

MOTUIHE RESTORATION PLAN



February 2005

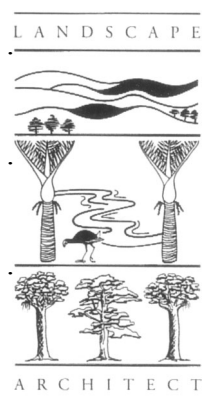


Department of Conservation
Te Papa Atawhai

MOTUIHE RESTORATION PLAN

Prepared for the Motuihe Trust

February 2005



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JOHN HAWLEY
Landscape Architect

This document is a response to a desire by the Motuihe Trust and the Department of Conservation to chart a clear pathway forward for their joint endeavours on Motuihe Island over the next ten years.

Trustees have completed work on an ambitious ten year strategy that signals the way ahead and this has now been extensively peer reviewed by technical staff. The key efforts in the strategy revolve around ridding the island of its pests, an extensive re-vegetation programme that would see the island restored to its natural beauty, enhancing the island's recreational values and finally the re-introduction of several of New Zealand's most precious indigenous species that are no longer found on the mainland.

The Motuihe Project will ensure the island serves as a treasure house for future generations and become a beacon of hope for many species that are not easily accessible for public viewing given their extinction from mainland New Zealand. The project is likely to be both high profile and hugely popular given its proximity to our largest city.

The Motuihe Project initiative, more than any of the other restoration projects being undertaken in the Hauraki Gulf has the potential for the greatest gains in the years to come. This immensely popular island, just a short distance from the Auckland CBD, is about to be transformed from a virtually barren landscape to a vibrant storehouse of natural and historic heritage.

We the undersigned as representatives of both the Motuihe Trust and the Department of Conservation hereby commit to undertaking this plan.



John Laurence
Chairperson
Motuihe Trust



Rob McCallum
Auckland Conservator
Department of Conservation

22/02/05

CONTENTS

FOREWORD	1
1. INTRODUCTION	2
2. PLANNING CONTEXT	3
3. THE VISION	4
4. THE RESTORATION PROGRAMME	7
4.1 PHYSICAL AND CULTURAL LANDSCAPE MANAGEMENT	7
4.1.1 Geological Heritage	7
4.1.2 The Visual Resource	7
4.1.3 Maori Archaeological Sites	9
4.1.4 European Historic Sites	10
4.2 ECOSYSTEM MANAGEMENT	11
4.2.1 Philosophy of Introductions	11
4.2.2 Vegetation Management	12
(1) Existing vegetation	12
(2) Plant pests	12
(a) Weed management to date	13
(b) Weed control strategies	14
(3) Exotic tree management	14
(4) Protection of remnants	15
(5) Pasture management	15
(6) Planting	16
(a) Planting concept	16
(b) Planting strategies	17
(c) Species	19
(d) Seed source	20
(e) Planting sequence	21
(7) Wetlands and stream enhancement	23
(8) Threatened plant species introductions	23
4.2.3 Fauna Management	24
(1) Existing fauna	24
(2) Future introductions	24
(a) Birds	24
(b) Reptiles	28
(c) Invertebrates	28
(d) Fish and crustaceans	29
(3) Animal pests	30
(a) Management to date	30
(b) Pest exclusion	30
(c) Domestic pets	31
(d) Wasps	31
(e) Undesirable bird species	31
4.2.4 Marine Environment Management	31
4.3 PROVISION OF VISITOR FACILITIES AND SERVICES	32
4.3.1 Existing Visitor Use and Facilities	32
4.3.2 Strategic Directions	33
4.3.3 Visitor Facilities	34

(1)	Changing/toilet facilities	34
(2)	Picnic sites	34
(3)	Camping	35
(4)	Visitor accommodation	35
4.3.4	Interpretation	36
4.3.5	Visitor Centre	37
4.3.6	Walking Tracks	38
4.3.7	Commercial Activities	40
4.4	COMMUNITY PARTICIPATION	40
4.4.1	Building Support for Conservation	40
4.4.2	Community Support for the Programme	41
4.4.3	Community Partnerships	42
4.4.4	Working with Volunteers	43
5.	RESTORATION PROGRAMME SUPPORT	45
5.1	MANAGEMENT OF THE RESTORATION PROGRAMME	45
5.2	FUNDING	45
5.3	OPERATIONS CENTRE	46
5.4	UTILITIES	47
5.5	FIRE PREVENTION	47
5.6	PLAN MONITORING AND REVIEW	48
	REFERENCES	50

PLANS

Aerial photograph

1. Location Plan
2. Inner Gulf Islands Ecological District (IGIED)
3. Geology
4. Landscape Features
5. Landscape Units
6. Recorded Archaeological and Historic Sites
7. Existing Vegetation
8. Indicative Planting Sequence
9. Existing Visitor Facilities and Farm Infrastructure
10. Existing and Proposed Walking Tracks
11. Restoration Concept
12. Isthmus – Landscape Management Proposals

APPENDICES

1.	Planning and Policy Documents Relating to Motuihe	A1
2.	Characteristics of Landscape Units	A2
3.	Recorded Archaeological and Historic Sites	A4
4.	The Vascular Flora of Motuihe	A5
5.	Pasture Management Options	A16
6.	Recommended Species for Restoration Planting	A18
7.	Threatened Plant Species to be Considered for Reintroduction	A20
8.	Bird Species Recorded on Motuihe	A21
9.	Reptiles Recorded from the Auckland Geographic Region	A22
10.	Biosecurity Standards for Motuihe Restoration Project	A23
11.	Visitor Centre Site Options	A25
12.	Koiwi Protocol	A26
13.	Memorandum of Understanding	A27

TABLES

Indicative Restoration Activities: Years 1-5

FOREWORD

Motuihe has held a special place in the lives of generations of Aucklanders. Its stunning beaches and sheltered bays, set in a rural context only 15km from downtown Auckland, has made it a popular day trip for private boat owners and visitors arriving by ferry.

In the past, the easily accessible and heavily modified inner islands of the Hauraki Gulf in public ownership have been classified as 'recreation islands' whereas the outer islands, which have retained a greater proportion of their natural values, have been seen primarily as 'conservation islands'.

The significant advances made in eradicating pests from large islands have potentially made all islands a focus for restoration. Tiritiri Matangi has demonstrated just what can be achieved with vision and dedicated volunteers. Its success has inspired other community groups and there are now restoration projects on a number of the Gulf's islands, including Motutapu, Motuora and Kawau.

The Motuihe Trust was formed in the year 2000 by a group of people with links to organisations in the Auckland Region involved in environmental education, outdoor recreational pursuits, boating, and conservation. Its mission is to:

"... restore, enhance and protect the indigenous flora and fauna and the significant Maori and historic sites of Motuihe Island in consultation with stakeholders. Members of the community will be provided with opportunities to participate in the restoration and maintenance of Motuihe Island. The Trust will promote the island as a visitor destination for interpreted conservation, heritage and educational experience, and will undertake commercial arrangements on the Island, which support the Trust vision, to ensure the ongoing financial viability of the island."

Motuihe will continue to be a recreation reserve administered by the Department of Conservation for all New Zealanders. However, it is anticipated that the enthusiastic involvement of the Motuihe Trust in partnership with the Department of Conservation, iwi and the wider community, will enhance the traditional recreational appeal of Motuihe whilst restoring its biodiversity and bringing its cultural and historical heritage to life.

1. INTRODUCTION

Motuihe is an island of 179ha situated 4.5km off Musick Point (Plan 1). It is one of a group of islands covered by the Inner Gulf Islands Ecological District (IGIED) (Plan 2).

It is owned by the Crown and administered by the Department of Conservation (the Department or DOC) as a Recreation Reserve under the Reserves Act 1977. The Department's Auckland area office manages Motuihe in conjunction with other islands as part of the Hauraki Gulf Marine Park. Most of the island is grazed by cattle in conjunction with Motukorea. No departmental staff live on the island.

Following discussions with the Department and with the support of the Auckland Conservation Board, the Motuihe Trust (the Trust) was registered in 2000 as a charitable trust. A proposal for the restoration of Motuihe was prepared by the Trust and submitted to the Department in April 2001. DOC welcomed the Trust's initiative and acknowledged that the proposal was a good platform from which to start.

The Department, as manager of this public reserve, required that the Trust prepare a plan which clearly sets out a detailed programme of activities to achieve its vision. It also required that the Trust consult with Ngati Paoa and Ngai Tai, both of whom have strong associations with the island. The Hauraki Maori Trust Board has also been approached for its input. The Trust was also to consult widely with organisations and community groups having a particular interest in heritage and the environment. Those canvassed have included the Heritage Department of the Auckland Regional Council, the Royal Forest and Bird Protection Society of New Zealand Inc, the Auckland Botanical Society and groups associated with other island restoration projects, these being the Motutapu Restoration Trust, the Supporters of Tiritiri Matangi Inc and the Motuora Restoration Trust. This restoration plan has been commissioned by the Motuihe Trust with the support of the Department. It is to be approved by the Department and the Auckland Conservation Board.

The Trust has worked closely with DOC in the preparation of this plan which is designed to give practical guidance to the implementation of restoration activities over the next 10 years but recognises the need to provide flexibility as circumstances change. The plan outlines a restoration programme under the headings of Physical and Cultural Landscape Management, Ecosystem Management, Provision of Visitor Facilities and Services and Community Participation. Restoration Programme Support sets out the management and funding structure to implement the programme. Finally, indicative restoration activities to be undertaken in the first five years are listed in Tables 1-5.

2. PLANNING CONTEXT

Strategic objectives for Motuihe are defined in the Auckland Conservation Management Strategy (CMS) (DOC, 1995) as follows:

Treaty of Waitangi

- Actively protect and provide for the interests of tangata whenua, in particular by facilitating their links with the island and its taonga.

Heritage Protection

- Record and protect the historic sites and associations with the island.
- Protect remnant indigenous forest and wetland areas and the forest character of the cliffs.

Accessibility

- Develop Motuihe as a visitor destination and entranceway to the special Hauraki Gulf recreational and conservation experiences.
- Increase public awareness of the island's history and historic places.

The CMS also contains a number of implementation strategies including:

“21.7.4 Investigate, and if appropriate implement, eradication of rabbits, rats, cats and mustelids.”

This is a very important strategy in terms of this plan.

The CMS is due for review in 2005.

The other plans and policies which help guide the management of the island are set out in Appendix 1.

3. THE VISION

There are many islands in the Hauraki Gulf, all with different characteristics and potential. Several of the inner gulf islands are undergoing restoration programmes and each has its own particular focus. Tiritiri Matangi was established to provide a habitat for rare or endangered fauna and flora; on Motutapu the primary goal of management is to protect and enhance historic values, while on Motuora the emphasis is on creating a habitat for invertebrates, reptiles and compatible bird species.

Motuihe offers unique opportunities to interpret New Zealand heritage. The whole island is in Crown ownership. Its wharf makes it easily accessible and it has a basic recreational infrastructure. Long sandy beaches and sheltered anchorages are popular destinations for private boat owners. With its close proximity to downtown Auckland the island, with enhanced facilities, opportunities and amenity, will be an attractive option for local, national and international visitors.

With the successful elimination of rats and mice and over time the current targets, cats and rabbits, the island will soon be free of mammalian pests. This will enable the restoration of indigenous biodiversity in a cost-effective manner not possible on the mainland. Although the vegetation is very degraded, significant remnants of coastal forest remain upon which new plantings can be based (Aerial photograph). Motuihe is already an important breeding site for a variety of sea and shore birds and as habitat is created, species of birds, reptiles and invertebrates will be introduced. This will provide visitors with an opportunity to appreciate and learn about the island's evolving natural values.

Like other inner islands, Motuihe is infested with weeds, which will need considerable investment and dedication to control. Their presence poses a challenge but at the same time provides an opportunity for the community to participate in conservation programmes.

The island had a long history of Maori settlement, which has left tangible evidence of fortified pa and living areas, although many of the sites have been significantly modified. The European association with Motuihe has been shorter but there are strong references to early farming activity, the Quarantine Station, prisoner of war camp and naval camp. These are the ingredients of stories that have yet to be told.

Together these characteristics suit Motuihe to the role of 'gateway' to the Hauraki Gulf and the recreational and conservation experiences it offers.

Motuihe will be managed as an open sanctuary combining introductions of plants and animals with public interpretation programmes. Most introductions will be from the IGIED and land on the periphery that would have influenced the island's biological community before it was modified by human intervention. It therefore includes the adjacent mainland and elements of the outer islands.

The Motuihe Trust Vision

“The vision is that Motuihe Island will be a natural environment of indigenous flora and fauna together with identified significant Maori and European historic sites, offering a quality recreational, environmental and educational experience to visitors. Visitors to the island will be able to see native birds in their natural habitat, close to white sandy beaches. They will be encouraged to walk around the island and learn about conservation issues and the heritage of the Hauraki Gulf.”

The concept for a restored Motuihe is illustrated on Plan 11. The main elements are:

- Environmentally damaging plants are controlled or eradicated and exotic trees removed except where they have historic, rarity or amenity value.
- Indigenous forest remnants are protected.
- Maori archaeological sites are protected and selected sites are interpreted to visitors in line with iwi wishes.
- European historic sites are protected and the more interesting sites are interpreted.
- The two geopreservation sites are interpreted.
- Habitat for New Zealand dotterel, variable oystercatcher, Caspian tern and reef heron at Southeast Beach is enhanced.
- A planted indigenous flora representing a range of ecosystem types replaces pasture over much of the island and stock is ultimately removed.
- Constructed wetlands are created and stream habitats enhanced.
- Species of compatible birds, reptiles and invertebrates are introduced, including threatened species.
- Rare plants are identified and appropriate threatened plant species are introduced.
- Effective biosecurity measures keep the island safe from animal pests and any new environmentally damaging plant species are quickly identified and controlled or eradicated.
- Landscape amenity is enhanced.
- A network of tracks, each with its own particular theme, provides access around the island.
- Camping opportunities are provided.
- Bunkhouse accommodation is available for volunteers together with some modest cabins and an eco-lodge for overnight visitors.

