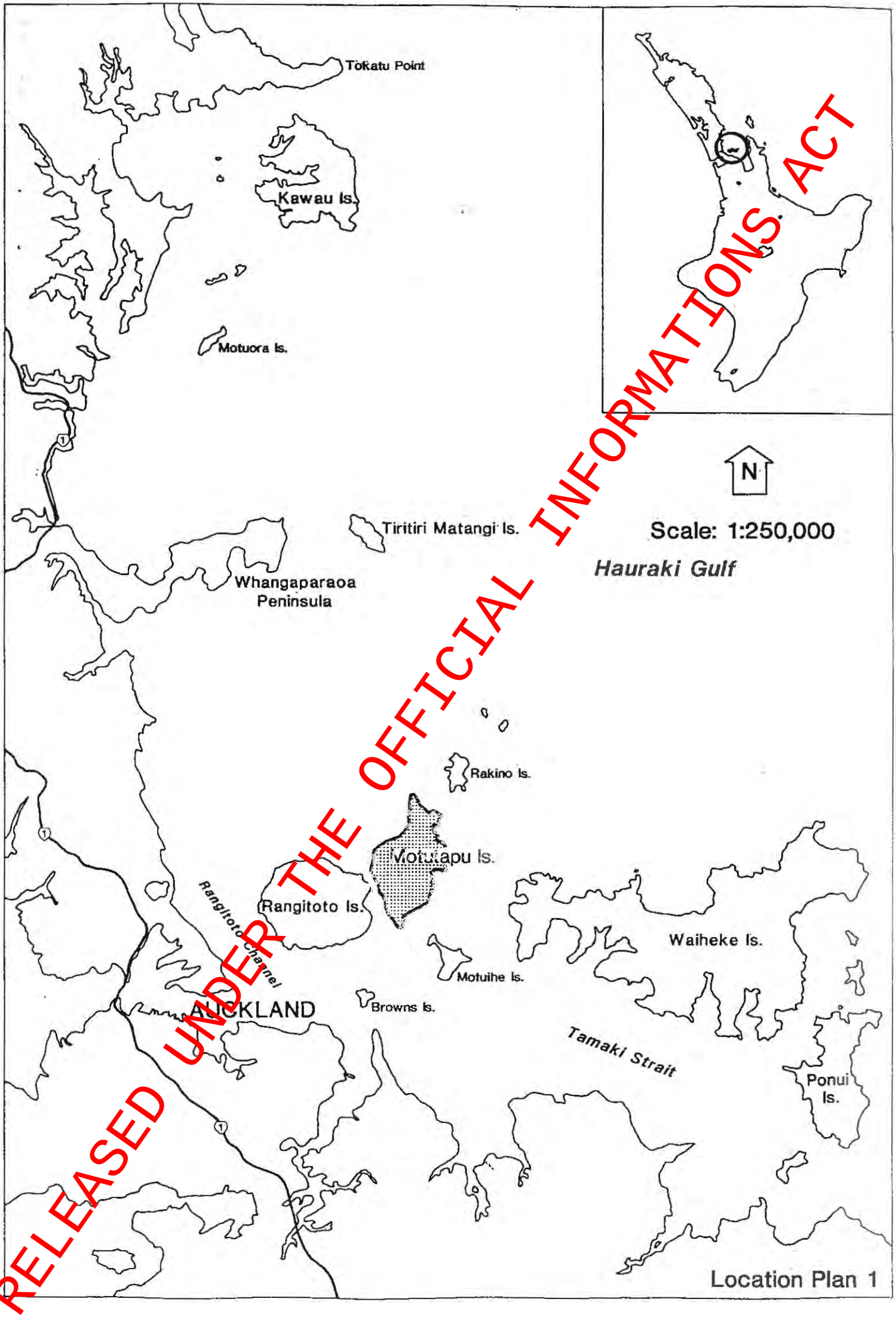
The programme of work for each year will be reviewed annually as part of the business planning cycle.

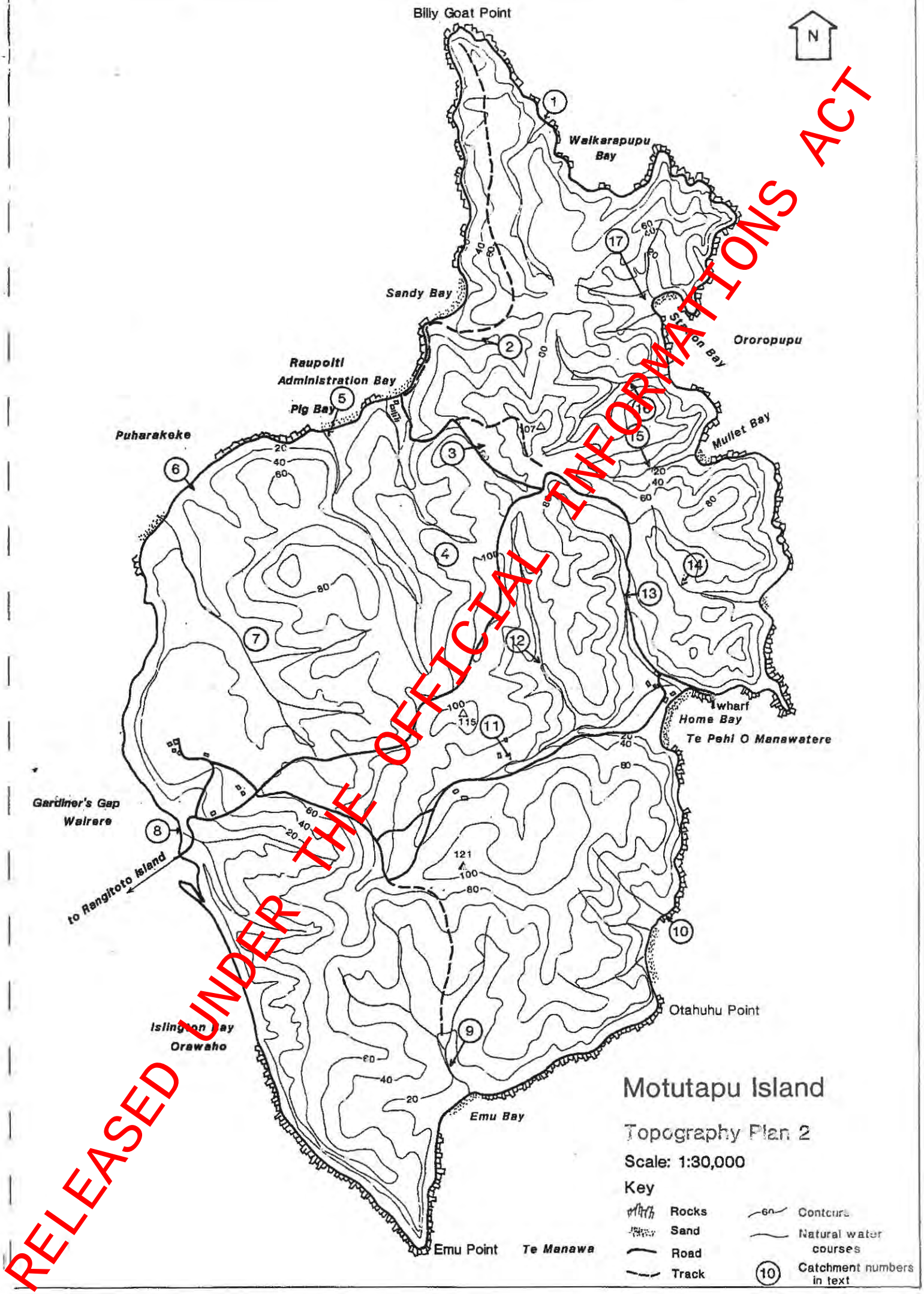
7.4 Plan Monitoring

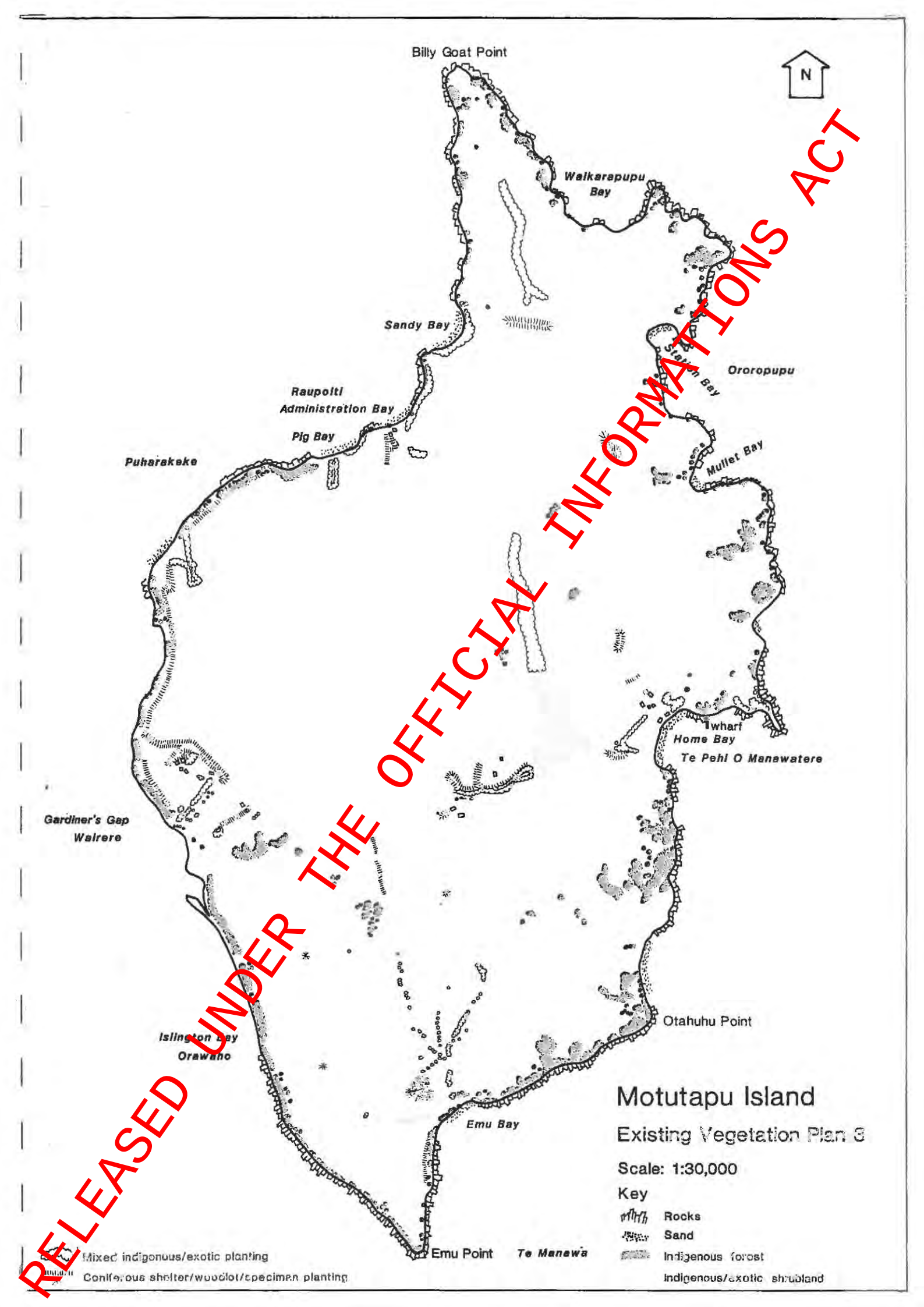
The achievement of the following outcomes will be a measure of the success of the Working Plan in 5 years time:

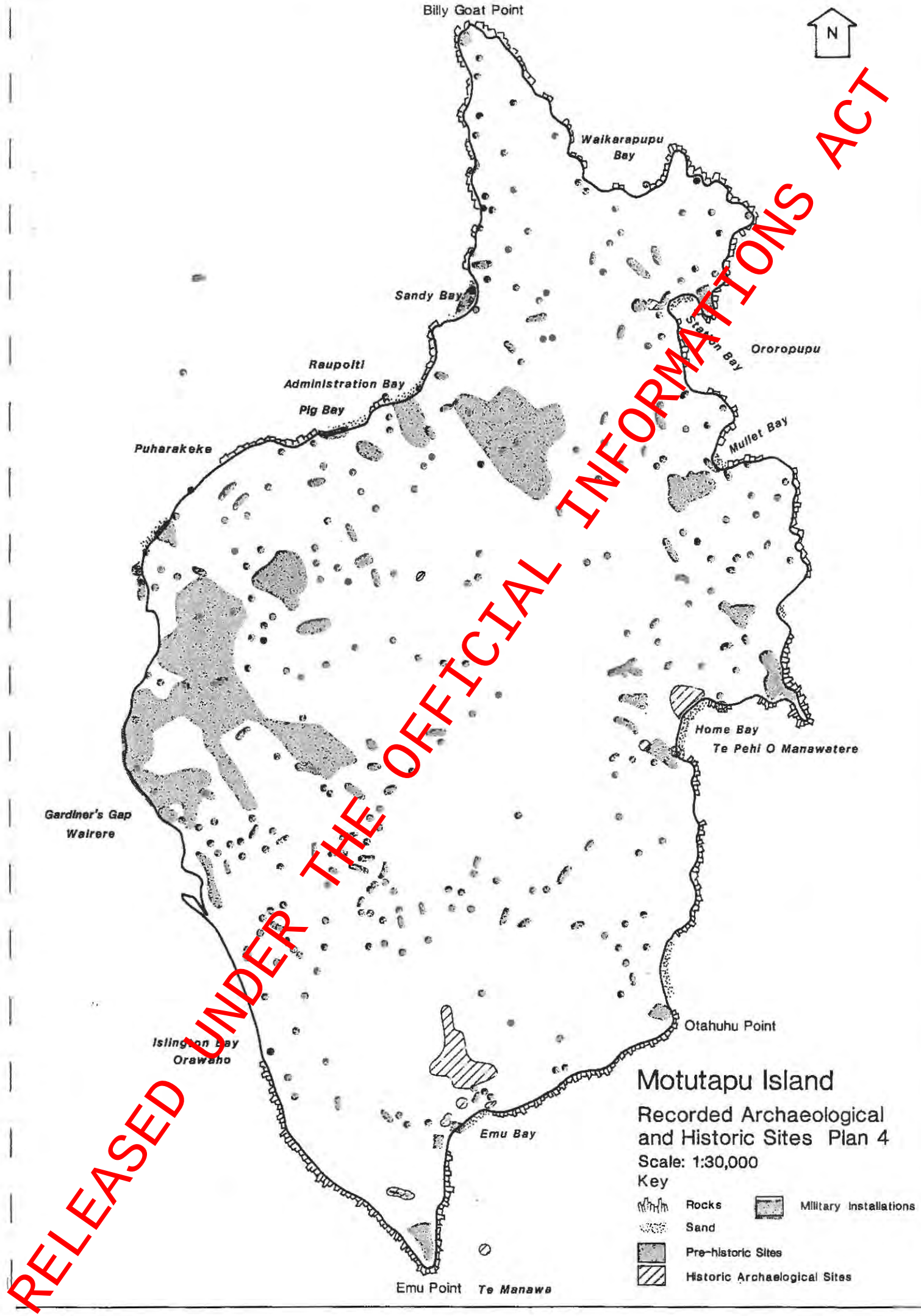
- An effective working relationship exists between the Department and iwi.
- The broad scale archaeological survey and research programme covering the whole island has been completed and a report published.
- The conservation management programme has arrested the decline of historic and military features and restored many to an interpretable condition.
- All significant indigenous remnants have been fenced.

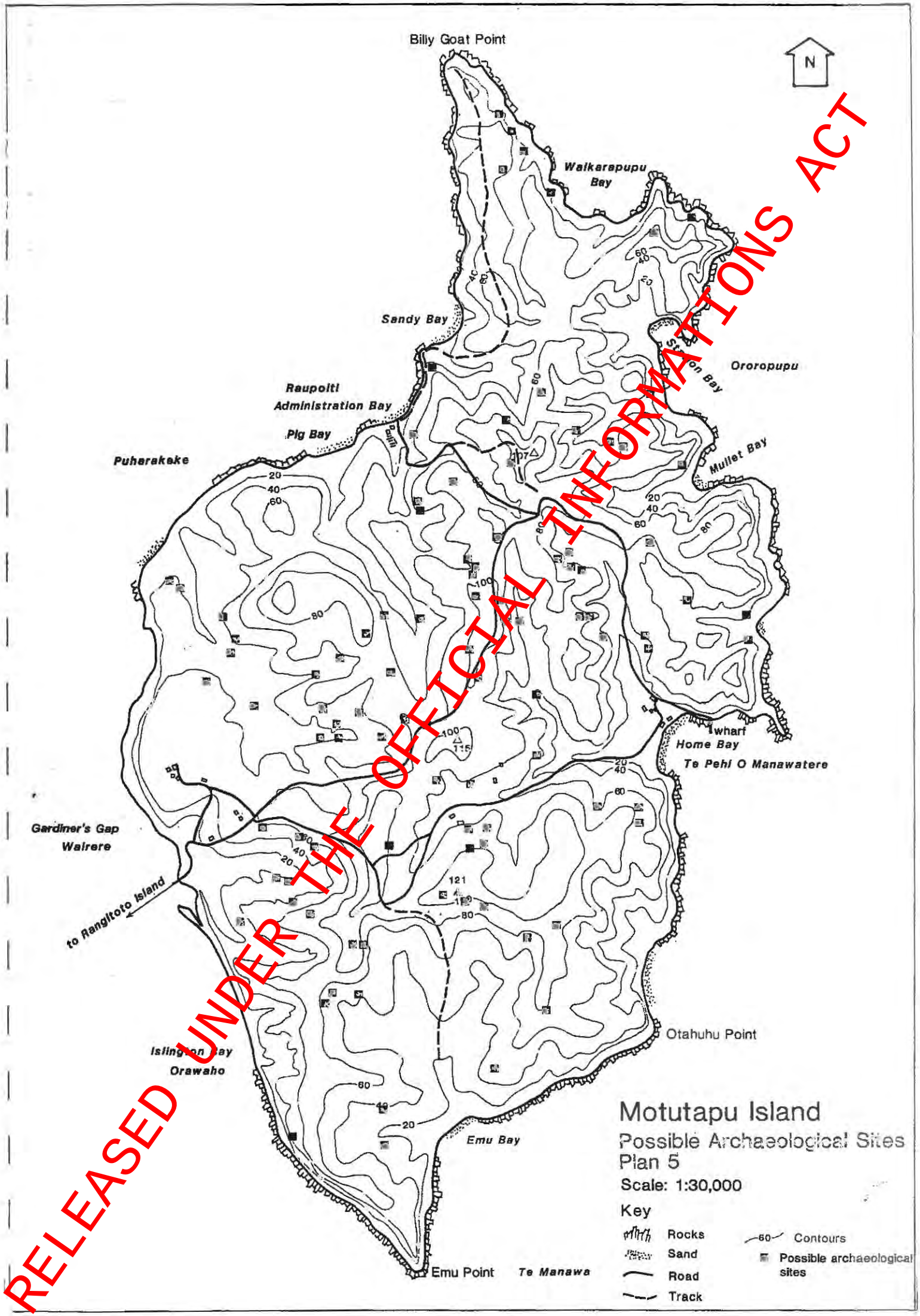
- The nursery is producing all the plant needs of the programme.
- Over 70 ha have been planted and other areas are naturally regenerating.
- Priority target weeds have been controlled and there is a substantial reduction in the extent of problem weeds especially evergreen buckthorn.
- There is a reduction in the incidence of exotics and indigenous plants outside their range have been removed.
- The rabbit population has been controlled to manageable levels.
- The programme is sufficiently well funded to sustain a broad range of working plan activities.
- There is wide public support for the restoration programme.
- The community is more aware of its shared cultural history and better informed about conservation issues through its participation in the restoration programme.
- An increased number of visitors come to Motutapu to enjoy its open space and experience the conservation/heritage opportunities offered.
- A sound base has been established from which to plan the second phase of the restoration programme.