- A visitor centre interprets the island's natural, cultural and historic heritage and offers refreshments and quality merchandise.
- Views of the Hauraki Gulf are retained from the main ridgeline and certain vantage points.
- Existing recreational activities are retained where they are compatible with the larger goals.
- The community is encouraged to participate in all aspects of the restoration programme.
- The success of the restoration programme results in a regular ferry service bringing increased numbers of visitors.
- Visitors leave the island with an enhanced understanding of and support for, New Zealand's natural, cultural and historic values.

4. THE RESTORATION PROGRAMME

Four major themes underlie the Motuihe restoration programme: management of the island's physical and cultural resources, rehabilitation of its natural biodiversity, providing for recreational use, and building support for conservation through participation in restoration activities.

Bullet points (•) identify management actions throughout the plan.

4.1 PHYSICAL AND CULTURAL LANDSCAPE MANAGEMENT

4.1.1 Geological Heritage

The island is composed of two major rock types, a greywacke base in the south, overlain by more recent (20 million years) Waitemata group sandstone elsewhere (Plan 3).

The softer sandstones have been eroded by the sea and form most of the island's cliffs. Parnell grit forms wave platforms and outcrops in some places. Soils are Brookby clay loam and clay and Marua clay loam and are of variable fertility. Motuihe was influenced by the Rangitoto ash shower, but to a lesser extent than Motutapu.

The Geopreservation Inventory (Kenny and Hayward, 1992) includes two sites that are classified as being of Regional Scientific and Educational importance. Both are basal Waitemata group sequences that directly overlie the ancient greywacke basement and record the rapid subsidence of the region in the early Miocene and formation of the deep marine Waitemata Basin. These old sediments contain fossils.

The first site is the section of coast on the west side of the island around 'Limestone Point' which is one of the very few examples of coastal limestone karst in the Auckland Region. The marine area adjacent is identified in the Proposed Auckland Regional Plan: Coastal (ARC, 2003) as a Coastal Protection Area (CPA.1). The second site is on the northern side of the island at the eastern end of Ocean Beach and records the succession of strata passing up into the thick Parnell grit that forms Te Raeokahu.

- Identify Limestone Point as a feature of interest on the Orchard Bush track.
- Interpret rock strata at Te Raeokahu.

4.1.2 The Visual Resource

Motuihe belongs to the inner ring of Hauraki Gulf islands which include Rangitoto, Motutapu and Motukorea. Together they contribute to Auckland City's coastal setting and are widely acknowledged to enhance its maritime character. Motuihe is identified as a landscape of outstanding value in the CMS.

Motuihe lacks the strong legible qualities of its island neighbours, ie. the instantly recognisable volcanic cone and blanket pohutukawa forest of Rangitoto; the coherent and very memorable volcanic forms of Motukorea highlighted by its predominant grass cover; and the rolling pastoral landscape with a consistent pattern of coastal vegetation which typifies Motutapu.

From a distance Motuihe presents a long, low profile. The older greywacke rocks form a broad elevated ridge rising to 63m at the trig, while in the north the topography is gently undulating (Plan 4). Bald Knob is a prominent feature at the southern end of the island. Most of the land is under grass.

The island has an irregular shape and varied coastal scenery. Sheer cliffs formed by wave action on the Waitemata sandstone are an imposing feature. Sandy beaches extend nearly halfway around the island and there are pohutukawa (*Metrosideros excelsa*) on the coastal fringe. A visually significant bush remnant has survived on the steep western slopes and in coastal gulleys on the east coast. There are stands of mature exotic trees at the northwest peninsula and on the isthmus which contribute significantly to the character and visual amenity at the main entry point to the island. Elsewhere there are remnants of former shelterbelts in farmland.

While Motuihe has some impressive landscape features, the overall appearance from the sea is of a highly modified landscape lacking in coherence. The prominent location of exotic trees on coastal cliffs gives them a high visual profile and they tend to dominate the geological features and dwarf regenerating indigenous vegetation. Their often dilapidated state imparts a ragged, uncared-for appearance.

The characteristics of the farmed landscape are most obviously experienced on shore. Its poor quality pasture, fallen trees, senescent shelterbelts, unfenced remnants, and fences and gates in need of repair contribute to an overall 'rundown' appearance.

For purposes of description, the island has been divided into eight landscape units, each sharing common landscape characteristics (Plan 5). These are illustrated with photographs and their characteristics are summarised in Appendix 2.

Landscape management

It is anticipated that the restoration programme will have very positive benefits for Motuihe's visual quality as viewed from both the sea and onshore. Pasture on the northern paddocks and flanks of the central ridgeline will be replaced with a blanket of forest linking coastal remnants and presenting a coherent aspect. Some of the existing open space character under grass will be retained at the ridgeline and Bald Knob to emphasise topography, provide a contrast with forest plantings, create habitat for some fauna and provide for views.

From the sea the appearance of the northwest peninsula will change to some extent as the predominant pine species in the coastal margins, maritime pine (*Pinus pinaster*), an invasive species that is seeding freely on the cliffs, is replaced with a more consistent native cover. Meanwhile, the backdrop to the main recreation beaches at the isthmus will change only in detail. The transformation from a farmed to a forested island will be gradual but as the exotic vegetation influences are reduced and the indigenous

characteristics are enhanced, a landscape which complements the quality of adjacent islands will emerge.

- Apply an integrated design approach to all aspects of the landscape.

4.1.3 Maori Archaeological Sites

The pre-European archaeological landscape is the product of several centuries of Maori life and is of prime importance in understanding Motuihe's human history. There are 62 recorded archaeological sites associated with Maori occupation and settlement (Plan 6). These include at least two headland pa, together with midden deposits, pits, terraces and burial sites or sites that contain combinations of these features (Appendix 3).

The most common type of site is midden and these are fairly evenly distributed around the island's perimeter. There are traditional accounts of kumara cultivation and the number of pit sites tends to support this. There are likely to be other sites that have not been recorded. Cultivation and stock trampling have substantially modified many sites outside the coastal protection fence. In addition, burrowing by rabbits has caused considerable damage to sites everywhere.

Management of sites

The Department has prepared a comprehensive archaeological and historic assessment to help guide the management of sites in relation to the restoration programme (DOC, 2003b).

The Department advises that the most desirable approach from a conservation perspective is to exclude archaeological sites from planting. However, on an island so infested with weeds, sites that are left in grass and unmanaged are likely to become a source of weed seed that will threaten the integrity of adjacent planted forest areas. It is also likely that, in the absence of sustained management, indigenous tree species will colonise these sites over time. The relatively poor condition of many of the sites is a factor to be considered when determining an appropriate management strategy.

The strategy recommended by the Department is to manage a representative sample of the best-preserved archaeological site types and to plant the remainder.

- In consultation with iwi, apply to the New Zealand Historic Places Trust (NZHPT) for an authority to modify archaeological sites affected by restoration planting. If iwi or the NZHPT consider planting to be inappropriate, mark out and exclude these sites from tree or shrub planting, monitor and manage weed growth.
- Planting, track construction and fencing undertaken in the vicinity of sites will be monitored by an archaeologist. Any unrecorded sites discovered will be left unmodified and contact made with the Department's historic staff and with iwi.
- In the event of a burial site being disturbed, implement the agreed koiwi protocol (Appendix 12).

- Mark out, exclude from tree and shrub planting, and manage for weed growth the following sites: pa site R11/151, pits/terraces R11/876, pit sites R11/158 and 159, coastal beach flats R11/154, 872 and 873. These sites have potential for interpretation. Establish a protective grass sward such as rice grass (*Microlaena stipoides*) to inhibit weed growth but use pohuehue (*Meuhlenbeckia complexa*) on the beach flats. Monitor and manage weed growth.
- Set aside the following sites already in bush remnants from infill planting: R11/148, 865, 866, 868, 870, 871, 875, 883, 884, 885, 886, 1899 and 1908. Monitor and manage weed growth.
- Plant the remainder of sites with shallow-rooting shrubs to inhibit weed growth.
- Liaise with iwi with regard to interpretation of sites.

4.1.4 European Historic Sites

Motuihe has a rich history dating back to the earliest period of European settlement in Auckland. The island was purchased from its Maori owners in 1839 and developed as a farm. It passed to the Crown in 1872 and a human quarantine station was built on the northwest peninsula. There is a small cemetery containing graves of those who died during this and later periods.

During World War I, the quarantine complex was used as an internment camp and it was from here in 1917 that the famous German Count Felix Von Luckner escaped. The camp was subsequently used as a children's health camp and during World War II was converted and enlarged to become the naval training base, HMNZS Tamaki. This base closed in 1963 and most of the buildings were removed, leaving only the water tower, a house and some sheds.

However, there remains ample evidence in the form of mature trees, roads, terraced areas, gun emplacements, the wharf, sea walls and the cemetery (DOC, 2003b). Of particular note is the avenue of Norfolk Island pines (*Araucaria heterophylla*) and Moreton Bay fig trees (*Ficus macrophyllus*), the grove of olives (*Olea europaea* subsp. *Europaea*) and the stands of Norfolk Island pines planted along the isthmus. This area is historically very significant and provides a valuable source of information for interpreting Motuihe's European history.

While the main part of the island was used less intensively, there are still representative elements from the early farm settlement and animal quarantine period. These include concrete foundations in the vicinity of the existing farm complex and pear trees in the orchard. A register of exotic trees of heritage significance throughout the island has been prepared (DOC, 2004f). Further research would clarify the heritage significance of some of the exotic trees. Von Luckner's dugout hiding place, if it can be positively identified, would be an interesting feature to interpret.

Management of sites

- Prepare a conservation management plan to guide management of the historic heritage on the northwest peninsula (R11/1784).
- Manage trees (DOC, 2004f) to prolong their lifespan, improve their appearance and prevent further damage to historic features by windthrow.
- Research the heritage significance of exotic tree plantings.
- Maintain the historic character of the peninsula and isthmus by replacing non-invasive heritage trees as they die with trees of the same species, grown from island-sourced seeds where available.
- When olive trees of heritage value (DOC, 2004f) reach the end of their natural life, replace with trees grown from island stock.
- Remove invasive exotic trees from R11/1784 and the isthmus.
- Remove invasive exotic trees from the coastal margins of R11/1784 and replace with indigenous species; replace other exotic trees as they die with indigenous species.
- Carry out amenity planting on the isthmus as shown on Plan 12.
- Plant specimen trees and some shelter at the historic farm settlement R11/1885.
- Retain the remains of structures where they occur, including concrete foundations and telegraph poles, etc, unless deemed unsafe following appropriate assessment.
- Investigate the practicality of repairing historic structures in line with repair and remedial work plans (Salmond Reed, 2001).
- Interpret sites relating to:
 - the Quarantine Station, Prisoner of War Internment Camp and HMNZS Tamaki Base, R11/1784
 - the historic settlement associated with early European farming or animal quarantine station, R11/1885
 - Von Luckner's escape attempts, R11/1897, 1903
 - the gun emplacement, R11/1881.

4.2 ECOSYSTEM MANAGEMENT

4.2.1 Philosophy of Introductions

Motuihe's status as a recreation reserve means that native species introductions may differ from elsewhere. For plants, the sources will be restricted either to the island or to IGIED. For animals, the list comprises species known historically or at present from IGIED. However, introductions may also include threatened species of national importance unlikely to interact negatively with resident species.

4.2.2 Vegetation Management

(1) Existing vegetation

Motuihe's long history of human occupation, cultivation and in particular, pastoral farming, has reduced the original forest cover to a few remnants in gullies and on steep coastal faces and a scattering of pohutukawa around the coastal fringe (Plan 7). Reference to the flora of nearby Waiheke suggests that some species of plants were lost from Motuihe, ie. kauri (*Agathis australis*), tanekaha (*Phyllocladus trichomanoides*), miro (*Prumnopitys ferruginea*) and kahikatea (*Dacrycarpus dacrydioides*) are not present and tawa (*Beilschmiedia tawa*) is represented by a single tree (Appendix 4).

Although the vegetation is very degraded, some interesting species have survived. The nationally threatened *Senecio scaberulus* has been found at one site on the east coast and the regionally threatened *Geranium solanderi* s.s. was identified above Waihaorangatahi Bay (de Lange & Crowcroft, 1999). Coastal mahoe (*Melicytus novae-zealandiae*), which is more typical of the outer Hauraki Gulf, is also present.

The largest indigenous remnant, known as Orchard Bush, is on the west coast and consists of large pohutukawa with kohekohe (*Dysoxylum spectabile*), karaka (*Corynocarpus laevigatus*), manuka (*Leptospermum scoparium*), mapou (*Myrsine australis*), mahoe (*Melicytus ramiflorus*), harakeke (*Phormium tenax*) and other species. Many plant pests are also present. In the two gullies on the east coast taraire (*Beilschmiedia tarairi*) is the principal component but with local dominance of kohekohe. There are a few old pohutukawa and puriri (*Vitex lucens*) standing in pasture. The pasture is of variable quality, prone to pugging and in places infested with pasture weeds such as pennyroyal (*Mentha pulegium*) and Apple of Sodom (*Solanum linnaeanum*).

There are many exotic trees representing various phases of settlement. The most notable are on the northwest peninsula and the adjacent isthmus and include Norfolk Island pine, European olive, Aleppo pine (*Pinus halepensis*), Moreton Bay fig and holm oak (*Quercus ilex*). These mature trees contribute significantly to the historic ambience. Elsewhere on the main part of the island there are other exotic plantings and remnants of farm shelterbelts.

- Identify the location of threatened and uncommon native plant species and protect from restoration activities.

(2) Plant pests

Plant pests pose a major challenge to the success of the restoration programme. Virtually all of the ungrazed areas are infested with environmentally damaging plant species capable of smothering or outcompeting indigenous plants. Species of concern include evergreen buckthorn (*Rhamnus alaternus*), moth plant (*Araujia sericifera*), kikuyu (*Pennisetum clandestinum*) and pampas grass (*Cortaderia selloana*, *C. jubata*). There are also many species with limited populations that may pose a threat (DOC, 2004a).

Many of the weeds on Motuihe are also present on the nearby islands of Rangitoto, Motutapu, Motukorea and Waiheke and on the adjacent mainland. The seeds of evergreen buckthorn and woolly nightshade, together with olives, are likely to be dispersed by birds flying between these places, while the seeds of moth plant and pampas grass are wind-borne. Effective control of weeds on Motuihe is also complicated by two other factors. First, the seeds of some species are known to remain viable for a number of years and secondly, the removal of rabbits may result in increased populations of some weed species which were formerly browsed by them (Lindsay, 2000).

A wide range of exotic plants has been planted over the years. Some of these, such as the olives associated with John Logan Campbell, are now acknowledged to be of significant heritage value and horticultural interest. Unfortunately several species, including olives, pine spp., Moreton Bay fig and holm oak are naturalising and their seedlings will need to be controlled.

Several native species that are not naturally found in the area or which have obviously been sourced from outside the IGIED have been planted. These include Kermadec pohutukawa (*Metrosideros kermadecensis*), *Olearia paniculata* and *Pomaderris apetala*. Given the risk that they could hybridise with relatives found naturally, they will be treated as exotics and removed.

The principal environmentally damaging plant species must be brought under control before the large-scale planting programme commences. Any plants not controlled are a potential source of seed for invasion into planted areas. Additionally, any seed already present in the ground will be a threat at a later date.

Pasture that is retired from grazing for planting is also at risk of invasion by weeds. Experience on other islands, eg. Motutapu, has shown that planting increases the area that needs to be kept free of weeds and adds to the overall burden of weed control.

(a) Weed management to date

A considerable amount of weed mapping and control has been undertaken by volunteers, including the New Zealand School of Outdoor Studies (NZSOS), Trust members and individuals. The focus has been on well-established and widespread weeds, particularly evergreen buckthorn and moth plant. The Department's weed control team has also been active, targeting those species with limited distribution but posing a high threat. Contractors have been employed to helicopter-spray large tracts of dense weeds such as gorse (*Ulex europaeus*), woolly nightshade and evergreen buckthorn, mainly on the east coast.

Control operations to date have had mixed results. Good control has been achieved on species with limited distribution such as barberry (*Berberis glaucophylla*) and elaeagnus (*Elaeagnus x reflexa*) but moth plant and evergreen buckthorn have proved difficult.

(b) Weed control strategies

The Motuihe Weed Control Strategy (DOC, 2004a) provides a thorough analysis of the plant pests present, priorities for control, techniques for control and eradication and the resources needed to carry out the tasks.

The ultimate objective is to eradicate, control to zero density or sustain control over all invasive weeds. Within the life of the plan this goal is achievable for species with limited distribution, eg. banana passionfruit (*Passiflora tripartita* var. *mollissima*) and boneseed (*Chrysanthemoides monilifera*), but may not be possible for those species with widespread populations.

Control techniques will be selected on the basis of lowest impact and practicability (CMS, 39.1.18). Physical control will be employed in preference to herbicides where it can achieve effective results. In reality, herbicide application will be required for many situations and in these cases the least toxic herbicide that is effective will be used.

There are many aggressive species that have not yet reached Motuihe. Its proximity to the mainland and other islands means there is always the prospect of new weeds being introduced by birds and wind. Consequently regular weed surveillance and quick action will be required. Ensuring that all incoming machinery is cleaned and free of soil and seeds is important. Education to alert visitors to the potential of introducing seeds, ie. on muddy boots, will also be necessary.

- Implement the Weed Control Strategy.
- Ensure delivery of stores and equipment is carried out in accordance with the Biosecurity Standards for Motuihe Restoration Project (Appendix 10).
- Emphasise the potential for visitors to introduce plant pests, using Trust publications, the website and instruction by its representatives on the island.

(3) Exotic tree management

A variety of exotic tree species have been planted on the farm over the years including macrocarpa (*Cupressus macrocarpa*), maritime pine, Norfolk Island pine and various eucalyptus species (Appendix 4). Skeletal remnants of formerly extensive shelterbelts survive in the northern paddocks but they no longer serve their original function. Some of the trees are dead or dying and the untidy nature of the remainder contributes to the farmland's run down appearance. Their tall growing habit gives them a high visual profile.

The protection and management of heritage value trees is covered in section 4.1.4. As part of the programme to enhance the indigenous character and biodiversity, exotic trees on the farm will be progressively removed. It is possible that some costs may be recoverable, particularly with macrocarpa.

The removal of exotic trees along the coastal edge, eg. maritime pine and macrocarpa on the cliff above Wharf Bay, is complicated by the potential to damage the adjacent

coastal protective fence and the indigenous understorey. If they are felled amongst weeds, it will also make weed control more difficult. For individual trees the best management solution may be to ringbark or poison rather than to fell. Management decisions will be made on the ground to suit circumstances.

- Implement the Weed Control Strategy.
- Progressively remove all exotic trees, other than those identified as being of heritage value (DOC, 2004f), from the main part of the island.
- Assess market value of exotic trees and their potential for timber use on the island.
- Depending on management considerations, fell trees, cut up, chip and burn debris or leave the trunk to rot. Alternatively, ringbark or poison trees and leave to decay.

(4) Protection of remnants

The forest remnants are small in area but extremely valuable as a sample of the island's past forest ecosystem and as a source of seed for a rejuvenated island-wide forest ecosystem. The stature and age of some of the trees, particularly pohutukawa, is very impressive and they make a significant contribution to visual amenity. Serious plant pests threaten the integrity of these remaining stands.

The coastal fence protects most of the forest remnants but some significant trees remain unprotected from stock. These include parts of Orchard Bush on the west coast, the northern edge of the east coast remnant, and a widely spaced group of puriri and pohutukawa in the centre of the northern paddocks. There are also isolated specimens and small groups of pohutukawa which are an attractive feature of the farmland.

All unfenced remnants are a priority for protection to prevent further deterioration through stock trampling and browsing of seedlings. It is not intended that single specimens be fenced off in the first instance, although most of them will ultimately be protected as paddocks are withdrawn from grazing. Fenced-off areas will require weed control.

- Protect remnants with stock-proof fencing or by retiring paddocks.
- Control plant pests and nurture the remnants back to a fully-functioning forest ecosystem.

(5) Pasture management

An area of approximately 130ha is currently grazed with cattle under a short-term agreement, (the previous farm concession having expired). Pasture quality is of generally fair to poor condition (Wiseman, 2003), with no fertiliser having been applied for several years. Fences are in fair order with the majority requiring some maintenance. Ragwort (*Senecio jacobaea*), gorse, woolly nightshade, Bathurst bur (*Xanthium spinosum*) and apple of sodom are present and have the potential to be significant problems. Parts of the property become very wet and susceptible to pugging over the winter period and this can make conditions unpleasant for walking.

A range of options for management of pasture during the transition to forest has been considered.

Option 1

Graze with stock and control any pasture weeds as necessary by tractor or knapsack sprayer. Maintain tracks with a tractor/mower. Retire paddocks, ideally two years in advance of planting, to allow compacted soil to recover and grass to go rank. Progressively plant until the restoration programme is complete/nearly complete. Cease grazing and manage remaining grass areas by tractor/mower.

Option 2

Remove stock and allow grass paddocks to go fallow. Manage weed growth as required, by helicopter, tractor and knapsack sprayer. Mow tracks and areas required for access or views. Progressively plant until the programme is complete.

Option 3

Remove stock and mow grass paddocks to control weeds. Progressively plant until the programme is complete.

Option 4

Combine some grazing with some fallow land to suit particular circumstances and mow tracks and areas required for access or views. Progressively retire paddocks and plant until the programme is complete. Remove stock.

Each option has benefits and disadvantages (Appendix 5). It is proposed to adopt option 4 because it provides some certainty in relation to the control of weeds, retains options for pasture management and allows these to be applied in a flexible manner. Sheep may be considered as part of the grazing regime, together with cattle.

The focus of the grazing operation will be to assist the implementation of the restoration programme and farming practices need to reflect this. The management of grazing with its requirement for stock access and water supply, will need to dovetail closely with the retirement of paddocks, planting and visitor access.

- Adopt Option 4 for the management of pasture.
- Review the grazing regime periodically with DOC.

(6) Planting

(a) Planting concept

The planting concept is shown on Plan 11. The pattern of planted forest and open space under grass is designed in response to the four main themes of the restoration programme: cultural landscape management, restoring a fully-functioning natural ecosystem, providing an enhanced recreational experience for visitors and creating opportunities for community participation.

The northwest peninsula will be managed primarily to protect and interpret its historic values (ref. 4.1.4). The isthmus is the hub of recreational activity and needs some enhancement work (Plan 12).

The major planting effort is directed at the main part of the island where a large proportion of the land currently grazed by stock will be revegetated to shrubland, forest and wetland. Existing remnants will be incorporated into planted areas. Large blocks of forest will be created to minimise edge effects and weed penetration and to assist natural ecological processes. Habitat will be created for native birds, reptiles and invertebrates that are to be introduced.

Grass will be retained along the main access corridor from the gateway to the lookout. Open space here and reverted grassland/low shrubland in the foreground, will allow visitors to look across a restored landscape, with vistas to Waiheke Island and back to Auckland City (see Appendix 6 for suitable species). The farm building complex will be managed as open space with specimen trees.

The main ridgeline of the island will be retained in grasses, sedges and low shrubs to provide habitat for takahe and other open-country bird species. This will also allow for expansive views of the island and the surrounding Gulf, giving visitors a different recreational experience to the forest walks and sandy beaches enjoyed elsewhere. Planting in the east coast catchment below the water reservoirs will be extended on to the ridge to incorporate and screen the tanks within the vegetation. Additional open space will be maintained at the pa for archaeological site management and cultural planting, on ridges leading down to scenic Snapper Bay, and at Bald Knob to emphasise this landscape feature and capitalise on the views obtained from it.

- Implement the planting concept shown on Plan 11.
- Maintain key vistas/viewshafts identified on Plan 11 in a manner that ensures they are not compromised.

(b) Planting strategies

The programme of planting will be closely linked to the successful control of plant pests. It is quite possible, because of the viability of some seed, that the full implications of planting in areas which have high concentrations of residual seed may not be manifest for several years.

There are essentially three different types of vegetation that will eventually be revegetated with indigenous species. They are:

- grazed pasture covering most of the island;
- a mixture of indigenous and exotic grasses, shrubs and trees around the coastal perimeter; and
- gaps between and under the canopy of coastal forest remnants.

(i) Planting in pasture

Paddocks will be retired from grazing and allowed to go fallow, ideally 2 years in advance of planting. This will give time for compacted soil to recover and allow grass to go rank. Pasture weeds like kikuyu will need to be eradicated at an early stage. Weeds such as moth plant and evergreen buckthorn, which may establish in the absence of grazing, will need to be monitored closely and controlled.

Archaeological sites will be identified and managed in accordance with Section 4.1.3. Walking track routes will be defined and excluded from planting. For the initial planting, fast growing and widely spreading pioneer species capable of rapid canopy closure will be used to shade out the grass and exclude some of the weeds (Appendix 6). Plant species will be chosen to suit different ecological conditions. This will be followed by enrichment planting or seed scattering with early-mid successional species and canopy species as opportunities and the appropriate conditions are created by the first plantings.

- Prepare a planting leaflet to assist volunteers to plant successfully.
- Identify archaeological sites prior to planting, inform supervisors of the location and manage according to section 4.1.3.
- Plant pioneer shrubs at not more than 1.5m c/s and release as necessary.
- Select species to suit different ecological conditions.
- Replant in the following season where plants have failed.
- Monitor closely for weeds and control where found.
- Follow up with early-mid successional and canopy species.

(ii) Planting in the coastal perimeter

There is a concentration of plant pests in some parts of the coastal perimeter and this is likely to delay planting in these areas. Extra care will be required to supervise volunteers working in this inherently unsafe environment. As weeds are controlled, opportunities will be created for planting or seed scattering. Pohutukawa and hardy shrub species tolerant of coastal exposure are best suited to this location (ref. Appendix 6)

- Plant pioneer coastal shrubs and pohutukawa at spacings to suit local conditions, release and replace as necessary.
- Follow up with early-mid successional and canopy species tolerant of coastal exposure.

(iii) Under coastal remnants

Evergreen buckthorn and moth plant are a particular problem in the pohutukawa-dominant Orchard Bush and effective weed control will be a prerequisite to

successful rehabilitation. Natural regeneration is producing healthy seedling growth in some areas. Once weeds are controlled, gaps in the canopy may provide ideal conditions for the planting or seed scattering of early-mid successional and canopy species. Plant densities will depend on local conditions.

The east coast remnants have a more intact canopy and a good seed source which is producing prolific natural regeneration. Planting within the remnants will only be necessary where the canopy is fractured or to achieve species diversity.

- Mark out archaeological sites and exclude from planting in accordance with section 4.1.3.
- Plant early-mid successional and canopy species at spacings to suit local conditions, release, and replace as necessary.
- Follow up with additional species to provide diversity for animals.

(c) Species

Species to be used in revegetation include indigenous species already present on the island and species known to have been there in the past or likely to have been there, based on the composition of forests on similar adjacent islands (Appendix 6). Other species have been added as a result of palynological research (Heiss-Dunlop, 2004).