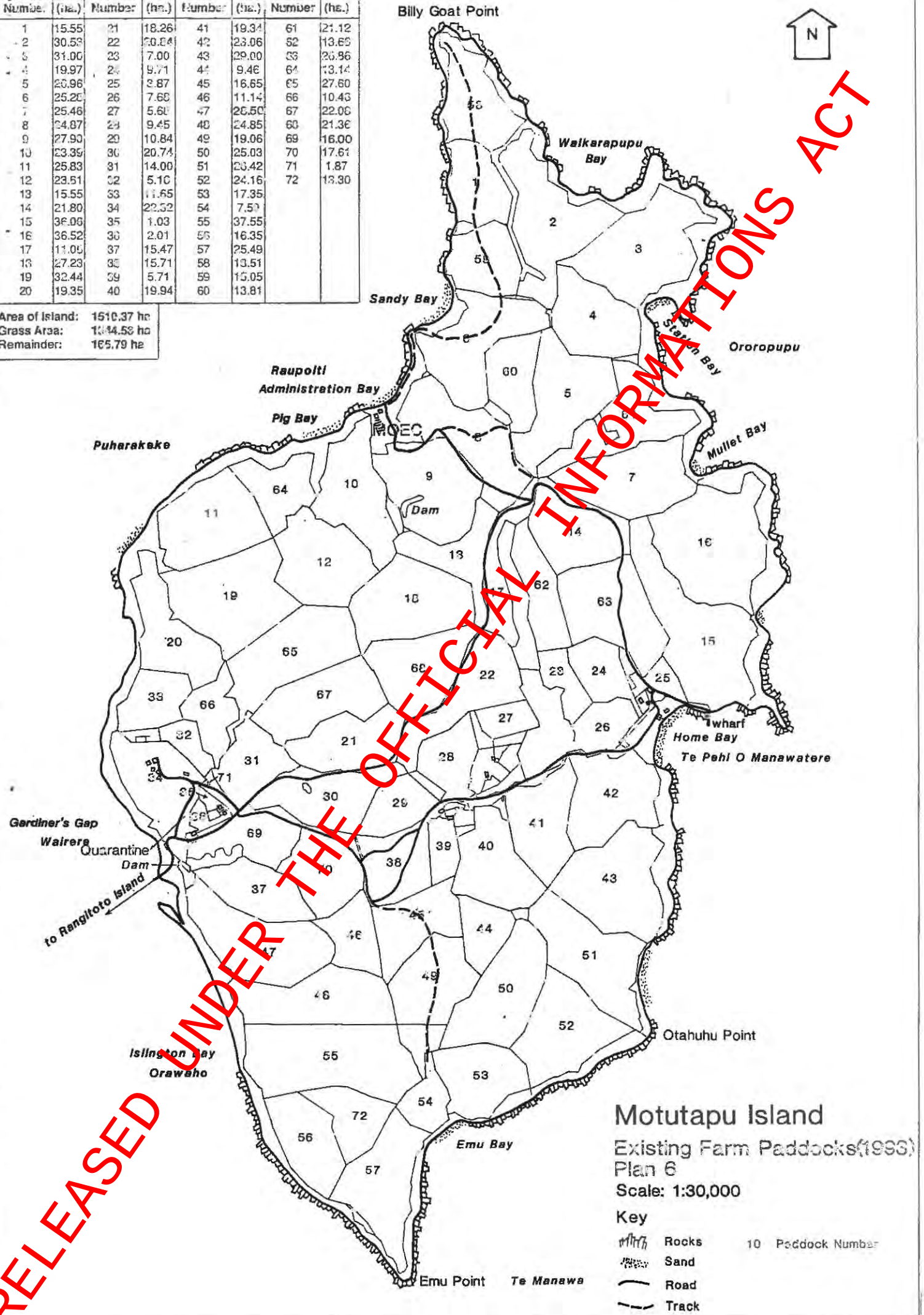






Paddock Number	Area (ha.)	Paddock Number	Area (ha.)	Paddock Number	Area (ha.)	Paddock Number	Area (ha.)
1	15.55	21	18.26	41	19.34	61	21.12
2	30.58	22	20.84	42	23.06	62	13.65
3	31.00	23	7.00	43	29.00	63	26.96
4	19.97	24	9.71	44	9.46	64	13.14
5	26.96	25	3.87	45	16.65	65	27.60
6	25.26	26	7.60	46	11.14	66	10.46
7	25.46	27	5.60	47	26.50	67	22.06
8	24.87	28	9.45	48	24.85	68	21.36
9	27.90	29	10.84	49	19.06	69	16.00
10	23.39	30	20.74	50	25.03	70	17.61
11	25.83	31	14.00	51	23.42	71	1.87
12	23.51	32	5.10	52	24.16	72	13.30
13	15.55	33	11.65	53	17.35		
14	21.80	34	22.32	54	7.50		
15	36.06	35	1.03	55	37.55		
16	36.52	36	2.01	56	16.35		
17	11.00	37	15.47	57	25.49		
18	27.23	38	15.71	58	13.51		
19	32.44	39	5.71	59	15.05		
20	19.35	40	19.94	60	13.81		