The soil on Motuihe is of variable depth and fertility. There is a good depth of loam in some areas but much of the flatter topography is poorly drained and subject to heavy stock pugging. Pioneer species tolerant of a wide range of soil types and growing conditions will be used to initiate succession, eg. kanuka, pohutukawa, *Coprosma*, *Pseudopanax* spp., koromiko (*Hebe stricta*), karo (*Pittosporum crassifolium*), manuka, tutu (*Coriaria arborea*), ngaio (*Myoporum laetum*), harakeke and ti kouka (*Cordyline australis*).

Experience has shown that growth and survival rates of the same species varies from island to island. Therefore it is advisable in the early stages to trial a broad range of species in a range of situations and to plant a larger proportion of the more successful species in subsequent stages. Species will be selected to suit different ecological conditions, eg. coastal karamu (*Coprosma macrocarpa* subsp. *minor*), harakeke, ti kouka, mahoe, whau (*Entelia arborescens*), etc. in damper more sheltered gullies; manuka, kanuka, pohutukawa, karo, karamu (*Coprosma robusta*), mamangi (*Coprosma arborea*) etc. on the drier and more exposed ridges.

The list of plants includes species which provide food for animals, which in turn contribute to pollination and seed dispersal processes. Pohutukawa, a light-demanding species, is included in this early planting cycle. However, because pohutukawa forest tends to be a low-productivity type compared with other mixed broadleaf forest types, with a lower diversity and abundance of invertebrates (Hicks et al, 1975), it will be planted only at particular sites. These include the

exposed southwest coast and elsewhere on the coastal margins as reinforcement for existing pohutukawa.

Shrubs planted along the coastal perimeter will be species tolerant of coastal exposure and will include manuka, ngaio, toetoe, harakeke, karo and taupata (*Coprosma repens*).

The southern end of the island is exposed to the prevailing south-westerly winds and the soil mantle on the steep slopes tends to be shallow over a rocky substrate. Species planted here will include a higher proportion of species tolerant of coastal exposure in the mix than will be necessary on the more sheltered and gently rolling northern paddocks.

Stands of kauri will be established on the seaward end of spurs which descend from the central ridgeline to the east coast. Kauri and tanekaha will be planted into established shrubland where there is some shelter but adequate light. On the broader ridges of the northern paddocks, puriri, rewarewa and taraire will be planted as the canopy species once pioneer species provide a suitable nurse crop. In the damper basins, it is anticipated that kahikatea, pukatea and totara will be the dominant species with an understorey of tawa, titoki and kohekohe.

In areas with an established canopy, as in gaps in Orchard Bush, mid-successional species such as nikau (*Rhopalostylis sapida*) and canopy species such as taraire can be planted directly. As the forest develops, additional species can be used to increase the diversity and extend food sources for particular bird species, eg. tree fuchsia (*Fuchsia excorticata*) for bellbird.

- Submit a list of species to be planted as part of the annual work programme.
- Plant species listed in Appendix 6 to suit different ecological situations and successional phases.
- Monitor the growth rates and survival of different species.

(d) Seed source

In order to preserve the genetic integrity of plants on the island, seeds or cuttings will be sourced from Motuihe as a first preference. Where seed supply is unavailable or inadequate for species known to have existed or likely to have existed on the island, seed will be obtained from the closest or best island source within the IGIED up to 12km distant (Plan 2). Whakanewha Regional Park on Waiheke offers the most diverse range of species.

Seed will be collected only from plants that have germinated naturally, ie. not from planted trees, and from several different plants to ensure genetic diversity.

- Obtain seeds and cuttings from Motuihe as a first preference or from the IGIED within 12km of the island.

(e) Planting sequence

Much of the effort to establish indigenous plants on Motuihe over the years has been thwarted by rabbits. Some initial planting was undertaken by the Trust in ramp paddock after the initial poisoning of rabbits in 2003 (Plan 7). An area of about 3ha was fenced off in 2004 and planting of this paddock will be completed before any new areas are started.

The sequence of planting is influenced by a number of factors:

(i) The effectiveness of the weed control programme

The capacity of the Trust to control weeds throughout the island will influence the rate at which pasture is planted.

(ii) Vulnerability to weed establishment

The majority of environmentally damaging weeds are concentrated in the remnants of forest and along the coastal perimeter. While seeds can be wind-borne or carried by birds to any part of the island, retiring paddocks in close proximity to those remnants where there is serious weed contamination should be delayed until weeds have been controlled in those areas.

(iii) Making an impact

Planting will focus on areas where most visitors can experience the results, ie. close to the gateway and the main recreational beaches and visible from offshore.

(iv) Walking track network

Planting will be used physically and visually to separate tracks, each of which is designed to provide for a different experience.

(v) Plant establishment

Establishing cover will be quicker in the more sheltered and damper gullies than on the more exposed ridges and will also enhance the quality of stream habitat.

(vi) Creating diverse habitats

Wetlands will be developed early in the sequence to provide habitat for a different range of species. Wetlands will also enhance visual amenity and broaden the range of conservation experiences offered.

(vii) Pasture management

Consideration is given to the potential to retire grazing early from the least productive pasture where soil erosion is worst. Maintaining access for stock and water supplies, providing stock shelter and shade, utilising existing fences for retired paddocks and distance from the farm centre are also factors to be considered.

The planting sequence illustrated on Plan 8 is indicative rather than prescriptive in recognition of the above factors, particularly weed control, which may influence progress. (For paddock numbers, refer to Plan 9). The planting phases are based on existing fencelines but relocation of fences could be considered, for example,

to exclude stream valleys from grazing and provide opportunities for planting, in advance of retiring a paddock.

Phase 1: Gateway to the restoration area (ramp paddock 4, 6, 7, 5 and 3 last)

- complete planting in ramp paddock
- trial plantings in existing remnants and coastal margins
- enhance main visitor access from isthmus
- plant context for island lookout
- plant environs of wetland 1
- plant to separate several tracks

Phase 2: Bald Knob paddock (17)

- protect largest unfenced remnant
- retire unproductive, erosion-prone pasture
- incorporate extension to Orchard Bush track

Phase 3: Northern paddocks (8, 10)

- extend Phase 1 planting
- enhance Maori track and pa environs
- plant the environs of Snapper Bay stream
- provide for access from Snapper Bay beach
- protect scattered remnants

Phase 4: Southeastern paddock (18)

- retire unproductive pasture and remove requirement for stock access
- incorporate stream valley, wetland and remnant
- improve coastal habitat at South East Beach
- enhance visual values

Phase 5: East Coast bush (15, 19)

- protect and consolidate remnants
- enhance ridgeline experience
- enhance east coast track

Phase 6: Orchard Bush (9, 16)

- protect and consolidate remnant
- enhance Orchard Bush track
- enhance ridgeline experience

Phase 7: Eastern peninsula (11, 12)

- extend northern paddock bush
- complete Snapper Bay catchment
- enhance track to Calypso Bay

Phase 8: Pug paddock (14)

- link northern and eastern forests

(7) Wetlands and stream enhancement

The two stream catchments which drain into Ocean Beach and Snapper Bay from the northern paddocks are currently grazed and pugged by stock. They support a low diversity of native bird life (Stubbs, 1996) but are suited to rehabilitation as wetland habitats. Both streams flow only intermittently but extensive planting may result in year-round water flow. Test pitting revealed an archaeological deposit in Ocean Beach catchment (R11/1882) and this will require an authority to modify.

Pollen analysis indicates that the Ocean Beach catchment may once have contained a freshwater lake supporting raupo (*Typha orientalis*), pukatea (*Laurelia novae-zelandiae*) and swamp maire (*Syzygium maire*) (Heiss-Dunlop, 2004). The contours are conducive to the reinstatement of substantial areas of open water and wetland. Some excavation will be needed to remove accumulated sediments and build low dams. Once water bodies are established, a buffer of vegetation will be planted around them to trap soil and nutrients and provide cover for birds. The depauperate state of wetland plant species on Motuihe means that some seeds will need to be sourced from offshore.

Snapper Bay catchment is the largest on the island. It is drained by two streams which merge a short distance before an area of tidal water at the back of the beach. The wetlands in the upper reaches of each stream will be enhanced by the removal of stock and planting on the periphery. The southeast arm in particular offers significant potential for stream habitat enhancement.

Wetlands provide valuable habitat for certain species. Once rehabilitated, both catchments are potential habitats for species such as Brown teal, fernbird and spotless crane. In addition to their natural biodiversity value, wetlands can enhance the amenity of a landscape and add interest for visitors.

- Commission a detailed design for the constructed wetlands in Ocean Beach catchment as funding permits.
- Apply to NZHPT for an authority to modify site R11/1882 before any work is undertaken on the site.

(8) Threatened plant species introductions

Many indigenous vascular plant species have become extinct or threatened in the Auckland Region as a result of human activities. Of the 792 threatened species nationally, 166 are thought to exist in the Auckland Conservancy (de Lange et al, 2004). Motuihe, with its reserve classification and prospective mammalian pest-free status, is potentially a valuable refuge for the translocation of threatened plants. However, until the restoration programme is more advanced, rabbits have finally been removed, environmentally damaging weeds are suitably controlled and habitats created, it is inappropriate to introduce threatened plant species.

- Consider introducing plants listed in Appendix 7 later in the life of this plan.

4.2.3 Fauna Management

(1) Existing fauna

The loss of forest habitat and its replacement with grazed pasture, exotic trees and shrubs, in conjunction with predation by animal pests, has severely depleted the island's fauna. Of the indigenous bush birds, only the more resilient species remain (Appendix 8).

The impact on coastal bird species has been less dramatic. There are Blue penguin burrows in Orchard Bush (D. Thompson, pers comm). At Southeast Beach a high proportion of species present are native and of these the New Zealand dotterel, variable oystercatcher, Caspian tern and reef heron are nationally important (Stubbs, 1996). This site is important for New Zealand dotterel because of the number of breeding pairs present.

No information is available on the status of invertebrates or reptiles, but it is likely that species diversity has been diminished given the reduced areas of forest habitat and the effects of predators. In the long term, the absence of mammalian predators means that Motuihe will become a valuable refuge.

(2) Future introductions

Species translocations will be essential to restore fully-functioning ecosystems on Motuihe. Birds play an important role in seed dispersal, pollination and soil enrichment. The role of reptiles is less well understood but also includes pollination and seed dispersal. Invertebrates are important in pollinating plants; they contribute to the breakdown of litter and are food for birds and reptiles. There are many possibilities for introductions, including a range of birds, reptiles and invertebrates that reflect the previous rich diversity of islands like Motuihe. However, success will require an integrated and strategic approach to overcome potential conflicts between species. There is the potential to use the release of high-profile species to attract publicity for the Trust's restoration activities.

A Transfer Permit is required from the Department for all species introductions and is issued following an application under the Translocation Standard Operating Procedure (DOC, 2004b). In planning for the relocation of species, the Trust will consult with iwi and facilitate tribal tikanga.

(a) Birds

The objectives and policies for management of bird species in the Conservancy are set out in the CMS under 'Bird Conservation Programmes'. Motuihe is listed only in relation to New Zealand dotterel (Table 4, DOC, 1995).

Work with threatened species is guided by the species priority ranking system and is carried out in accordance with Species Recovery Plans. Motuihe is not recognised in any recovery plans and therefore management objectives elsewhere may have priority.

There are many species that would in due course enhance the ecosystem. For instance, seabirds bring significant nutrients ashore in their guano and this can help to reactivate ecosystems where nutrients are depleted. However, some species, such as banded rail, may interfere with possible reptile introductions or prey on the nests of existing threatened species such as New Zealand dotterel.

While there is already suitable habitat to sustain some species and justify translocation, others will have to wait until habitat is available. It will be essential to provide adequate natural food supplies throughout the year. The restoration programme aims to create or enhance a range of habitats on the island - forest, grassland/shrubland, wetland and coastal – all providing for different species.

(i) Forest habitat

The following species could be introduced into the existing remnants and as the planted pioneer species mature.

◆ Existing remnants

North Island brown kiwi, grey-faced petrel, common diving petrel, fluttering shearwater, whitehead, red-crowned parakeet, saddleback.

- North Island brown kiwi: The kiwi is a national icon and provides a special opportunity to raise the profile of the Motuihe project. Kiwi are found in a variety of habitat including shrublands. Diet consists mostly of invertebrates.
- Grey-faced petrel: A common breeding petrel in northern New Zealand. Breeds on some inner gulf islands and even some mainland headlands. It probably formerly occurred on the island (Stubbs, 1996) and may re-colonise unassisted. Seabird transfers are still being researched (Taylor, 2000) and Motuihe could provide an opportunity to trial techniques.
- Common diving petrel: breed on many predator-free offshore islands in the Hauraki Gulf. Diet of small krill and copepods. Transfers have been attempted elsewhere.
- Fluttering shearwater: Very common in the Hauraki Gulf but need pest-free islands to breed successfully. Diet mostly of small fish and krill. Successfully transferred from Long Island to Maud Island, Marlborough Sounds (Taylor, 2000).
- Whitehead: Forages on invertebrates in foliage and on the fruit of shrubs such as mahoe, mapou, karamu and hangehange. Introduced successfully to Tiritiri Matangi in 1990-91 and now the most common bird there.
- Red-crowned parakeet: Practically extinct in native forests on the New Zealand mainland but common on many predator-free offshore islands and even on highly modified islands with little forest cover. Mainly herbivorous diet - includes seeds, fruits, buds and nectar.

- Saddleback: Has been established very successfully on many offshore islands with and without the help of artificial roosting sites and nesting boxes. Diet is mainly invertebrates but also includes fruits and nectar. Excellent advocacy species as very conspicuous and noisy.

◆ **Once extensive shrublands of pioneer species are established**

Bellbird, North Island tomtit

- Bellbird: Locally extinct in the Auckland mainland, with the exception of the Hunua Ranges, but was present on Motuihe until about 1970. Feeds on nectar, fruit and invertebrates with males being more nectivorous than females.
- North Island tomtit: Widespread in mature forest, second growth shrublands and older exotic plantations. Diet mainly invertebrates supplemented by fruits. May co-exist with robin on some small islands (Fitzgerald and Veitch, 1985). Recently (2004) introduced to Tiritiri Matangi (220ha) where robins were introduced in 1992-93.

◆ **When shrub cover has matured and mid-successional species are establishing**

This will be towards the end of the life of this plan.

Rifleman, North Island robin

- Rifleman: Requires mature forest (cavity nester) and older shrublands. Shrubland habitat could be enhanced by providing nesting boxes (Gray, 1969; Sherley, 1994). Diet is almost entirely invertebrates with some fruit. Present on Hauturu.
- North Island robin: Was once widespread but disappeared from northern North Island except Hauturu. Now successfully re-established on Tiritiri Matangi (Armstrong, 2000). Feeds mainly on invertebrates taken on or near the forest floor, supplemented with fruit. May compete with tomtits, especially on smaller islands with limited areas of forest habitat and this aspect is being studied on Tiritiri Matangi.

◆ **When mature forest has established**

This will be beyond the life of this plan.

Kaka, kokako, stitchbird (hihi)

- Kaka: Occur in mature and regenerating forests and are likely to visit Motuihe from Hauturu as the vegetation matures. The need to reintroduce kaka will depend on how successful natural colonisation is. Birds could be sourced from Hauturu or captive-bred stock. Excellent advocacy species, being large, noisy and conspicuous.

- Kokako: Nationally endangered species. Generally associated with mature, diverse forest habitat, where it feeds on vegetation and fruits supplemented with invertebrates. Successfully introduced to Tiritiri Matangi where it survives in shrublands and small forest remnants. Good advocacy species.
- Stitchbird/hihi: Of the three honeyeaters (tui, bellbird and stitchbird), this species is at the bottom of the dominance hierarchy. Motuihe may not be large enough to support all three species. Introduced to Tiritiri Matangi where they depend on a supply of supplementary nectar from feeders. Good advocacy species.

(ii) Grassland/shrubland habitat

Grassland habitat will naturally attract indigenous species such as New Zealand pipit and pukeko but the focus will be on Takahe.

- Takahe: Now breeding on several islands including Tiritiri Matangi. Motuihe offers another opportunity to increase the population of one of New Zealand's rarest birds. Diet on islands consists of roots of grasses including Cocksfoot (*Dactylis glomerata*), Yorkshire fog (*Holcus lanatus*) and perennial ryegrass (*Lolium perenne*), all of which are present on Motuihe. Year-round water supply required. Would have a high public profile.

(iii) Wetland habitat

The following species could be introduced when suitable wetland habitat is available: Brown teal, fernbird and spotless crane.

- Brown teal: Nationally endangered species with main population on Great Barrier. An omnivorous feeder that favours short vegetation associated with wetlands. Captive-bred birds on Tiritiri Matangi have bred successfully.
- Fernbird: A shy bird frequenting areas of low, dense vegetation, swamp margins and salt marshes. Diet mainly invertebrates.
- Spotless crane: Secretive and rarely seen inhabitant of freshwater wetlands with raupo or sedge, and forest on some offshore islands. Feeds mainly on a mixture of invertebrates and seeds of aquatic plants. Could re-colonise the island naturally.

(iv) Coastal habitat

The existing coastal habitat principally needs enhancement for the bird species already breeding there, for instance, by ensuring beach nesting areas are kept free of weeds, providing nesting boxes for blue penguin, appropriate planting, etc.

(b) Reptiles

Tuatara and sixteen species of lizards have been recorded from the greater Auckland region (Appendix 9). As a land-bridge island, Motuihe is likely to have supported a high number of species; tuatara and up to fourteen species of lizards may once have lived there. The list includes species that may not have been on the island in the past but are in the Auckland area and would benefit from establishment of an island population. This form of management is appropriate under the present reserve classification. Some of the species listed are at present covered by recovery plans. None identify Motuihe as an option for recovery and management objectives elsewhere may have priority over the proposed use of the island for these species.

The possibility that some of these species persist on the island needs to be established by survey before any recommendations for introductions can be made. Some species can survive in very low numbers in sub-optimal habitats and then take time to recover, while others can rebound quickly. At present, suitable habitat is limited for some species, eg. shoreline habitat.

The release of species other than those that are not threatened will depend on availability of animals for release and adequate security.

Species compatibility must also be considered when selecting species. Ornate skink and Whitaker's skink are not yet recorded as co-existing which could indicate species incompatibility. McGregor's skink is likely to affect other related species, such as Whitaker's skink, detrimentally and is not recommended for transfer. Forest gecko and Auckland green gecko may not be able to persist in the long term because of their particular habitat requirements (D. Towns, pers comm).

The presence of large numbers of ground-feeding birds, such as pukeko, could pose a threat to the establishment of some species of reptiles and this risk needs to be assessed before any nationally endangered species are transferred.

Some of the larger iconic species such as Duvaucel's gecko and tuatara will be useful in attracting a public profile for the programme.

- Carry out surveys to establish the species present and habitat available and plan releases on the basis of the data collected.

(c) Invertebrates

Natural recovery of species is preferred over translocations of the same species. A comprehensive survey of invertebrates is required to identify which species are present and to reveal gaps that could be filled by translocations.

To date there have been very few invertebrate transfers. One of the key constraints is the lack of reliable monitoring methods to determine if a transfer is successful or otherwise. This would require research for each species and could influence the timing of possible transfers. A second constraint is sourcing enough individuals. A minimum of fifty is recommended to maximise genetic diversity

and enhance chances of establishment. For some species captive breeding would be required (C. Green, pers comm).

Suitable habitat is required for each species to be transferred. Currently, habitat on the island is considered to be limited for some species. The presence of weeds is also an issue because it is essential that invertebrate release sites remain relatively undisturbed, particularly in terms of weed control activities.

Translocation will concentrate on species which cannot readily establish themselves, ie. flightless species. Species that could be considered for transfer within the life of this plan, subject to a very flexible timescale for the reasons identified, include:

(i) Non-threatened species characteristic of predator-free islands in the Hauraki Gulf

- Darkling beetles, giant cave weta, giant centipede, common ground beetle, karo weevil, large carabid, puriri moth

Of these species the giant centipede and puriri moth may already be present and the moth could introduce itself. Reintroduction of both species could be considered later in the sequence if shown not to be present, ie. 5-10 years.

(ii) Threatened species not currently recorded on the island

- Wetapunga (giant weta), giant flax weevil, flax snail

Of these species the wetapunga, found only on Hauturu, would be the first priority. The Threatened Weta Recovery Plan (Sherley, 1998), provides for the establishment of a captive breeding programme for introductions to other Hauraki Gulf islands.

- Carry out surveys to establish the species present and habitat available and plan releases on the basis of the data collected.

(d) Fish and crustaceans

The island has a moderate rainfall. A mean annual average of 1048mm has been recorded for years 1998-2003 (M. Harrison, pers comm). Rainfall is seasonal, with higher levels in winter and lower levels in summer and none of the streams flow continuously throughout the year. Dams in Ocean Beach catchment will create fresh water habitats for a range of species. Provision will be made for fish to negotiate dams via fish ladders. There is potential to enhance stream habitat for aquatic species such as koura (*Paranephrops planifrons*) and banded kokopu (*Galaxias fasciatus*), particularly on the southeastern arm of the Snapper Bay catchment.

- Evaluate the potential to enhance fish habitat.

(3) Animal pests

(a) Management to date

Introduced mammals present on Motuihe include rabbits and feral cats. Norway rats and mice were formerly present but were eradicated during the aerial poison bait drop in 1997 (Veitch, 2002). The current programme to remove rabbits began in 2002 with an aerial drop of 1080 and has been followed up with the aid of dogs, shooting, trapping and poisoning.

It is thought that cats have now been eradicated as part of the rabbit programme but this has yet to be confirmed. There are no mustelids on the island.

Removal of the last rabbit and confirmation that the island is indeed free of mammal pests, will be a major milestone on the road to Motuihe's recovery.

- Monitor for the presence of cats.
- Monitor for the presence of rabbits following completion of the eradication programme.

(b) Pest exclusion

Reinvasion by animal pests is a constant threat and it is essential that pest exclusion measures be maintained. The island is considered to be outside the swimming distance of all mammals except stoats which could gain access via Crusoe Island. Detection devices for both rodents and mustelids will be maintained on Crusoe as part of the pest surveillance programme.

The main opportunities for rodent and insect invasions are from moored boats, boats delivering goods or machinery, and goods brought to the island by visitors, eg. camping equipment. Education and positive publicity about the programmes will help to mitigate against these threats.

Minimising the risk of accidental pest introduction is covered by the Auckland Conservancy Island Biosecurity Plan (DOC, 2004d). This provides for bait stations to be located around the coastline and in bush remnants.

Key pest prevention standards from the Auckland Conservancy Island Biosecurity Plan have been summarised in the 'Biosecurity Standards for Motuihe Restoration Project (DOC, 2004e; Appendix 10). This establishes a code of practice which all volunteers transporting equipment to the island must follow. It covers actions such as maintaining poison bait stations and pest tracking tunnels on boats and barges and requiring inspections for Argentine ant nests.

- Brief all Trust members and volunteers on Biosecurity Standards.
- Deliver stores and equipment in accordance with Biosecurity Standards.

- Construct any new buildings to a rodent-proof standard so as to enable visibility and containment of any rodents detected when unpacking supplies.
- Emphasise the importance of pest exclusion through Trust representatives on the island, website, brochures, interpretation displays and particularly through boating club contacts.

(c) Domestic pets

Domestic pets are prohibited and signs to this effect are maintained at the wharf and popular beaches. However, despite this, dogs are often brought ashore from boats to exercise (DOC, 2003a).

- Review existing signage at the wharf and main beaches.
- Act promptly to remove pets and take further compliance action when appropriate.
- Emphasise reasons why domestic pets should not be brought to Motuihe through the Trust's website, brochures and interpretation displays and through boating/yacht/fishing club contacts, newsletters and magazines.

(d) Wasps

German, common and Asian paper wasps are a periodic problem throughout the Auckland area. They compete with native birds for food and can cause problems where people congregate.

- Monitor wasp populations and implement a control programme if required.

(e) Undesirable bird species

Certain introduced and self-introduced bird species may have negative effects on indigenous birds, reptiles and invertebrates, and some may introduce weeds. They include Eastern rosella, rainbow lorikeet, magpie, myna and spur-winged plover. Rosella may compete with kakariki for food and nesting sites. Magpies are very territorial and may affect the successful breeding of other species, particularly tui and kereru. On Tiritiri Matangi mynas compete with saddlebacks for nesting boxes. Plovers have been observed harassing New Zealand dotterel on Motukorea (P. MacDonald, pers comm).

- Monitor the impacts of these species and implement control measures if warranted.

4.2.4 Marine Environment Management

To achieve the best outcomes for Motuihe's ecosystems it is necessary to integrate management of both land and marine areas around the coast. The Hauraki Gulf Maritime Park Act (2000) seeks to provide for this integration and to protect the life-supporting capacity of the Gulf.

Southeast Beach and the small bays on the southern tip of the island are important breeding and roosting sites for several threatened bird species. This is acknowledged in the Proposed Auckland Regional Plan: Coastal (ARC, 2003) which identifies the adjacent marine area as a Coastal Protection Area (CPA.1).

Management initiatives to protect and nurture these bird species have two components. First, the protection of the site from human disturbance, particularly during the breeding season and secondly, the protection and enhancement of bird feeding areas around the coast.

The most popular anchorages for boats visiting the island are adjacent to the best beaches, ie. Wharf Bay and Takutairaroa Bay, and to a lesser extent Snapper and Calypso Bays. Southeast Beach is not favoured because of the offshore platform which extends the full length of the beach. This provides a natural defence against access from the sea and ensures that boats anchor some distance offshore. Currently, few people visit Southeast Beach and the south coast beaches but, as the programme develops and more people are attracted to explore the island, it will be necessary to discourage visitor access in order to protect ground nesting seabirds in this area. For this reason, walking tracks will be deliberately routed to allow visitors to look over but not descend to the beach.

There is evidence that there has been a significant reduction in the size and abundance of shellfish around Motuihe in recent times (Stubbs, 1996). The reasons for this are unclear. It could be part of a general pattern of decline seen in other areas throughout the Gulf. As there is no evidence to suggest that shellfish here have become depleted as a result of human pressure, the option of prohibiting or controlling the taking of shellfish could be difficult to justify.

It would be desirable to manage the marine areas in a way which complements the effort on land to enhance the island's biodiversity. Further research is required on how to achieve the objective of sustaining the coastal habitat.

- Investigate the potential for coastal management measures to ensure the maintenance of the marine habitat around the southeast and southern coastline.
- Seek to include foreshore areas within the reserve.

4.3 PROVISION OF VISITOR FACILITIES AND SERVICES

4.3.1 Existing Visitor Use and Facilities

Motuihe is regarded as one of the best boating destinations in the inner Hauraki Gulf. Its proximity to the city, the Tamaki River and various marinas, combined with its beautiful beaches, sheltered bays and safe anchorages, make it very popular with private boat owners for day trips. However, while there are no accurate statistics on visitor numbers, anecdotal evidence suggests that overall they have declined in recent years. This is probably related to the reduction in ferry services and the promotion of other islands as visitor destinations. There is currently a very limited ferry service to the

island, which affects access for people who are not boat owners. While the island has high recreational potential, this is not being realised at present.

The infrastructure of recreational facilities consists of a wharf and shelter, information signs, changing/toilet facilities, campground, bookable picnic sites with wood-fired barbecues, and a farmhouse which can be rented for overnight accommodation. (Plan 9)

There was a kiosk on the isthmus which provided food and drink, but it was destroyed by fire in 2002. The site has not been regrassed or otherwise planted and this, together with the presence of weeds and worn out facilities, gives the isthmus a somewhat neglected appearance.