Area of Island: 1510.37 ha
Grass Area: 1344.58 ha
Remainder: 165.79 ha



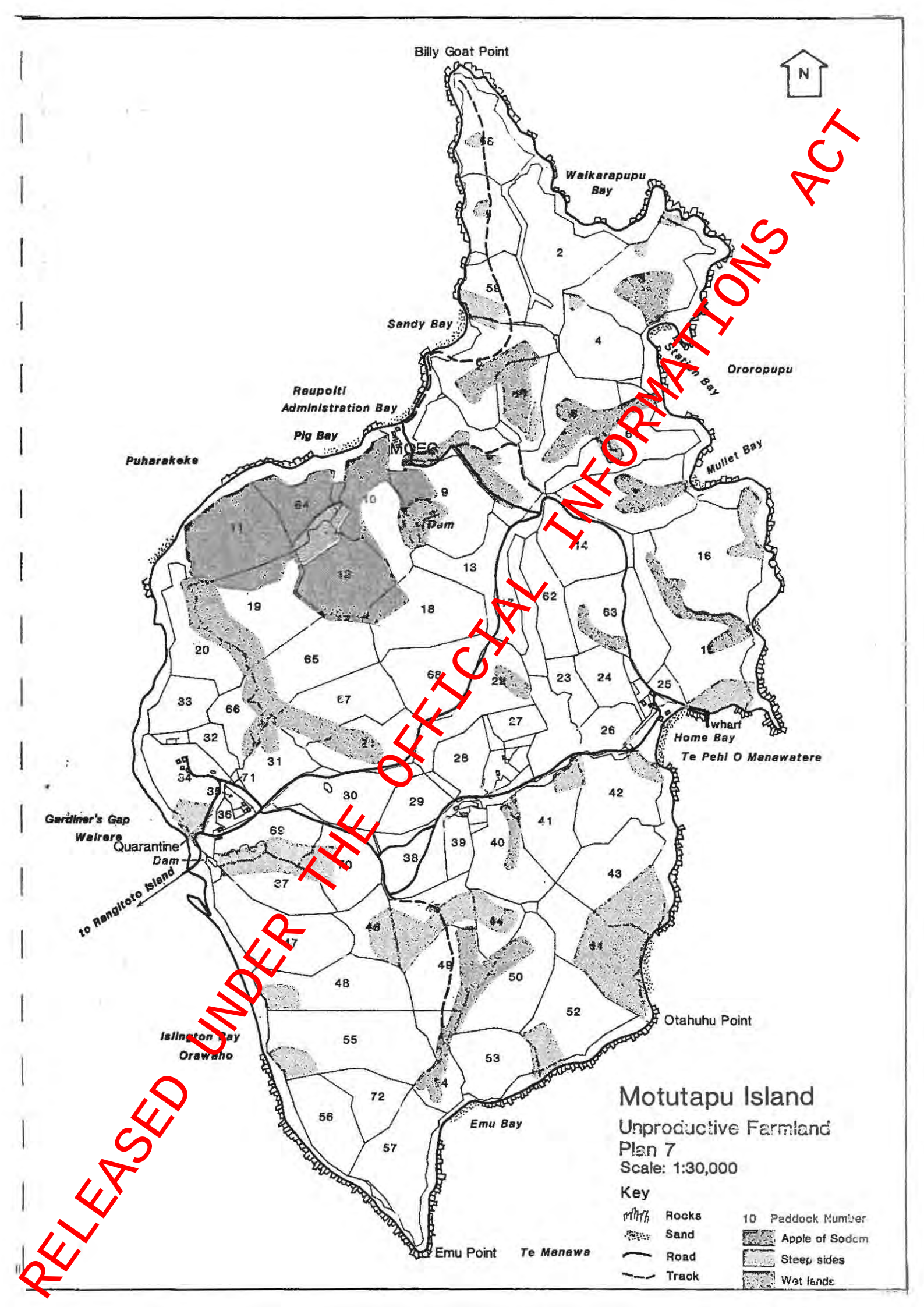
Motutapu Island

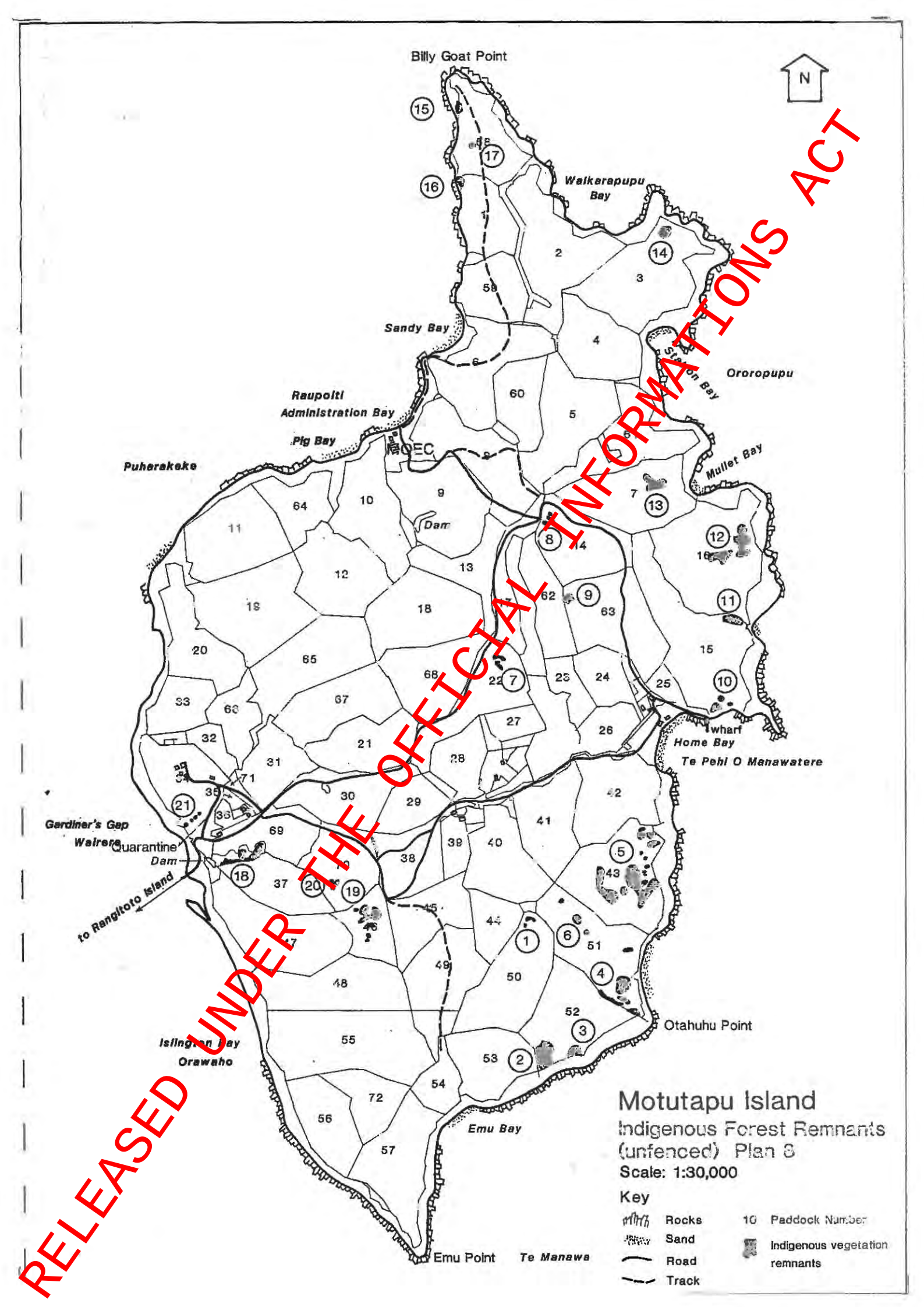
Existing Farm Paddocks(1993)
Plan 6

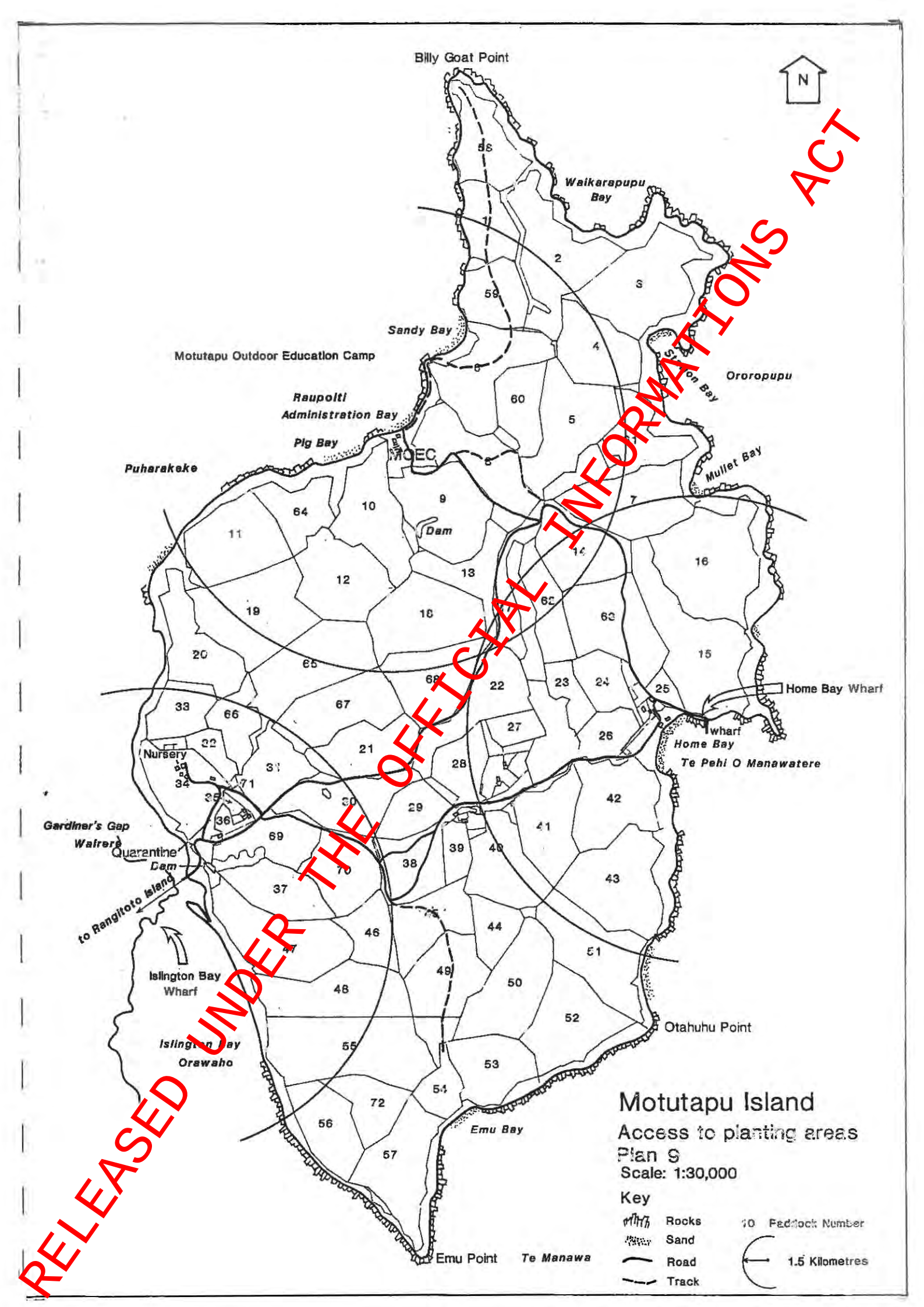
Scale: 1:30,000

Key

Rocks
Sand
Road
Track
10 Paddock Number







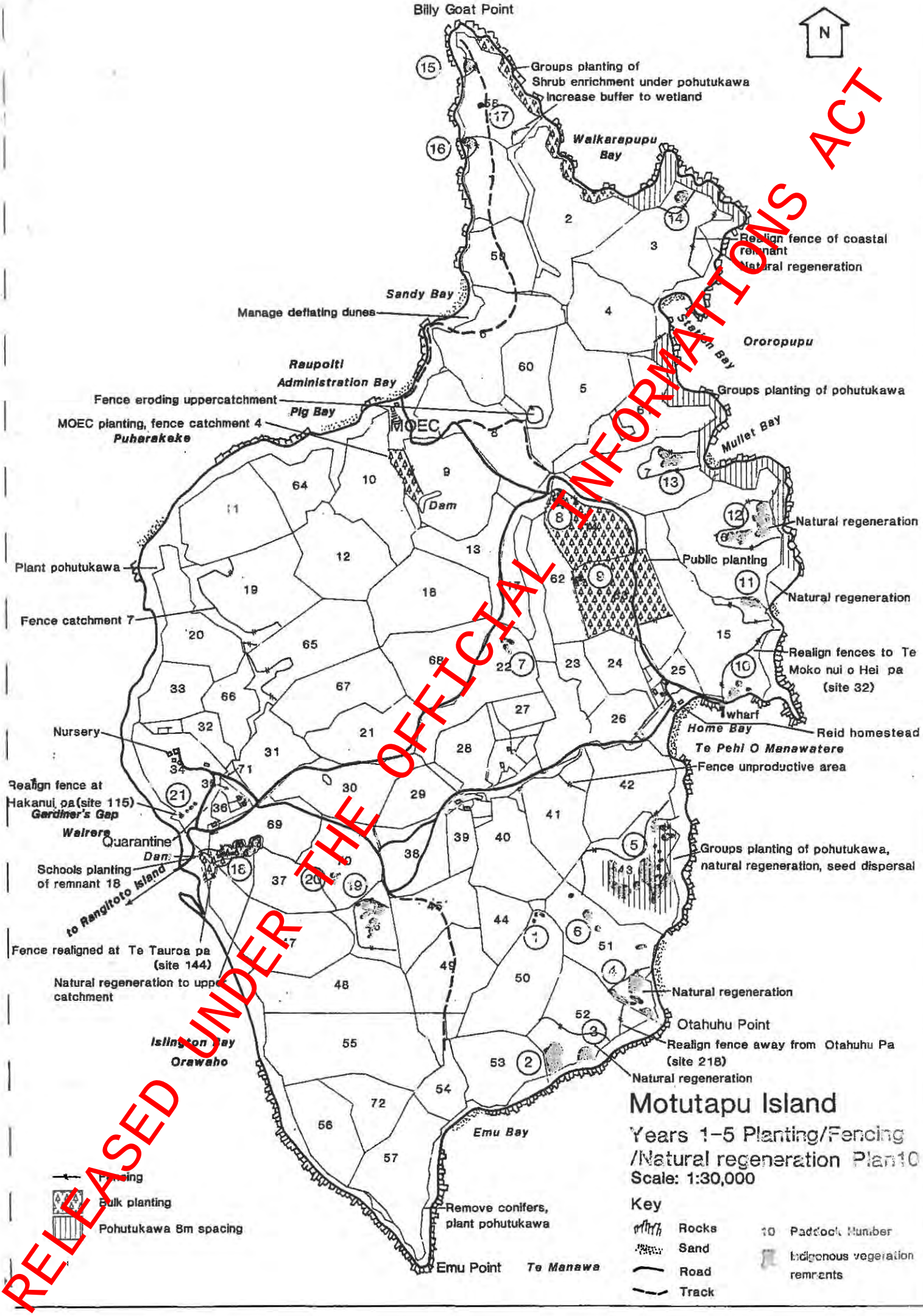


TABLE 1 YEAR 1 1993/1994

CULTURAL RESTORATION ACTIVITIES	ECOLOGICAL RESTORATION ACTIVITIES	COMMUNITY PARTICIPATION ACTIVITIES
Restoration of Tangata Whenua Associations with Motutapu **Archaeological Survey** • Assess possible/doubtful sites • Assessment of fencelines for year 1 and 2 • Assessment of planting areas for year 1 and 2 **Archaeological Research** **Site Management** • Re-align fence, site 144 pa at Islington Bay • NZHPT consents, if necessary **Conservation of Historic Features** **Conservation of Military Features** **Protection of Indigenous Forest Remnants**	**Nursery** • Purchase 21,000 plants for year 1 planting • Seed collection (Nov-March) • Propagate 30,000 plants for year 2 • Start nursery upgrade • Purchase tools and equipment • Prepare seed collection guidelines • Rabbit-proof nursery fence **Fencing** • Paddock 14 • Upgrade coastal conservation fence with farm **Weed Control/Eradication** • Spray trials on *Rhamnus* **Animal Pest Management** • Continue possum/wallaby eradication • Undertake local control of rabbits near areas planted **Planting and Management** • Groups - remnant 5, wide-spaced pohutukawa - coast adjacent paddocks 2, 8 • Public - paddock 14 • MOEC - paddock 9 • Prepare planting plans for Causeway and Home Bay • Release plantings **Natural Regeneration Sites** **Exotic Plant Management** **Research**	**Sponsorship** • Generate and administer Trust funds **Project Advocacy** • Promote regular restoration programme events, i.e. planting, management of planted areas • Promote special restoration programme events, i.e. start of planting season, annual picnic • Promote annual conservation events, i.e. Arbor Day (June 5), Island care • Develop volunteer network • Arrange speakers to community groups • Liaise with ferry companies • Purchase school house **Education** **Interpretation**
Review progress of programme (June)	Review progress of programme (June)	Review progress of programme (June)

TABLE 2 YEAR 2 1994/1995

CULTURAL RESTORATION ACTIVITIES

Restoration of Tangata Whenua Associations with Motutapu
- Identify Cultural Programme Co-ordinator
- Locate source material for pouwhenua
- Secure additional funding and carvers for pouwhenua
- Design, commission and carve pouwhenua/gateway for Causeway
- Investigate Marae/meeting place, venue for carvers and possible accomodation for Ngai Tai
- Locate sources and sites for planting medicinal and cultural materials
- Ngai Tai ki Tamaki annual Hui a Iwi
- Compile Ngai Tai traditional and oral history
- Cultural component for education - teacher resource kits, curricula and cultural heritage planning
- Assess school/education curricula programming to incorporate iwi component

Archaeological Survey
- Continue to assess possible/doubtful sites
- Survey north-east part of island
- Assessment of year 3 planting areas
- Assessment of fencelines for year 3

Archaeological Research
- Develop research strategy
- Begin implementation of research strategy
- Auckland University study of site relationships

Site Management
- Weed control site 144
- Plant *Microlaena stipoides* site 144
- Re-align fence site 218 Otahuhu Pa, establish native grass.
- Re-align Fence Site 115 Pa at Gardiner's Gap
- Weed Control, site 115
- Exotic tree species removal, site 115
- Management of deflated dunes, Sandy Bay
- NZHPT Consents, if necessary

Conservation of Historic Features
- Prepare scale drawing of Reid Homestead
- Identify potential uses of house
- Prepare Conservation Plan for Reid Homestead, outbuildings and immediate environs
- Implement Conservation Plan on termination of WAC contract
- Arborist to advise on conservation of vegetation - Emily and Home Bays
- Implement arborists measures (if approved)

Conservation of Military Features
- Complete inventory
- Cost conservation work
- Provide interim safety measures at magazine access stairs
- Restore perimeter fence to battery (Area 1)
- Control weeds in concrete structures
- Prepare conservation management proposals for MOEC
- Drain and stockproof underground plotting room

Protection of Indigenous Forest Remnants
- Fence remnant 5
- Fence Remnant 14
- Fence remnants 2 and 3
- Fence remnant 4

ECOLOGICAL RESTORATION ACTIVITIES

Nursery
- Seed collection (Nov-March)
- Propagate 35,000 plants for year 3
- Complete nursery upgrade
- Purchase 4-wheel bike and trailer

Fencing
- Remnants 5, 2 and 3, 4, 14, 21
- Complete paddock 14 with rabbit fencing
- Part catchment 4 (MOEC)
- Upper catchment paddock 60
- Upgrade coastal conservation fence with farm
- Re-align fence paddock 3, 4

Weed Control/Eradication
- Complete weed inventory
- Prepare weed strategy in co-operation with farm
- Start to implement weed strategy
- Incorporate results of Msc Thesis
- Continue spray trials for various weeds
- Report on Rhamnus spray trials