While there are opportunities to stay on the island and on boats at anchor overnight, Motuihe is predominantly a day-visitor destination. The main recreational activities are associated with the coast and include swimming, sunbathing, relaxing and picnicking on the beach, fishing, and motorised water sports such as water skiing and jet skis. The two most popular beaches are on either side of the isthmus near the wharf. Calypso and Snapper Bays are also favourite landing points for those with boats. While some visitors walk around the northwest peninsula, very few venture beyond the isthmus to explore the main part of the island (DOC, 2003a).

Given the present focus of recreation, it is understandable that most people visit over the summer and at weekends.

4.3.2 Strategic Directions

In line with the CMS, the restoration programme aims to develop Motuihe as the gateway to the Hauraki Gulf Marine Park's special recreational and conservation experiences; a place where visitors not only enjoy and learn about the unique qualities of Motuihe, but also obtain information about the other many and varied islands in the Gulf.

Traditional access and recreational use of the island will not be diminished. The programme plans to upgrade the facilities provided at the isthmus and enhance the amenity and maintenance levels there. At the same time it will widen the range of recreational opportunities available by restoring the forest, grassland/shrubland, wetland and coastal habitats on the currently under-utilised, farmed portion of the island. Restoration of the ecosystem and particularly the introduction of rare and iconic species will create opportunities for recreation based around conservation. The protection and interpretation of cultural and historic sites will add another layer of interest to the visitor experience.

Visitors will be encouraged to explore the whole island on a network of tracks, each highlighting a different aspect of the restored landscape; to see rare animals in their natural environment; to learn about the island's Maori and European heritage; to stay overnight; and to participate in restoration activities. Unlike the present pattern of recreation, which is focused on the isthmus beaches and is highly seasonal, these new opportunities will tend to distribute activities across the whole island and throughout the year.

As the programme progresses, numbers will increase together with demand for expanded facilities. It will be necessary to provide adequate infrastructure and interpretation to ensure visitor experiences remain positive. With careful planning, there is potential to support high numbers of visitors. It is equally important to ensure that all development is sustainable and that appropriate weight is given to the protection of the island's visual values.

In time, Motuihe has the potential to become a major destination in the Auckland region for international travellers seeking an eco-tourism experience. Worldwide, eco-tourism is recognised as one of the fastest growing sectors of tourist activity. The Trust will promote the island as an eco-tourism destination, offering recreational experiences based on conservation activities, which will lead to a greater understanding and appreciation of the island's natural and historic resources. This will provide an alternative to Tiritiri Matangi which has already reached its visitor-carrying capacity as set by the Department.

4.3.3 Visitor Facilities

(1) Changing/toilet facilities

The existing changing rooms/toilet facility is adequate to meet the current needs of visitors using the main recreational beaches. Some maintenance repairs were undertaken in 2003 and natural lighting to the interior was improved. As numbers of visitors increase it may be necessary to reassess the capacity and design of the wastewater disposal system and to consider the need for additional public toilet facilities. To reinforce the conservation objectives of the Trust, the design of waste disposal systems will be selected on the basis of sound environmental practice and practicability.

- Assess the need for additional wastewater disposal capacity and toilets as the programme develops.

(2) Picnic sites

There are four picnic sites at the isthmus that can be pre-booked by groups on a charge per person basis. An average of 4500 per annum have done so in the years 1998-2002. Formerly each site had a barbecue but these are now in a decrepit state and will be removed in the interests of reducing the fire risk. Gas-fired barbecues and marquees for shade and shelter will continue to be available. The isthmus is very exposed to wind.

- Enhance the general appearance of the isthmus, and picnic opportunities in particular, by regrassing the former kiosk site and planting for shade and shelter. (Plan 12)
- Ban wood-fired barbecues and replace with gas-fired barbecues for hire.

(3) Camping

The campground is located on the former HMNZS Tamaki parade ground. This is a large, flat, open space above Wharf Bay and an average of 400 campers use the facility each year (DOC, 2003a).

This area offers little in the way of amenity to campers. It lacks the shelter and intimate spaces generally favoured by campers and although close to the beaches, does not enjoy a direct relationship with or good view of them. Historic considerations mean that subdivision of the large space by planting is inappropriate.

The Recreational Opportunities Review (DOC, 2004c) proposes that camping be retained and the experience improved. The Department acknowledges that the campsite may need to be relocated and facilities upgraded. It also accepts that there is a risk of introducing rodents to the island in camping equipment and will seek to minimise the risk through its biosecurity procedures.

- Target campers to warn them of the risks of introducing rodents to a pest-free island.

(4) Visitor accommodation

Visitor accommodation is currently limited to the farmhouse (10 beds) at the farm complex. Contractors and DOC staff also use it and there are likely to be heavy demands on the house in the future to accommodate workers and volunteers associated with the restoration programme. With this reduced availability there is an incentive to build alternative and separate overnight rental accommodation.

Two types of accommodation are proposed; self-contained cabins catering for families and designed to complement existing recreational facilities, and an eco-lodge with 20-30 beds providing for groups or companies. The cabins, (say five), would be located in the vicinity of the former parade ground where they would be reasonably accessible to the wharf access road and beaches. The historic context would require a sympathetic response in terms of siting and design, and development would be subject to a New Zealand Historic Places Trust authority to modify. A potential site for the eco-lodge is on the coastal edge at the farm complex where it would look across to Orchard Bush and the city and be closely associated with the restoration programme. Alternatively, consideration could be given to locating it in association with the cabins and campground.

The provision of these facilities is not a high priority. Construction of an eco-lodge would logically only follow substantial enhancement of the island's natural character. An overnight stay would be a special experience, providing an opportunity to hear the evening and morning bird chorus, the call of kiwi and morepork, and to witness the return of petrels to their burrows. In the meantime, priority at the farmhouse will be given to management needs over private bookings.

- Plan for the provision of self-contained cabins and an eco-lodge.

4.3.4 Interpretation

Interpretation has a critically important role to play in stimulating visitor appreciation and understanding of Motuihe's cultural, historical and natural heritage. The Trust is committed to providing a unique visitor experience through quality interpretation. A professionally prepared interpretation strategy is an essential step in realising this objective.

The degraded state of much of Motuihe's natural resources, eg. wetlands and streams, means that interpretation of many of these features will have to wait for rehabilitation to manifest positive change. The strongest subjects for interpretation in the short term and for which material is already available, are:

- The restoration programme
Covering the degraded habitats and the programme to restore their biodiversity through controlling weeds, planting and species introductions; the invaluable work of volunteers and how visitors can contribute; expanding visitor opportunities.
- The open sanctuary concept
Explaining the value of islands as refuges; the habitat to be restored for threatened birds and other species to follow; the continuing need for biosecurity; the benefits of an open sanctuary and the risks.
- Remnants of coastal forest
Identifying the canopy species and enrichment planting; the birds and other animals present; explaining ecological processes.
- Coastal marine area
Explaining the coastal environment where most visitors spend time; coastal processes, geology and marine life to be found there.
- European historic sites
Covering the early farming, quarantine, children's health camp, internment camp and HMNZS Tamaki periods; identifying the historic references to be seen at the northwest peninsula.
- Maori heritage
Iwi will have a key role in the design and preparation of this subject.

As the restoration programme progresses and capacity for delivering quality interpretation expands, other themes will emerge:

- Native forest/shrubland/grassland biodiversity
- Wetland and stream ecology
- Threatened species recovery

Interpretation has been identified as one of the ways that the Trust can raise revenue to support its activities. The Trust and the Department will collaborate on providing a level of on-site interpretation that enhances visitors' understanding of the island, but leave the Trust with enough scope to add value by providing more detailed guided (or self-guided) walking tours.

An introduction to the island's features will be delivered at the visitor centre. From there visitors will be able to purchase brochures or hire laminated fact sheets which they can refer to while exploring the island. Audiotapes keyed to marked locations along the route will also be available for hire. Alternatively visitors will be offered a guided tour. A high level of expertise and professionalism will be the hallmark of guides.

- Prepare an interpretation strategy
- Develop the brief for the design of a visitor centre in harmony with the interpretation strategy.
- Interpret the main themes outlined in the strategy.
- Produce brochures and fact sheets on each theme to inform self-guided tours.
- Produce information tapes for hire and develop a network of way stations.
- Encourage the involvement of specialists in the delivery of guided tours and monitor the standard of interpretation offered by them.

4.3.5 Visitor Centre

The Trust proposes to construct a centre where visitors can obtain information about recreational opportunities on the island and in the Hauraki Gulf, and learn about Motuihe's geological, historical and natural values through interpretation. Refreshments and other merchandise will be available for purchase. The centre will also cater for functions and events and provide office space for Trust staff and volunteers. It is anticipated that the visitor centre will incorporate the following facilities:

- shop/secure storage
- café with seating
- kitchen/food preparation/storage
- multi-purpose space
- museum exhibits and interpretative displays
- lecture room/audio visual
- office/administration space
- toilets

The centre may be built in stages as the restoration programme gathers momentum and as funds are generated to finance construction.

(1) Design objectives

The design will be guided by the need to:

- Reflect the conservation objectives of the Trust.
- Engender a memorable visitor experience and leave the visitor better informed about the restoration programme.

- Minimise negative visual impacts on the immediate site and as seen from the wider landscape.
- Complement the island's landscape character and the scale of existing buildings.
- Acknowledge existing recreational use patterns and potential adverse impacts on recreation values.
- Achieve low-maintenance design, with efficient energy use, water collection and solar generation and ecologically sourced materials where practicable.
- Provide good indoor/outdoor connections and create suitable conditions for outdoor spaces.

(2) Site options

A range of sites has been evaluated. They have been reduced to a cluster of three sites west of the wharf access road on the northwest peninsula, and one other located on the farm in the vicinity of the homestead (Plan 11). Placing the visitor centre at either of these locations has benefits and disadvantages and these are summarised in Appendix 11. There is also potential to separate out some of the proposed visitor centre functions.

A final decision on the location of the visitor centre will be made when the suggested sites have been fully evaluated. In the meantime, the Trust will assess the need and potential for a small temporary information structure at the isthmus to direct visitors and provide them with basic information about the programme. This would replace all existing information structures and signs in the locality.

- Assess the provision of a small information structure at the isthmus.
- Refine and develop the visitor centre brief.
- Continue to evaluate potential visitor centre sites.
- Commission a visitor centre design.

4.3.6 Walking Tracks

The restoration programme will provide a portfolio of visitor experiences based on interpretation of the island's heritage. A main track originating at the isthmus will link into a number of different routes, each with its own theme (Plan 10). The lookout provides walkers with an overview of the island to be explored. Tracks are designed to be walked in one direction only. This is intended to increase visitors' enjoyment by reducing the potential for interruption by others. Most routes traverse the open ridgeline either on the return or outward journey. This will allow visitors to enjoy views of Motuihe and the Gulf and to come into contact with grassland/shrubland bird species such as takahe. Walkers will be able to purchase or hire interpretation material about each walk.

The following planned experiences will be offered:

- Track 1: Native forest biodiversity
Based on a walk through Orchard Bush where visitors experience a mature coastal forest remnant enriched with additional planting, watch bush birds from short spur tracks and see a range of native reptiles and insects. Short loop returns via the remnants of the old orchard (3.1km from the isthmus). Long loop incorporates Limestone Point, Bald Knob and archaeological site R11/876 (4.7km).
- Track 2: Native wetland
Provides a walk through planted forest to a constructed wetland. Boardwalks traverse wet areas and visitors observe wetland bird species from hides. (1.9km)
- Track 3: Maori heritage
Includes a walk through planted forest to the pa and its nearby gardens and plantings for food, medicinal and weaving purposes. Return via another garden site. (2.8km)
- Track 4: European historic heritage
Based on a walk around the northwest peninsula with its concentration of archaeological sites from the early farming, quarantine and HMNZS Tamaki eras. (1.4km)
- Track 5: Coastal forest and coastal biodiversity
Provides a journey through a planted forest and the east coast forest remnants. An opportunity to see forest bird species and look down over the habitat of coastal bird species at Southeast Beach from vantage points on the scarp edge. (4.3km)
- Track 6: Stream biodiversity
Combines a walk across open grassland, through remnants and planted forest and along restored stream valleys. Incorporates the old pumphouse. (3.3km)
- Track 7: “Treasured Island” experience for children
Involves a short walk to different habitats, ie. marine rocky shore, sandy beach, native forest remnants and grasslands, and interactive learning experiences in and around the visitor centre.
- Track 8: Night walks
Incorporates encounters with kiwi, little blue penguins, petrels, moreporks, lizards and weta under the night sky.

In addition to these particular experiences, the track network will provide access to Ocean Beach, Snapper and Calypso Bays. There will be no track access to Southeast Beach or the small coves at the southern end of the island because they are sensitive habitats for threatened bird species.

Once completed, the network will extend approximately 12km. There is nothing to prevent visitors choosing their own routes independently of the planned experiences. The network offers a choice of track length and grade to suit visitors’ circumstances and capability. Ultimately it is intended that some tracks will be accessible to wheelchairs

and pushchairs and this would require a maximum grade of 1:12. Track 1 (short loop), track 2 and track 4 are the most likely routes to satisfy the grades and surface finish required for wheeled mobility.

The tracks will be implemented on a phased programme, integrated with other restoration developments.

- Prepare a comprehensive sign system.
- Route tracks to avoid modifying archaeological sites and historic features.
- Implement the tracks identified on Plan 10 subject to detailed design.
- Construct tracks in accordance with the Department's Track Service Standards for Day Visitors.

4.3.7 Commercial Activities

The Department manages commercial activities on the island. Applications to operate a commercial activity will be considered for a wide range of recreational activities. These must be compatible with the Trust's vision and the policy and implementation statements contained in this plan.

As the restoration programme develops, there will be opportunities to expand the range of commercial activities available. The Trust will need to apply to the Department when it wishes to undertake activities from which it obtains gain or reward and also when it wishes to construct buildings. The Trust will work closely with the Department when providing services of a commercial nature to the public.