Animal Pest Management
- Continue possum/wallaby eradication/monitoring
- Undertake local control of rabbits near areas planted
- Undertake island-wide rabbit control programme

Planting and management
- Schools - remnant 18
- Groups - coast adjacent paddocks 61, 7
  - Home Bay, pohutukawa
  - causeway, pohutukawa
- Public - paddock 14
- MOEC - paddock 9
- Release plantings
- Prepare planting plans for causeway and Home Bay

Natural Regeneration Sites
- Identify management groups for remnants 2, 3, 4, 5, 14, 18 and coastal zone adjacent paddock 3

Exotic Plant Management
- Assess timber value of exotic shelterbelts/woodlots and prepare management plans for each
- Prepare management plan for Quarantine area
- Prepare guidelines for plant introductions to Motutapu
- Poison exotics remnant 5
- Remove pines on dunes, adjacent paddock 20
- Map introduced plants

Research
- Apply results of Tiritiri research to planting
- Set up photo points
- Fund palynological research

COMMUNITY PARTICIPATION ACTIVITIES

Sponsorship
- Generate and administer Trust funds
- Develop trust strategy for sponsorship
- Appoint programme co-ordinator to be located on the island.
- Implement sponsorship strategy and target other sponsors as necessary
- Special events for sponsors e.g. office tours

Project Advocacy
- Mount A Trust
- Promote regular restoration programme events, i.e planting, weed control, management of planted areas, walkway upgrading
- Promote special restoration programme events, i.e. completion of nursery upgrade
- Promote annual conservation events, i.e Walkweek, Rangitoto/Auckland swim
- Arrange speakers to community groups
- Prepare speaker's resource kit
- Produce pamphlet - 'Targeting a weed - Rhamnus'
- Liase with tourism agencies and in-bound tour operators
- Publish new brochure on Motutapu
- Refurbish Quarantine House

Education
- Prepare resource kits for teachers
- Promote understanding and commitment to caring for Motutapu
- Encourage tertiary institutions to incorporate programme in their curricula, be involved in management interpretation, research
- Develop a video for education and PR purposes
- Involve 6 schools in planting days
- MOEC - expand iwi involvement
  - plan planting for camp environs

Interpretation
- Staff training in interpretation
- Monitor and evaluate staff training
- Offer interpretative events
- Install introductory information to the project at causeway
- Produce pamphlet on Gardiner's Gap area
- Plan for interpretation signs
- Design interpretation structure, Gardiner's Gap
- Provide collated interpretative material for Co-ordinator
- Approach Friends of Walking to upgrade walkway indicator posts and to "adopt a track".
- Incorporate printed ferry interpretation

TABLE 3 YEAR 3 1995/1996

CULTURAL RESTORATION ACTIVITIES	ECOLOGICAL RESTORATION ACTIVITIES	COMMUNITY PARTICIPATION ACTIVITIES
Restoration of Tangata Whenua Associations with Motutapu • Install pouwhenua at causeway • Plant areas of medicinal plants and flax for cultural harvesting • Commission designs for pouwhenua for pa and sites of significance • Locate source materials for pouwhenua for pa and significant sites • Seek additional funding for carving of pouwhenua • Annual Ngai Tai Hui A Iwi/wananga • Publication of Maori cultural history pamphlet • Participate in preparation of Gardiner's Gap interpretation material • Monitor and confirm Maori heritage/cultural input to education curricula - teacher Resource Kits and other PR material **Archaeological Survey** • Complete assessment of possible/doubtful sites • Survey north-west side of island • Assessment of fencelines for year 4 • Assessment of year 4 planting areas **Archaeological Research** • Continue to implement research strategy • Auckland University study of site relationships • Assist in publication of cultural/history pamphlet **Site Management** • Re-align fencelines as programme of farm fence upgrading allows **Conservation of Historic Features** • Implement Conservation Plan for Homestead environs **Conservation of Military Features** • Stock-proof shelters behind guns • Repair access hatch to N° 2 magazine • Repair stair rail to N° 1 magazine • Restore steel doors and shutters to crew shelter, N° 1 gun • Investigate lighting one magazine • Identify structures and functions (area 1) **Protection of Indigenous Forest Remnants** • Re-align fence of remnant 18	**Nursery** • Seed collection (Nov-March) • Propagate 40,000 plants for year 4 **Fencing** • Lower catchment 7, paddock 19 • Middle catchment 7, paddock 65 • Lower catchment paddock 8, paddock 37 • Paddock 63 **Weed Control** • Implement weed strategy • Continue spray trials as necessary **Animal Pest Management** • Complete possum/wallaby eradication • Undertake local control of rabbits near areas planted **Planting and management** • Schools - remnant 18 • Groups - coast adjacent paddock 2, 16 • Public - paddock 14 • MOEC - paddock 9 **Natural Regeneration Sites** • Monitor regeneration **Exotic Plant Management** • Remove individual exotics from coastal cliffs • Remove introduced plants **Research** • Monitor photo plots	**Sponsorship** • Generate and administer Trust funds • Establish 'Friends of Motutapu' • Special events for sponsors **Project Advocacy** • Promote regular restoration programme events • Promote special restoration programme events, e.g. completion of possum/wallaby eradication • Promote annual conservation events • Arrange speakers for community groups • Initiate seasonal farming activities visitor programme **Education** • Expand network of schools participating • Build on links with tertiary institutions • MOEC - prepare plans for 'heritage' room - Develop reference material in the nursery - Monitor planting programme **Interpretation** • Evaluate staff interpretation • Offer interpretative events • Construct sign structure Gardiner's Gap • Install project introduction sign
Review progress of programme (June)	Review progress of programme (June)	Review progress of programme (June)

TABLE 4 YEAR 4 1996/1997

CULTURAL RESTORATION ACTIVITIES	ECOLOGICAL RESTORATION ACTIVITIES	COMMUNITY PARTICIPATION ACTIVITIES
Restoration of Tangata Whenua Associations with Motutapu • Install pouwhenua at pa and sites of significance • Extend flax, medicinal and cultural harvest plant areas • Ngai Tai annual Hui A Iwi/wananga • Participate in interpretive events and archaeological research • Participate in MOEC and DOC staff training and monitor, evaluate and approve cultural restoration interpretation and education programmes **Archaeological Survey** • Survey southern part of island • Assessment of fencelines for year 5 • Assessment of year 5 planting areas • Continue implementation of research strategy • Obtain HPT consents for pouwhenua on pa sites **Archaeological Research** • Continue to implement research strategy **Site Management** • Re-site water tanks, stock troughs as farm programme to upgrade water reticulation allows **Conservation of Historic Features** • Continue implementation of Conservation Plan for Reid Homestead **Conservation of Military Features** • Stock-proof and clean battery observation post • Repair BOP roof support • Stock-proof and clean HMNZS Emu observation post engine-room and wireless building • Investigate lighting and restoration of underground plotting room • Identify structures and functions (area 2) **Protection of Indigenous Forest Remnants**	**Nursery** • Seed collection (Nov-March) • Propagate 40,000 plants for year 5 **Fencing** • Paddock 41 • Increase buffer to catchment 1, paddock 58 • Remnants 11, 15, 16, 19 • Lower catchment 14 **Weed Control/Eradication** • Implement weed strategy **Animal Pest Management** • Undertake local control of rabbits near planted areas **Planting and management** • Schools - catchment 8 • Groups - coast adjacent paddock 2 • Public - paddocks 14, 63 • MOEC - paddock 9 **Natural Regeneration Sites** • Identify management groups for remnant 15 **Exotic Plant Management** • Remove individual exotics from coastal cliffs • Remove inappropriate indigenous plants **Research** • Monitor photo plots	**Sponsorship** • Generate and administer Trust funds • Special events for sponsors **Project Advocacy** • Promote regular restoration events • Promote special restoration events • Promote animal conservation events • Arrange speakers for community groups **Education** • Expand network of schools participating • Build on links with Tertiary institutions • MOEC - Develop the concept of cultural planting areas around camp - Implement 'heritage' proposals in resource room **Interpretation** • Interpretation sign programme - Gardiner's Gap, pa, mudflats, military sites • Offer interpretation events
Review progress of programme (June)	Review progress of programme (June)	Review progress of programme (June)

TABLE 5 YEAR 5 1997/1998

CULTURAL RESTORATION ACTIVITIES	ECOLOGICAL RESTORATION ACTIVITIES	COMMUNITY PARTICIPATION ACTIVITIES
Restoration of Tangata Whenua Associations with Motutapu • Continue planting and harvesting of cultural materials and medicines • Establish workshop for traditional medicines • Install pouwhenua at pa and sites of significance • Ngai Tai annual Hui A Iwi/wananga • Ngai Tai participation in all events • Iwi cultural restoration and development traing programmes • Assessment and confirmation of archaeological sites and site relationships • Iwi participation in heritage/cultural education and planting (MOEC) • Draft programme of cultural heritage restoration activities and iwi eco-tourism strategy for inclusion in the next 5-year plan **Archaeological Survey** • Complete outstanding survey work • Prepare report on survey results • Assessment of fencelines for year 6 • Assessment of year 6 planting areas • Complete research strategy and produce draft report **Archaeological Research** • Prepare interpretative material based on survey/research results **Site Management** • Re-align fence Home Bay pa site 32 **Conservation of Historic Features** **Conservation of Military Features** • Clean and stock-proof miniature range, engine room and old plotting room • Identify structures and functions, area 3 • Excavate and restore shrapnel-proof shelter, area 2 • Restore N° 1 gun crew shelter, area 2 • Restore pill-box, area 3 **Protection of Indigenous Forest Remnants** • Fence remnants 12 and 13	**Nursery** • Seed collection (Nov-March) • Propagate 40,000 plants for year 6 **Fencing** • Remnants 10, 12, 13 • Lower catchment 15 **Weed control/eradication** • Implement weed strategy **Animal pest management** • Undertake local control of rabbits near planted areas **Planting and management** • Schools - catchment 8 • Groups - coast adjacent paddock 2 • Public - paddock 63 • MOEC - paddock 9 **Natural regeneration sites** • Identify management groups for remnant 12 **Exotic Plant Management** • Remove individual exotics from coastal cliffs • Remove inappropriate indigenous plants **Research** • Monitor photo plot	**Sponsorship** • Generate and administer Trust funds • Special events for sponsors **Project Advocacy** • Promote regular restoration events • Promote special restoration events • Promote annual conservation events • Arrange speakers for community groups **Education** • Expand network of schools participating • MOEC - monitor planting progress and expand as necessary • Build on links with Tertiary institutes **Interpretation** • Interpretation sign programme - Battery Observation Post • Offer interpretation events
Review progress of plan (June) Plan programme of cultural conservation activities for years 6-10	Review progress of plan (June) Plan programme of ecological restoration activities for years 6-10	Review progress of plan (June) Plan programme of public participation activities for years 6-10

APPENDIX 1 OTHER PLANNING AND POLICY DOCUMENTS RELATING TO MOTUTAPU

1. The Auckland Conservancy Conservation Management Strategy

This document provides a 10-year strategy for the integrated management of all protected lands and marine areas administered by the Department in the Auckland Conservancy. It sets out long-term management directions and policies to guide day-to-day conservation management activities, working relationships with other agencies and the wider community, and provides for public participation in the management of natural and historic resources. The strategy identifies Rangitoto and Motutapu as key areas and priority places for conservation investment. Policies applicable to Motutapu are expanded under Section 2 of this plan, Objectives for the Conservation Management of Motutapu.