The homestead in House Paddock is available as accommodation for concessionaires.

4.4 COMMUNITY PARTICIPATION

4.4.1 Building Support for Conservation

One of the objectives of the programme is to build support for conservation by encouraging visitors to participate in a range of restoration activities. Restoration programmes elsewhere have shown that through hands-on involvement, participants gain an increased understanding and knowledge of, and commitment to, caring for the wider environment.

As a recreation reserve, Motuihe has a special role to play in promoting conservation. The programme seeks to engage not only those already committed to conservation objectives but also the wider public, eg. visitors attracted to Motuihe by its beaches and who may not generally be exposed to conservation messages. Skills learnt here could be applied elsewhere and may help change attitudes to the wider environment.

Motuihe's proximity to Auckland means that it is practicable to involve schools. They will be encouraged to include the island and its restoration programme on their curricula.

To realise the island's potential for conservation education, the Trust will undertake the following:

- Build a visitor centre.
- Prepare attractive and informative resource material.
- Provide information to the ferry companies about the island and its management.
- Work with iwi to interpret Maori heritage.
- Develop working relationships with schools, tertiary institutions and community groups.

Any additional material, such as brochures prepared by the Trust for use on the island, will be discussed with and approved by the Department prior to production.

4.4.2 Community Support for the Programme

The vision for restoring Motuihe can only be realised if sufficient numbers of Aucklanders take part in and support the programme. Since its formation in 2000, the Trust has made substantial progress in gaining support from the community through the following actions:

- Website: Provides a description of the project, information about the island, keeps volunteers informed about events and progress and encourages everyone to become a Friend of Motuihe.
- 'Friends of Motuihe': An opportunity to support the project through membership subscriptions or donations.
- Brochure: 'Help create an authentic natural paradise' explains how people can support the programme and become a 'friend'.
- Working Days: Held every month to get volunteers actively involved in a range of tasks depending on the season, ie. seed collection, weed control, planting and nursery work. The emphasis is on volunteers working hard but having fun and with opportunities to socialise and enjoy a barbecue. The price of a ferry ticket is reduced for volunteers.
- Schools: Links have been made with Auckland schools to develop active education programmes.
- Promotional talks: By Trustees to various groups to spread awareness and engender support.

- Guided tours: Of the island to engage support from prospective sponsors.
- Publicity: Showcasing the project through the media.
- New Zealand School of Outdoor Studies: Uses Motuihe as a training site for its students and they have been providing labour for weed control, nursery work and clean up.

The Trust will continue to build on these foundations to obtain the support it needs to implement the restoration programme. In particular it will use its links with the Outboard Boating Club to realise the strong attachment to Motuihe by the boating community.

Effective weed control is vital to the success of the project and a substantial and sustained effort will be required by volunteers for this time-consuming and labour intensive work. It will be a serious challenge for the Trust to gain and maintain volunteer support for this less attractive but essential component of the restoration programme.

As the programme gains momentum, the range of tasks needing volunteer support will diversify. Staff will be required to assist in the visitor centre, act as guides and lead aspects of the development programme. Training volunteers to perform effectively and help others to do so will become an essential management role.

- The Trust will continue to engage community support and will assist volunteers to reach their full potential.

4.4.3 Community Partnerships

Building and maintaining co-operative and mutually supportive relationships with key partners is central to the realisation of the Trust's vision.

Iwi

Ngati Paoa and Ngai Tai have strong associations with Motuihe. Hauraki Maori also have links to the island. Iwi representatives have expressed an interest in developing an interpretative experience based around the pa, and there is a need to build a partnership and capacity in order for this to be achieved.

The Trust has investigated a potential track route to the pa and is seeking iwi involvement in planning for and providing an interpretative experience for visitors. The Trust has offered to assist with weed control and possible repair of the pa's defensive earthworks (subject to an NZHPT authority to modify).

New Zealand Historic Places Trust

The NZHPT administers the legislation, which mitigates and manages any modification of archaeological sites deposited prior to 1900, and as such their consent is required for any development that has the potential to destroy, damage, or modify an archaeological site. It can also provide additional best practice advice regarding the management of historic features and structures on the island.

Historical groups

If the Trust is to present a quality historical experience for visitors, it will need the assistance of archaeologists and historians holding relevant knowledge and information sources. There is considerable expertise and interest available in the community and in bodies such as the Navy, Auckland Regional Council and the Department of Conservation.

Auckland Regional Botanic Gardens

The Botanic Gardens have been involved in breeding threatened plants for re-establishment in the Auckland region. It is keen to assist the restoration programme.

Auckland Zoo

The Auckland Zoo has several established breeding programmes for threatened native species such as kiwi, kaka and tuatara. It may be interested in establishing others to assist with Motuihe's restoration. It also has the best facilities for testing the health of animals prior to translocation.

Tertiary Institutions

The restoration programme has the potential to generate opportunities for study and research. In some instances this may be of direct application to management. In addition, DOC's procedures for the translocation of flora and fauna require information on both the source population and the establishment of a new population. These are ideal topics for student research.

- Encourage and assist the involvement of iwi in the restoration programme and in particular, management and interpretation of Maori archaeological sites.
- Seek out interested parties to help assemble an historic database for use in interpretation.
- Cultivate relationships with NZHPT, Auckland Regional Botanic Gardens and Auckland Zoo.
- Encourage the involvement of tertiary institutions and other parties in conducting research where this supports management objectives.

4.4.4 Working With Volunteers

(1) Principles

The Trust recognises that the community and volunteers will play a significant role in achieving both advocacy and operational objectives described in the plan.

The Trust is committed to providing the appropriate structures to support volunteers and to ensure that they are provided with the opportunity to develop their interests and to contribute knowledge, experience and skills in a safe manner.

(2) Definition of a volunteer

A volunteer is a person who undertakes unpaid work of their own free will in support of conservation efforts under the management of the Trust. Volunteers will range from casual to longer-term volunteers, who will have an ongoing involvement in the project.

(3) Health and Safety Responsibilities

The Trust's responsibilities

The Trust will ensure that activities are undertaken in a safe manner and will provide volunteers with information on:

- hazards that the volunteer may face and how to manage them;
- the working environment and any personal protective clothing and equipment (PPE) required;
- guidelines for the safe use of equipment;
- potential emergency situations and what to do should an emergency occur.

Volunteers' responsibilities

The Trust will endeavour to ensure that volunteers understand their responsibilities to work in a safe way. This means:

- following instructions and using PPE;
- not undertaking work that is unsafe;
- removing hazards or notifying the co-ordinator of volunteers for the project or event of such hazards;
- informing the co-ordinator of volunteers of any physical or health issue that might be affected by the work, or that might affect the volunteer's ability to do the work.

The Department's responsibilities

As a partner in the restoration programme, the Department recognises that it has a duty of care to the Trust in regard to managing volunteers safely. The Department will provide advice on health and safety issues including:

- hazards that may be encountered and how they should be managed;
- PPE that should be worn by volunteers;
- assistance with training in the use of equipment when that equipment is provided by the Department;
- emergency procedures that should be in place.

5. RESTORATION PROGRAMME SUPPORT

5.1 MANAGEMENT OF THE RESTORATION PROGRAMME

The Trust will be responsible for managing the restoration programme in partnership with the Department. The nature of this relationship is defined in a Memorandum of Understanding (Appendix 13). Under the agreement the Department retains statutory responsibility for the administration and management of the island. This is exercised through the Area Manager, Auckland Area Office. The Trust implements the restoration programme in line with an agreed annual work programme which sets out work to be done, who is to undertake the tasks and how it is to be funded. This work is covered by a health and safety plan.

The work of the Trust is assisted by an advisory panel of individuals with particular knowledge, skills and expertise who can be called upon as the need arises.

- The Trust and the Department will continue to work co-operatively for the successful implementation of the restoration plan.
- Enter into a Memorandum of Understanding with the Department of Conservation.

5.2 FUNDING

The Trust will raise funds for and promote sponsorship of the programme and implement the work in accordance with this plan. The Department will provide management, technical and infrastructural assistance and will continue to fund its priority work outcomes, which may include projects on the island.

The restoration of this degraded island and the provision of quality experiences based on a high standard of infrastructure will have significant costs. The Trust is confident however, that there will be strong support for the project given the location of Motuihe and its proximity to the large population and business community of the Auckland region.

The main funding sources are considered to be:

- Supporters: Some income will be generated by supporters of the Motuihe project.
- Funding agencies: Several agencies have been identified as possible providers, eg. the NZ Lottery Grants Board and ASB Trust. Funding is most likely to be obtained for specific components of the programme, eg. installation of a track.
- Corporate sponsorship: Some direct funding is expected but most assistance is likely to be in the form of donations of, or discounts on, goods and services, eg. nursery supplies. High visitor numbers will ensure good exposure for sponsors.

- Other sources of revenue: This may include sponsorships for individual trees planted and in the longer term, revenue from the sale of branded clothing and other goods and services in the visitor centre. As the programme develops, there will be increasing opportunities to generate income from guiding, overnight accommodation, functions and eco-tourism packages.

Early sponsorship has come from the NZ Lotteries Grants Board, Worldwide Fund for Nature, Outboard Boating Club, Mobil Oil (NZ) Ltd, Sky City Entertainment Group Ltd and Dow Chemical (NZ) Ltd.

- Develop a Motuihe business plan.

5.3 OPERATIONS CENTRE

The Trust uses the existing farm building complex as a base for its operations. The complex is located well away from the main concentration of visitors, yet conveniently sited to service the main part of the island.

The woolshed provides a covered venue for volunteer activities. It is large enough for gatherings and the special events that are so important in building commitment and support. It also provides space for essential nursery activities such as pricking out and potting on seedlings. There is a toilet and several ancillary storage buildings and garages, which can be used to store vehicles, equipment, chemicals, etc. The farmhouse is located nearby, potentially providing accommodation for the Trust's island-based project co-ordinator and volunteers. Any expansion of volunteer accommodation should be within the operations centre.

Nursery

The nursery is located adjacent to the woolshed. Officially opened in September 2003, it was funded by the Tindall Foundation, the Worldwide Fund for Nature and the Outboard Boating Club, and built by volunteers. Facilities comprise a propagation room, shade house and standing out area, all with sprinkler irrigation. The nursery has the capacity to produce about 30,000 plants per year. The majority of plants produced will be in root trainers. A small number of species will be potted on in bags, eg. flax (larger size is more resistant to uprooting by pukeko), and pohutukawa (2-year old plants do better).

Some plants have been grown off the island using seed collected from the island. There are risks associated with this practice, eg. seeds or plants of different origin can get mixed up and weeds, insect and reptile pests can be imported in the growing medium. Now that the Motuihe nursery has the capacity to produce all the island's plant needs, further off-island plant production is unnecessary and will cease. Only in special circumstances, ie. threatened plants raised at the Auckland Regional Botanic Gardens, will exceptions to this general rule be approved.

- Produce sufficient numbers of plants in the Motuihe nursery to meet the needs of the planting programme.

5.4 UTILITIES

Electric power

The mains power cable link to Waiheke was abandoned in 1989 because of persistent damage by boats snagging the cable with their anchors. A hybrid power system was installed at the homestead comprising photovoltaic panels and diesel generators, with bottled gas to fuel heating and cooking appliances. A separate solar panel supplies light to the farmhouse. A portable generator is used elsewhere as required, ie. to pump waste from the toilets up to the soakage field on the edge of the former parade ground. Any new buildings, such as a lodge, will be designed so as to minimise energy use.

Water supply

Drinking water is pumped from a bore in the Ocean Beach catchment to water reservoirs on the high point of the island. These have the capacity to hold in excess of 1 million litres. From here the water is gravity fed to the farm complex, the homestead and the changing/toilet facilities at the isthmus.

Stock water is drawn from the same source and distributed to stock troughs via a separate water tank. This supply is supplemented by rainwater drawn from the stock dam when conditions permit.

Adequate supplies of water could limit the visitor-carrying capacity of the island. There have been past occasions when a combination of sustained dry weather and high visitor numbers has resulted in the need to monitor water use closely (R Harrison, pers comm). However, it is anticipated that an increase in visitors will be offset by a decrease in stock numbers and finally, the removal of stock. Additional data is required on the potential water demand of the proposed visitor infrastructure.

Waste disposal

Waste minimisation, re-use and separation will be practised by the Trust together with the return of any waste to the mainland for disposal. Visitors will be encouraged to support the 'pack in - pack out' policy.

- Manage power generation and use to achieve maximum efficiency.
- Carry out an audit of the water supply as part of the planning for additional structures.

5.5 FIRE PREVENTION

Motuihe is covered by the Conservancy Fire Action plan. Fire is a potential threat to the island's vegetation and its infrastructure. While the forest is regenerating, it contains a high component of rank grass, bracken (*Pteridium esculentum*) and shrubs like manuka, which are vulnerable to fire. This risk is compounded in summer when vegetation is dry and visitor numbers are high. It is important that the consequences of fire and prevention methods are emphasised in promotional literature.

The open mown track and series of open spaces along the main ridgelines, extending from the isthmus towards the southern end, will serve to separate the west coast forest

from the east coast plantings. Mown tracks will also provide egress for people and access for fire control. The proposed wetlands in the northern paddocks will help to divide this planted area into smaller units.

The Department will reserve the right to close the main part of the island to visitors during extreme fire hazard conditions. Fire risks can be minimised by the following actions:

- Include fire danger warning messages in promotional literature and at the main entrance point from the wharf.
- Prohibit fires on the island and erect 'No Fire' signs at Wharf Bay, Ocean Beach, Snapper and Calypso Bays.
- Allow only gas-fired barbecues or cookers at designated sites.
- Request visitors to take every care and to refrain from smoking except on the beach and in the campground.
- Fit spark arrestors to house chimney flues, tractors and diesel generators.
- Maintain the mown areas throughout the year.
- Close the main part of the island to visitors if extreme fire hazard conditions warrant this measure.