2. Ngai Tai Ki Tamaki Trust Agreement

In accordance with the principles of the Treaty of Waitangi this agreement establishes protocols, standards and objectives for the effective working relationships between tangata whenua of the island and the Conservancy.

3. The Inner Gulf Islands Ecological District and Rangitoto Action Plan

Motutapu is one of a group of more than 20 islands which extend from Kawau in the north to Pakihi in the south east. Proximity to the mainland, and for the last 150 years urban Auckland, has resulted in most of these islands being significantly modified with a consequent loss of natural values. Nevertheless these islands provide a better opportunity to preserve threatened species of flora and fauna than anywhere on the mainland.

The Action Plan will describe each island's resources, define the threats, and outline the management actions needed to protect or enhance their remnants of natural heritage. It will place the restoration of Motutapu in the context of other ecological protection and restoration work on islands in the Gulf, and will ensure a strategic and compatible approach to, for example, the re-introduction of indigenous species.

4. The Auckland Conservancy Historic Resources Strategy

This document will provide a strategy for integrated management of the historic resources on land administered by the Department. It will identify Motutapu as one of the richest cultural and historic landscapes in the Conservancy. The conservation of these resources will be a high priority in the strategy.

5. Public Awareness Strategy

Education and interpretation are central to the Conservancy's mission to conserve the natural, historic and cultural heritage of New Zealand for the benefit of present and future generations. It increases understanding and appreciation of that heritage and has the capacity to generate public support for and involvement in its conservation and protection. The Public Awareness Strategy will provide direction and priorities for public awareness, education and interpretation activities. The strategy will identify Motutapu as a key area and premier place in the Conservancy for the interpretation of cultural and historic landscapes and will give it a high priority in terms of effort and funding.

6. Visitor Services Strategy

As part of its planning for the management of visitor facilities the Department has prepared a recreational opportunities spectrum (ROS) study for the terrestrial areas of the Conservancy. In addition, information about all existing recreation facilities has been entered on to a database and a preliminary study of the existing and anticipated demand for facilities has been completed. Motutapu has been identified as a medium priority for the development of visitor services and opportunities but is considered a high priority for interpretation. The management approach in the short term will be to focus on the restoration programme to help promote community support for conservation through a programme of visitor participation in activities such as tree planting and historic site interpretation.

7. Motutapu Restoration Trust

This independent charitable trust was established in November 1993 to generate and administer public and corporate funding for the achievement of the restoration programme.

8. Motutapu Farm Lease

The Department is committed to managing open areas on the island through a sustainable grazing regime which protects historic places, landscape values and remaining natural values. The farm lease, signed in 1992, is the contractual agreement between the Department and Motutapu Farms Ltd. It provides for a term of nine years with a right of renewal for a further nine years, and includes such clauses as the protection of archaeological sites, provision for public access, and the withdrawal of pasture for revegetation.

9. Possum and Wallaby Eradication Programme on Rangitoto and Motutapu

The eradication of possum and wallaby is seen as an essential pre-requisite for the restoration programme on Motutapu. Browsing by possums and wallabies has interrupted the process of indigenous forest colonisation on Rangitoto, caused the loss of species diversity, modified the forest structure, and reduced the food available to native species. On Motutapu one of the most visible impacts has been the death of many pohutukawa which, by the late 1980s had reached a crisis point. A

comprehensive programme to eradicate the pests was initiated in 1990 by the Auckland Conservancy with support from sponsors. The target date for completion is 1995.

10. RMA Statutory Plans

The Resource Management Act established a hierarchy of plans which potentially affect the planning of Motutapu. The overarching policy document is the Regional Policy Statement prepared by Auckland Regional Council with policies and rules for the Coastal Marine area, and the Auckland City District Plan, Hauraki Gulf Islands Section, which contains policies and rules relating to land use. In addition there may be Regional Plans prepared by ARC containing policies and rules relating to environmental management.

11. Department of Conservation Auckland Conservancy Annual Business Plan

The Business Plan specifies conservation work priorities and allocates staff time and finance for the year. The 1993/94 Business Plan under key output 5.3 Island Restoration, identifies the Motutapu Restoration Working Plan as one of the year's 'highlights'. One of the principal objectives under key output 8.1, Management of Visitor and Public Information Services, is to raise the necessary sponsorship and community support. While some staff time is allocated the business plan anticipates that revenue will come from outside the Department.

12. Hauraki Gulf Maritime Park Management Plan 1982

This plan was prepared for the Hauraki Gulf Maritime Park Board under section 41 of the Reserves Act and has status as a current and operative Conservation Management Plan under the Conservation Act 1987. The plan covers all or part of more than 40 islands in the Gulf, including Rangitoto and Motutapu, and provides a broad framework of objectives and policies to guide management decisions.

APPENDIX 2 – STATUS OF PLANNING AND POLICY DOCUMENTS

PLAN	IN DRAFT/ PROPOSED	OPERATIONAL
Auckland Conservancy CMS	✓	
Ngai Tai Ki Tamaki Trust Agreement		✓
Inner Gulf Islands Ecological District and Rangitoto Action Plan	✓	
Auckland Conservancy Historic Resources Strategy	✓	
Public Awareness Strategy	✓	
Visitor Services Strategy	✓	
Motutapu Restoration Trust		✓
Motutapu Farm Lease		✓
Possum and Wallaby eradication programme on Rangitoto and Motutapu		✓
RMA Statutory Plans — Regional Policy Statement Auckland City District Plan, Hauraki Gulf Islands Section	 ✓ ✓	
Auckland Conservancy Annual Business Plan		✓
Hauraki Gulf Maritime Park Management Plan		✓

APPENDIX 3 - SUMMARY OF FENCING

REMNANT	LENGTH (M)	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
1						
2 and 3	450		450			
4	900		900			
5	1000		1000			
6						
7						
8						
9						
10	600					600
11 + lower catchment 14	400				400	
12	900					900
13 + lower catchment 15	700					700
14	310		310			
15	250				250	
16	150				150	
17						
18 Fenced						
19	600				600	
20						
21	200		200			
SUBTOTAL	**6460**	**0**	**2860**		**1400**	**2200**
ARCHAEOLOGICAL SITES						
115	100		100			
144	300	300				
218	150		150			
SUBTOTAL	**550**	**300**	**250**			

APPENDIX 3 (contd)

CATCHMENT	LENGTH (M)	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
1 Enlarge buffer	200				200	
2 Eroding slopes	200		200			
3						
4 MOEC	250		250			
5						
6						
7 Paddock 19 Paddock 65	1150 960			1150 960		
8 Paddock 37	350			350		
9						
10						
11 Unproductive Paddock 41	250				250	
12						
13 Paddock 14 + rabbit netting Paddock 63	750 300	750		300		
14						
15						
16						
17						
18						
SUBTOTAL	**4410**	**750**	**450**	**2760**	**450**	
COASTAL FENCE						
Paddock 4	450		450			
SUBTOTAL	**450**		**450**			
TOTAL METRES*	**11870**	**1050**	**3760**	**2760**	**1850**	**2200**

* Average cost of $7/m has been allowed for fencing

APPENDIX 4 — SUMMARY OF PLANTING

LOCATION	PLANTERS	AREA (HA)	TOTAL PLANTS REQUIRED	PLANTING PER SEASON/SITE				
				YEAR 1 1994*	YEAR 2 1995*	YEAR 3 1996*	YEAR 4 1997*	YEAR 5 1998*
Remnant 18	School	1.2	5,000		2,000	3,000		
Catchment 8	School	1.0	4,500				3,000	1,500
Remnant 5	Group	19.0	1,550	1,550				
Coast: Pohutukawa								
Billy Goat Pt - Waikarapupu Bay	Group	2.5	1,650	1,650				
Waikarapupu Bay — Station Bay	Group	5.5	860					
Station Bay — Home Bay	Group	9.6	1,500		800	700		
Coast: shrubs								
Billy Goat Pt — Station Bay	Group	8.0	4,000			2,000	2,000	2,000
Paddock 14	Public	18	81,000	19,800	27,130	29,300	7,000	
Paddock 63	Public School	19.0	85,000				28,000	35,000 1,500
Home Bay	Group		50		50			
Causeway	Group		20		20			
TOTAL		**83.8**	**189,130**	**23,000**	**30,000**	**35,000**	**40,000**	**40,000**

NOTE: MOEC plants are supplied by the MOEC nursery and are not included in this table.

* Each planting season straddles two years. For the purpose of programming Year 1 refers to the 1994 planting season and Year 2 to the 1995 season etc.

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APPENDIX 5

Appendix Native Flora of Rangitoto and Motutapu Island's. (Adapted from: Esler 1980, Segedin 1985).

R = Rangitoto only, M = Motutapu only, B = both islands,

Gymnosperms		
Phyllocladus trichomanoides	Tanekaha	(R)
Podocarpus totara	Totara.	(M)
Angiosperms		
Dicotyledons		
Acaena novae-zelandiae	Bidibidi	(B)
Alectryon excelsus	Titoki	(R)
Apium australe	N.Z. celery	(B)
A. filiforme		(R)
Avicennia resinifera	Mangrove	(B)
Beilschmieda taraire	Taraire	(M)
Beilschmieda tawa	Tawa	(M)
Brachyglottis repanda	Rangiora	(B)
Callitriche stagnalis	Starwort	(M)
Calystegia sepium	Convolvulus	(B)
C. soldanella	Convolvulus	(M)
C. tuguriorum	Convulvulus	(B)
Cardamine debilis		(R)
Carmichaelia aligera	NZ broom	(M)
Centella uniflora		(R)
Chenopodium ambiguum		(R)
Clematis paniculata		(R)
Coprosma lucida		(R)
C. macrocarpa	Coastal karamu	(B)
C. propinqua		(R)
C. propinqua x *C. robusta*		(R)
C. repens	Taupata	(B)
C. robusta	Raoul karamu	(B)
Coriaria arborea	Tutu	(B)
Corynocarpus laevigatus	Karaka	(B)
Cyathodes fasciculata	Mingimingi	(B)
C. fraseri		(R)
C. juniperina	Prickly mingimingi	(B)
Dichondra repens	Mercury Bay weed	(B)
Disphyma australe	N.Z. Ice plant	(B)
Dodonaea viscosa	Akeake	(R)
Drosera peltata ssp. *auriculata*		(R)
Dysoxylum spectabile	Kohekohe	(B)
Elaeocarpus dentatus	Hinau	(R)
Entelea arborescens	Whau	(M)
Epilobium billardierianum		(R)
E. komarovianum		(R)
E. nummularifolium	Willowherb	(B)
E. pallidiflorum	Swamp willowherb	(M)
E. pedunculare		(R)
E. pubens		(R)
E. rotundifolium		(R)
Euphorbia glauca		(R)
Galium propinquum		(R)
Gaultheria antipoda		(R)
Geniostoma ligustrifolium	Hangehange	(B)
Geranium homeanum	Geranium	(M)
G. retrorsum / G.solanderi		(R)
G solanderi		(M)
Gnaphalium collinum		(R)
G. gymnocephalum		(R)
G. involucratum		(R)
G. luteo-album		(R)
Gonocarpus incanus		(R)
Grislinea lucida	Shining broadleaf	(B)
Haloragis erecta		(B)
Hebe macrocarpa	Koromiko	(B)
Hebe stricta (var *stricta*)	Koromiko	(B)
Hedycarya arborea	Pigeonwood	(B)
Hypericum japonicum		(M)
Hydrocotyle americana		(R)
H. moschata		(R)
Knightia excelsa	Rewarewa	(B)
Kunzeaericoides	Kanuka	(B)
Lagenifera pumila	Cheesem	(B)
Lepidium flexicaule		(R)
Leptospermun scoparium	Manuka	(B)
Lilaeopsis sp.		(R)
Linum monogynum		(R)
Litsea calicaris	Mangeao	(B)
Lobelia anceps		(B)
Macropiper excelsum	Kawakawa	(R)
Melicope ternata	Wharangi	(B)
Melicytus ramiflorus	Mahoe	(B)
Meterosideros excelsa	Pohutukawa	(B)
M. excelsa x *M. robusta*		(B)
M. perforata		(R)

M. robusta	Rata	(B?)
Mida salicifolia		(R)
Muehlenbeckia australis		(B)
M. complexa		(B)
Myoporum laetum	Ngaio	(B)
Myriophyllum triphyllum		(R)
Myrsine australis	Mapou	(B)
Nestigis lanceolata		(R)
Olearia furfuracea		(R)
Oxalis corniculata var. *crassifolia*		(B)
Parietaria debilis		(R)
Parsonia heterophylla		(M)
Peperomia urvilleana		(B)
Pimelea prostrata		(R)
Pittosorum crassifolium	Karo	(B)
P. tenuifolium	Kohuhu	(M)
Plagianthus divaricatus	Shore ribbonwood	(B)
Planchonella novo-zealandica	Tawapou	(M)
Plantago raoulii		(R)
Pomaderris phylicifolia var *ericifolia*		(R)
Potamogeton cheesemanii	Pondweed	(M)
Pseudopanax arboreus	Five-finger	(B)
P. crassifolius	Lancewood	(R)
P. lessonii	Houpara	(B)
Ranunculus acaulis	Shore butter-cup	(B)
R. hirtus	Forest butter-cup	(B)
Rhabdothamnus solandri		(R)
Rhagodia triandra		(M)
Salicornia australis	Glasswort	(R)
Samolus repens	Marsh pimpernel	(B)
Sarcocornia quinqueflora		(R)
Sceleranthus biflorous		(B)
Selliera radicans		(B)
Senecio biserratus		(R)
S. glomeratus		(R)
S. hispidulus	Fire-weed	(M)
S. kirkii var *kirkii*		(R)
S. lautus	Shore groundsell	(B)
Solanum aviculare	Poroporo	(R)
Sonchus kirkii		(R)
Sophora microphylla	Kowhai	(B)
Stellaria parviflora		(R)
Suaeda novae-zelandiae		(R)
Tetragonia tetragonioides		(R)
Tillaea sieberiana		(B)
Vitex lucens	Puriri	(B)
Vittadinia australis		(R)
Wahlenbergia gracilis		(R)

Monocotyledons

Asplenium flaccidum var *sinclairii*		(R)
A. richardii		(R)
Agropyron scabrum	Blue wheat grass	(M)
Arthropodium cirratum	Renga lily	(M)
Astelia banksii		(B)
A. solandi		(R)
Baumea juncea		(M)
Bulbophyllum pygmaeum		(R)
Caladenia catenata		(R)
Carex breviculmis		(R)
C. dissita		(R)
C. flagellifera		(B)
C. inversa		(M)
C. lessoniana		(M)
C. ochrosaccus		(M)
C. pumila	Sand sedge	(M)
C. spinirostris		(M)
C. testacea		(M)
C. virgata		(M)
Collospermum hastatum		(R)
Cordyline australis	Cabbage tree	(B)
C. pumilio		(R)
Cortaderia splendens	Toetoe	(M)
Corybas trilobus		(R)
Cyathea dealbata	Ponga	(M)
C. medullaris	Mamuku	(M)
Cyperus ustulatus		(B)
Dendrobium cunninghamii		(R)
Deyeuxia billarderi		(B)
Dianella nigra	Turutu	(B)
Dichelachne crinita		(R)
Drymoanthus adversus	Dockrill	(B)
Earina autumnalis		(R)
E. mucronata		(R)
Echinopogon ovatus		(R)
Eleocharis acuta		(M)
Gahnia lacera		(B)
Juncus gregiflorus		(B)
J. maritimus var. *australiensis*	Salt rush	(B)
J. paliidus	Stout rush	(M)
J. prismatocarpus		(M)
J. sarophorus		(M)
J. usitatus		(M)
Lachnagrostis filiformis var *filiformis*		(R)
Lemna minor	Duckweed	(M)
Leptocarpus similis		(B)
Luzula picta var *picta*		(R)
Microlaena stipoides		(M)
Microtus unifolia		(R)
Morelotia affinis		(R)
Notodanthonia racemosa		(M)
Oplismenus imbecillus		(M)
Orthoceras strictum		(R)
Paspalum distichum	Coastal paspalum	(M)
Phormium tenax	N.Z. flax	(B)
Poa anceps		(B)
P. imbecillus		(R)
Prasophllum pumilum		(R)
Pterostylis alobula		(R)
P. banksii		(R)
P. graminea		(R)

P. plumosa		(R)
P. trullifolia		(R)
Rytidosperma unarede		(R)
Scirpus cernuus		(B)
S. chlorostachyus		(M)
S. lacustris		(B)
S. medianus		(M)
S. nodosus		(B)
S. prolifer		(M)
Spinifex hirsutus	Spinifex	(M)
Stipa stipoides		(R)
S. teretifolia	Coastal needle grass	(M)
Thelymitra longifolia		(R)
Triglochin striatum		(B)
Typha orientalis	Raupo	(B)
Uncina uncinata		(B)
Zostera capricorni		(R)
Z. novazelandica		(R)

Ferns

Adiantum cunninghamii	Maidenhair	(B)
A. hispidulum	Maidenhair	(B)
Anarthropteris lanceolata		(R)
Asplenium bulbiferum ssp. *bulbiferum*		(R)
A. flabellifolium		(R)
A.flaccidum	Spleenwort	(B)
A. lucidum	Shining spleenwort	(M)
A. oblongifolium		(R)
A. obtusatum ssp. *northlandicum*		(R)
A. polyodon		(R)
Athyrium australe		(M)
A. japonicum		(M)
Azolla rubra	Water fern	(M)
Blechnum capense		(B)
B. chambersii		(R)
B. filiforme		(R)
B. lanceolatum		(M)
Cheilanthes distans		(R)
C. sieberi		(R)
Ctenopteris heterophylla		(R)
Cyathea dealbata	Silver tree fern	(B)
C. medullaris	Mamaku	(B)
Doodia media		(B)
Gramnitis billardieri		(R)
Hymenophyllum cupressiforme		(R)
H. demissum		(R)
H. dilatatum		(R)
H. flabellatum		(R)
H. flexuosum		(R)
H. multifidum		(R)
H. rarum		(R)
H. revolutum		(R)
H. sanguinolentum		(R)
H. scabrum		(R)
Lycopodium billardieri		(R)
Ophioglossum coriaceum		(R)
Paesia scarberula		(R)
Pellaea falcata		(R)
P. rotundifolia		(R)
Phymatodes diversifolium	Hounds tongue	(M)
Phymatosorus scandens		(R)
P. diversifolius		(R)
Pneumatopteris pennigera		(R)
Polystichum richardii		(R)
Psilotum nudum		(R)
Pteridium aquilinum	Bracken	(B)
Pteris macilenta		(R)
P. tremula		(B)
Pyrrosia serpens	Leather-leaf fern	(B)
Schizaea bifida		(R)
S. fistulosa		(R)
Thelypteris pennigera		(M)
Tmesipteris tannensis		(R)
Trichomanes elongatum		(R)
T. endlicherianum		(R)
T. reniforme		(R)
T. venosum		(R)

Exotic species

Dicotyledons

Achillea millefolium	Yarrow	(M)
Albizia lophantha	Brush wattle	(M)
Amaranthus deflexus		(M)
A. lividus		(M)
A. powelli		(M)
Anagallis arvensis	Scarlet pimpernell	(B)
Anemone x hybrida		(R)
Anthemis cotula	Stinking mayweed	(M)
Antirrhinum majus		(R)
Aphanes microcarpa	Parsley piert	(M)
Apium graveolens	Celery	(M)
Aptenia cordifolia		(R)
Araucaria heterophylla		(R)
Araujia hortorum	Moth plant	(M)
Arctotis acaulis		(R)
Armoracia rusticana	Horse radish	(M)
Asarina erubescens		(R)
A. lophospermum		(R)
Aster subulatus	Sea aster	(M)
Atriplex hastata	Orache	(M)
Bellis perennis	Lawn daisy	(B)
Bidens pilosa		(R)
Brassica campestris	Wild turnip	(M)
Bryophyllum pinnatum		(R)
Cakile edentula	Sea rocket	(M)
C. maritima	Sea rocket	(M)
Calendula officinalis		(R)
Callitriche stagnalis		(R)
Cannabis indica		(R)
Capsella bursa-pastoris	Shepard's purse	(M)
Carduus acanthoides		(R)

C. pycnocephalus	Winged thistle	(B)
C. tenuiflorus	Winged thistle	(B)
Carpobrotus aequilaterus		(M)
C. edulis	Bolus ice plant	(R)
Centaurium erythraea	Centaury	(B)
Centranthus ruber		(R)
Cerastium glomeratum	Chickweed	(B)
Cheiranthus cheiri		(R)
Chenopodium album	Fathen	(M)
C. murale	Nettle-leaved fathen	(M)
C. ambrosiodes	Mexican tea	(M)
Chrysanthemodes monilifera		(R)
Cirsium arvense	Californian thistle	(M)
C. vulgare	Scotch thistle	(B)
Conium maculatum	Hemlock	(M)
Conzya floribunda		(R)
Coronopus didymus	Twin cress	(M)
C. squamatus	Warter cress	(M)
Cotula australis		(B)
C. coronopifolia		(M)
Crassula coccinea		(R)
C. decumbens		(R)
C. multicava		(R)
Crataegus monogyna	Hawthorn	(M)
Crepis capillaris	Hawksbeard	(B)
Cucurbita pepo	Pumpkin	(M)
Cymbalaria muralis		(R)
Digitalis purpurea		(R)
Dipogon lignosus		(R)
Duchesnea indica	Indian strawberry	(M)
Echeveria secunda		(R)
Emex australis		(M)
Erica arborea		(R)
Erigeron floribundus	Fleabane	(M)
Erodium cicutarium	Storksbill	(M)
E. moschatum	Musky storksbill	(M)
Escallonia bifida		(R)
Eschscholzia californica		(R)
Eucalyptus sp.		(R)
Eupatorium adenophorum	Mexican devil	(B)
Euphorbia peplus	Spurge	(B)
Ficus carica		(B)
Foeniculum vulgare	Fennel	(M)
Fumaria muralis	Fumitory	(B)
Galium aparine	Cleavers	(B)
G. murale		(R)
G. parisiense	Slender bedstraw	(M)
Geranium disectum	Cut-leaved geraniu	(M)
G. molle	Dovesfoot	(B)
Gnaphalium spicatum	Cudweed	(B)
Hakea salicifolia		(R)
H. sericea		(R)
Hedera helix		(R)
Hieracium sp.		(R)
Hypericum androseamum		(R)
Hypochoeris radicata	Catsear	(B)
Inula graveolens		(R)
Lactuca virosa	Acrid lettuce	(M)
Lamium purpureum	Red dead nettle	(B)
Lapsana communis	Nipplewort	(M)
Leontodon taraxacoides	Merat hawkbit	(B)
Ligustrum sinense	Privet	(M)
Linaria purpurpea		(R)
L. vulgaris		(R)
Linum marginale	Australian flax	(M)
L. trigynum	Yellow flax	(M)
Lotus angustissimus		(M)
L. pedunculatus		(M)
L. subbiflorus		(M)
Lycium ferocissimum	Boxthorn	(M)
Lythrum hyssopifolia	Loosestrife	(M)
Malus domestica		(R)
Malva neglecta	Dwarf mallow	(M)
M. nicaeensis	French mallow	(M)
M. parviflora	Mallow	(M)
Matricaria matricariodes	Rayless chamomile	(M)
Medicago arabica	Spotted bur medick	(M)
M. lupulina	Black medick	(M)
M. polymorpha	Bur medick	(M)
Melilotus indica	King Island melilot	(M)
Mentha pulegium	Pennyroyal	(B)
Modiola caroliniana	Creeping mallow	(M)
Myosotis arvensis	Field forget-me-not	(M)
M. caespitosa	Forget-me-not	(M)
M. sylvatica	Forget-me-not	(M)
Nasturtium officinale	Watercress	(M)
Navarretia squarrosa		(R)
Nephrolepis cordata		(R)
Onopordon acanthium		(R)
Orobanche minor	Broomrape	(B)
Osteospermum ecklonis		(R)
Othonna capensis		(R)
Oxalis pes-caprae		(B)
Papaver somniferum		(R)
Pelargonium x asperum		(R)
P. peltatum		(R)
Physalis peruviana	Cape gooseberry	(M)
Phytolacca octandra	Inkweed	(B)
Picris echioides	Oxtongue	(B)
Pinus pinaster		(R)
P. radiata		(R)
Plantago coronopus	Buckshorn plantain	(M)
P. lanceolata	Plantain	(B)
P. major	Plantain	(M)
Polycarpon tetraphyllum	Allseed	(B)
Polygonum aviculare	Wireweed	(B)
P. hydropiper	Water pepper	(M)
Portulaca oleracea		(M)
Potamogeton crispus	Curled pondweed	(M)
Prunella vulgaris	Selfheal	(B)
Prunus cerasifera	Plum	(M)
Prunus persica		(R)
Querus ilex		(R)
Ranunculus parviflorus	Buttercup	(M)

R. repens	Creeping buttercup	(M)
R. sardous	Hairy buttercup	(B)
R. sessiliflorus		(R)
Raphanus maritimus	Sea radish	(M)
Rhamnus alaternus		(B)
Rochea coccinea		(R)
Rosa sp.		(R)
Rubus fruticosus	Blackberry	(B)
Rumex actosella		(R)
R. brownii	Hooked dock	(M)
R. conglomeratus	Clustered dock	(M)
R. crispus	Curled dock	(M)
R. obtusifolius	Broad-leaved dock	(M)
R. pulcher	Fiddle dock	(M)
R. sagittatus		(R)
Sagina apetala		(R)
S. ciliata	Pearlwort	(M)
S. procumbens	Pearlwort	(M)
Salix fragilis	Crack willow	(M)
Salsola kali	Saltwort	(B)
Sedum acre		(R)
S. album		(R)
S. reflexum		(R)
Selaginella moellendorffii		(R)
Sempervivum sp.		(R)
Senecio bipinnatisectus	Australian fireweed	(B)
S. cruentus	Garden cineraria	(B)
S. jacobaea	Ragwort	(B)
S. spathulatus	Gravel groundsel	(M)
S. vulgaris	Groundsel	(B)
Sherardia arvensis	Field madder	(M)
Silene gallica	Catchfly	(B)
Silybum marianum	Variegated thistle	(B)
Sisymbrium officinale	Hedge mustard	(M)
Solanum mauritianum	Wooly nightshade	(M)
S. nigrum	Black nightshade	(B)
S. sodomeum	Apple of sodom	(M)
Sonchus arvensis		(R)
S. asper	Prickly sow thistle	(B)
S. oleraceus	Sow thistle	(B)
Spergula arvensis	Spurrey	(B)
Spergularia rubra	Sand spurrey	(M)
Sporobolus capensis		(R)
Stachys arvensis		(R)
Stellaria graminea	Bog stitchwort	(M)
S. media	Chickweed	(B)
Taraxacum officinale	Dandelion	(B)
Tecomaria capensis		(R)
Torilis arvensis	Hedge parsley	(M)
Trifolium dubium	Suckling clover	(B)
T. fragiferum	Strawberry clover	(M)
T. glomeratum	Clustered clover	(M)
T. micranthum	Suckling clover	(M)
T. repens	White clover	(M)
T. resupinatum	Reversed clover	(M)
T. subterraneum	Subterranean clover	(M)
Tropaeolum majus	Garden nasturtium	(B)
Ulex europaeus	Gorse	(B)
Urtica urens	Nettle	(M)
Verbascum blattaria		(R)
V. thapsus	Wooly mullein	(M)
Verbena officinalis	Vervain	(M)
Veronica arvensis	Speedwell	(B)
V. persica	Speedwell	(B)
V. serpyllifolia	Thymeleaf speedwell	(B)
Vicia sativa	Vetch	(M)
V. tetrasperma	Smooth tare	(M)
Vinca major	Periwinkle	(M)
Xanthium spinosum	Bathurst bur	(M)

Monocotyledons

Agapanthus sp.		(R)
Agropon littoralis	Beard grass	(M)
Agrostis semiverticillata		(M)
A. stolonifera	Creeping bent	(M)
A. tenuis	Browntop	(M)
Aira caryophyllea	Hair grass	(B)
Allium vineale		(M)
Alocasia macrorrhiza	Elephant's ear	(B)
Aloe saponaria		(R)
Amaryllis sp.		(R)
Ammophila arenaria	Marram grass	(B)
Anthoxanthum odoratum	Sweet vernal	(M)
Arum italicum	Italian arum	(M)
Asparagus asparagoides	Smilax	(B)
Bambusa japonica		(R)
Bothriochloa macra		(M)
Briza minor	Shivery grass	(B)
Bromus diandrus	Roth	(M)
B. mollis		(M)
B. unioloides	Praire grass	(M)
Canna x generalis	Canna	(M)
C. indica	Indian shot	(M)
Carex divisa		(M)
C. divulsa		(M)
Catapodium rigidum		(M)
Cortaderia jubata	Purple pampas	(M)
C. selloana	Pampas	(B)
Crocosmia x crocosmiflora	Montbretia	(B)
Cynodon dactylon	Indian doab	(B)
Cynosurus cristatus	Crested dogstail	(M)
Cyperus eragrostis		(M)
Dactylis glomerata	Cocksfoot	(M)
Eragrostis brownii	Bay grass	(M)
Festuca arundinacea	Tall fescue	(M)
F. rubra	Red fescue	(M)
Gladiolus undulatus	Wild gladiolis	(B)
Glyceria declinata	Floating sweet grass	(M)
Holcus lanatus	Yorkshire fog	(M)
Hordeum leporinum	Barley grass	(M)
H. murinum	Barley grass	(M)
Iris germanica		(R)
I. orientalis	Garden iris	(M)

Juncus articulatus	Mud rush	(M)
J. bufonius	Toad rush	(M)
J. effusus	Soft rush	(M)
Lachenalia sp		(R)
Lagurus ovatus	Harestail	(B)
Lolium perenne	Perennial ryegrass	(M)
L. perenne x *Festuca arundinacea*		(M)
Narcissus sp.		(R)
Parapholis incurva	Sickle grass	(M)
Paspalum dilatatum	Paspalum	(M)
P. paspalodes	Mercer grass	(M)
Pennisetum clandestinum	Kikuyu	(M)
Poa annua		(B)
P. trivialis		(M)
Polypogon monspeliensis	Beard grass	(B)
Rytidosperma penicillatum		(R)
Sporobolus africanus	Ratstail	(M)
Stenotaphrum secundatum	Buffalo grass	(M)
Vulpia bromoides	Vulpia hair grass	(B)
V. myuros		(R)
Watsonia bulbillifera		(B)
W. meriana		(R)
Zantedeschia aethiopica	Arum	(B)

APPENDIX 6

Vegetation History from the Archaeological Record

The range of tree and shrub species originally present on the island can be reconstructed, at least partially, from the archaeological record.

A sample of wood branches and twigs and leaves, collected from within the Rangitoto ash, in a swamp behind Pig Bay by J Coster and R Foster in 1985. This material represents species present at the time of the eruption (Table 3).

Table 3. Tree and shrub identifications, Pig Bay swamp.

Common Name	Scientific Name	Common Name	Scientific Name
Kohekohe	*Dysoxylum spectabile*	Totara	*Podocarpus totara*
Titoki	*Alectryon excelsus*	Hard beech	*Nothofagus truncata*
Kahikatea	*Dacrycarpus dacrydioides*	Climbing rata	*Metrosideros perforata*
Rimu	*Dacrydium cupressinum*	Bracken	*Pteridium esculentum*[1]
Ngaio	*Myoporum laetum*	Coprosma	*Coprosma* cf. *arborea*

Wood samples were identified by Dr R Wallace, University of Auckland, and leaves by Dr B Clarkson, DSIR.

To this list the charcoal samples identified (Table 4) and identifications of leaf impressions in the Rangitoto ash (Table 5) from the Sunde site may be added

Table 4. Charcoal identifications from the Sunde site (pre-eruption).

Common Name	Scientific Name	Common Name	Scientific Name
Kauri[2]	*Agathis australis*	Gymnosperms	
Puriri	*Vitex lucens*	Rata/pohutukawa	*Metrosideros* sp.
Manuka	*Leptospermum scoparium*	Horoeka	*Pseudopanax crassifolium*
Heketara	*Olearia rani*	Olearia	*Olearia* sp.
Hebe	*Hebe* sp.	Akeake	*Dodonaea viscosa*

[1] Very common

[2] Nichol reports Kauri charcoal widespread on island

Table 5. Leaf impression identifications from Rangitoto ash, Sunde site

Common Name	Scientific Name	Common Name	Scientific Name
Pohutukawa	*Metrosideros excelsa*	Kawaka	Libocedrus plumosa
Kawakawa	*Macropiper excelsum*	Rewarewa/titoki	*Knightia excelsa*/ *Alectryon excelsus*
Kohekohe	*Dysoxylum spectabile*	Taraire	*Beilschmiedia tarairi*
Olearia	*Olearia* sp.	Coprosma	*Coprosma* sp. *robusta*

Nichol (1988:390) also identified charcoal from the post-eruption site at the Sunde site. These are list in table 6.

Table 6. Charcoal identifications from the Sunde Site (post-eruption).

Common Name	Scientific Name	Common Name	Scientific Name
Pohutukawa	*Metrosideros excelsa*	Mahoe[3]	*Melicytus ramiflorus*
Pseudopanax	*Pseudopanax* sp.	Dracophyllum	*Dracophyllum* sp.
Pate	*Schefflera digitata*		

No evidence appears to currently available about the vegetation of the island for the last two to three hundred years before European settlement on the island. Two avenues are available for future research into this aspect of the island's past. Firstly pollen cores from swamps on the island (well selected coring sites could also add to the pre-eruption vegetation list as well) and charcoal sampling by scientific sampling of some of the uninvestigated archaeological sites.

[3]Early regrowth species

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