5.6 PLAN MONITORING AND REVIEW

A system for monitoring progress of the restoration programme will be established at the start of the project.

- The Trust will prepare annual work programmes for approval by the Department.
- The Trust will record restoration activities as they occur and will present an annual report to the Department documenting progress against the annual work programmes and the plan.
- Records of the following will be kept for reporting purposes:
 - Database of weeds, control methods and progress
 - Numbers and dates of trees planted
 - Plant survival rates
 - Nursery records of plants produced
 - Details of volunteers – numbers, hours, dates, etc.
- An island-wide grid search of weeds will be carried out annually to measure weed control performance and to record any new weed species appearing.

- The Department will regularly monitor the programme to ensure the plan is being implemented effectively and that the provisions are still current and in the best interests of conservation management.
- A full review of this document will be undertaken in year 5.

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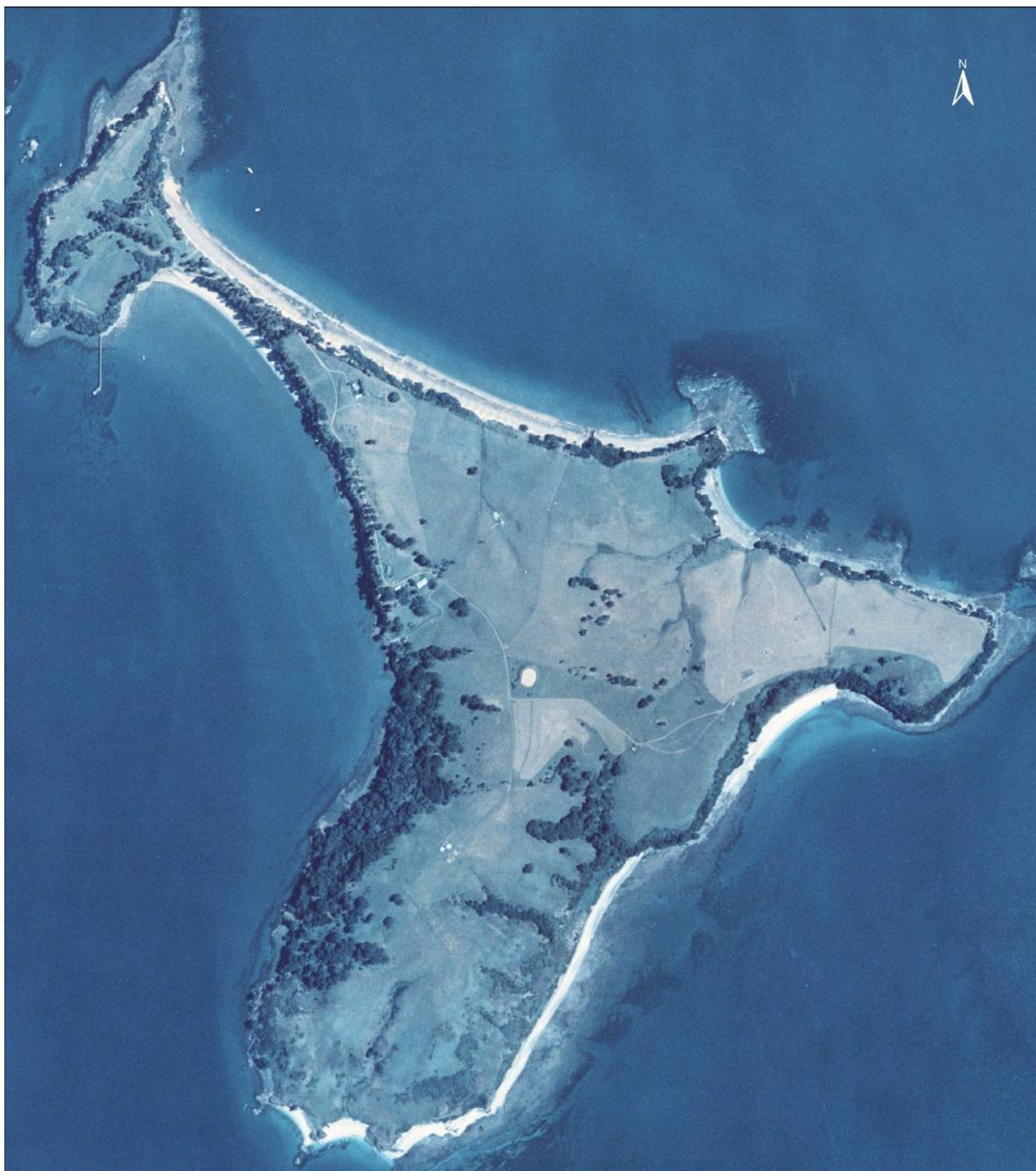
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PLANS

Aerial photograph

1. Location Plan
2. Inner Gulf Islands Ecological District (IGIED)
3. Geology
4. Landscape Features
5. Landscape Units
6. Recorded Archaeological and Historic Sites
7. Existing Vegetation
8. Indicative Planting Sequence
9. Existing Visitor Facilities and Farm Infrastructure
10. Existing and Proposed Walking Tracks
11. Restoration Concept
12. Isthmus - Landscape Management Proposals



Aerial photograph

Scale: 0.5 0 0.5 1 Kilometers



Department of Conservation
Te Papa Atawhai



Source: Department of Conservation 1999

Plan 1: Location Plan

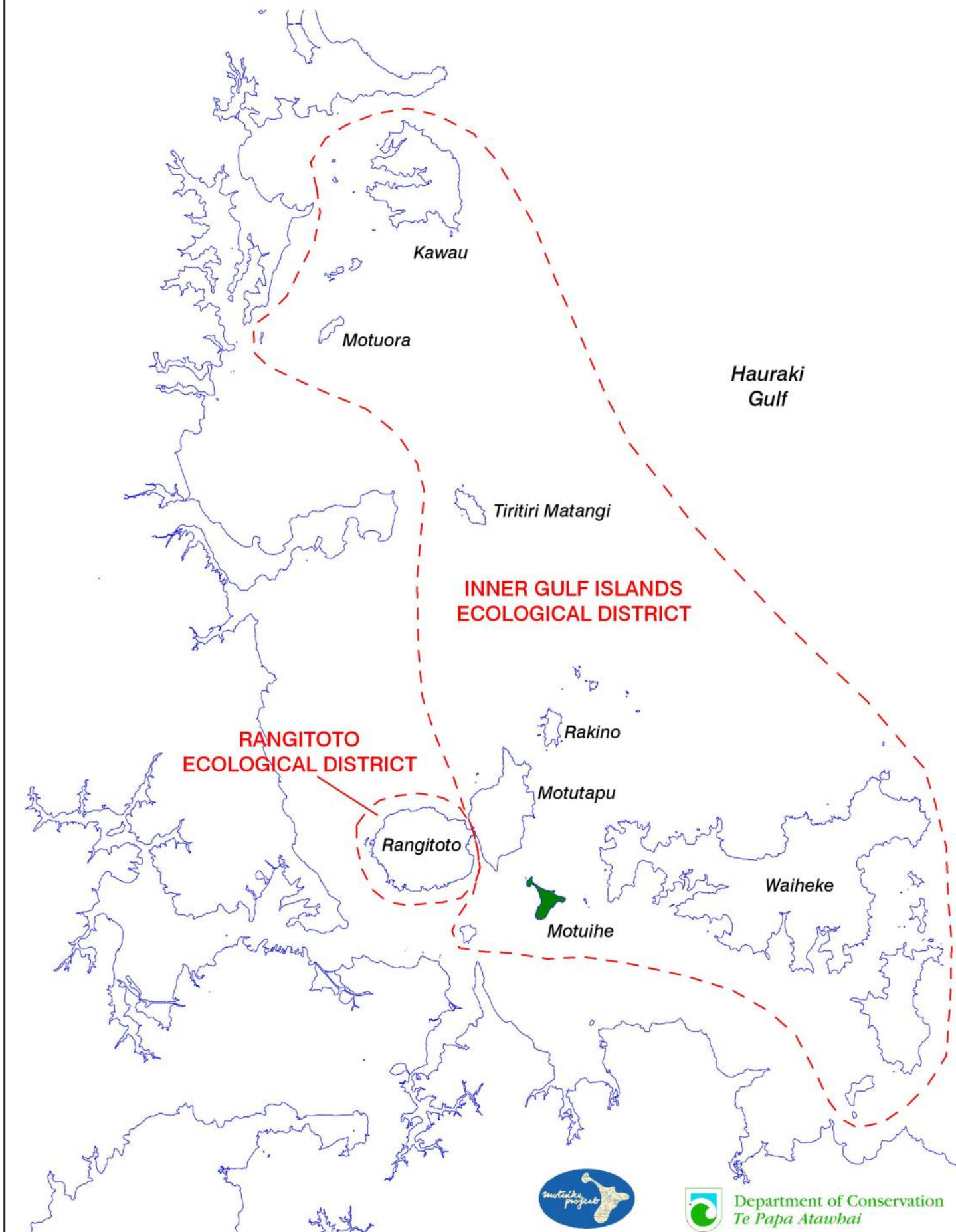
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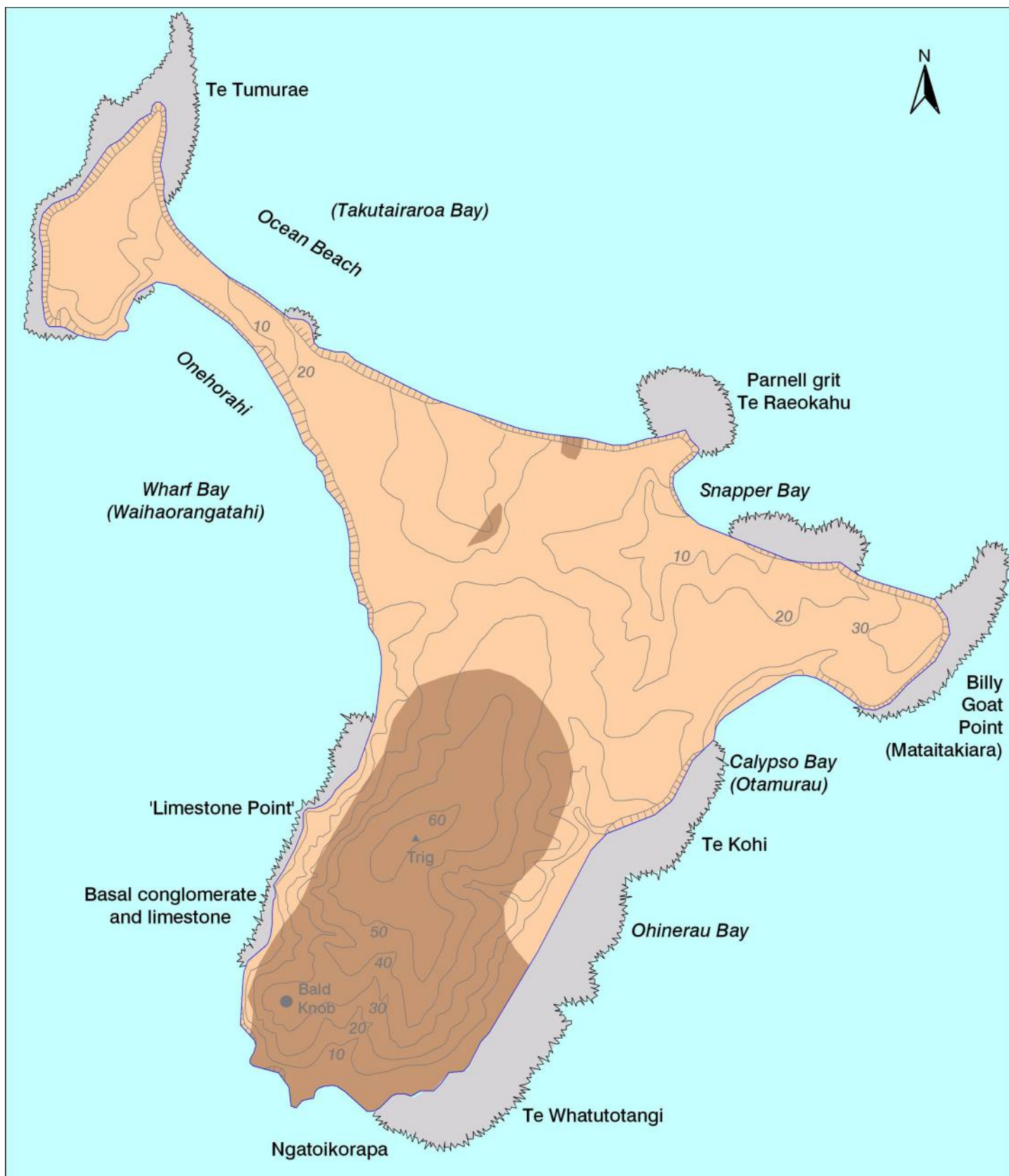


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Plan 2: Inner Gulf Islands Ecological District (IGIED)

Scale: 0 10 20 Kilometers





Plan 3: Geology

-  Greywacke
-  Waitemata sediments
-  Shore platform

Scale: 0.5 0 0.5 1 Kilometers



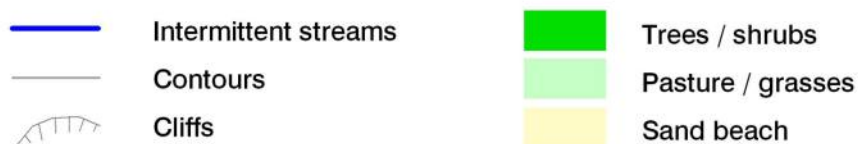
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Source: Ballance, PF and Smith, IEM, 1982
Contours are in 10m intervals



Plan 4: Landscape Features



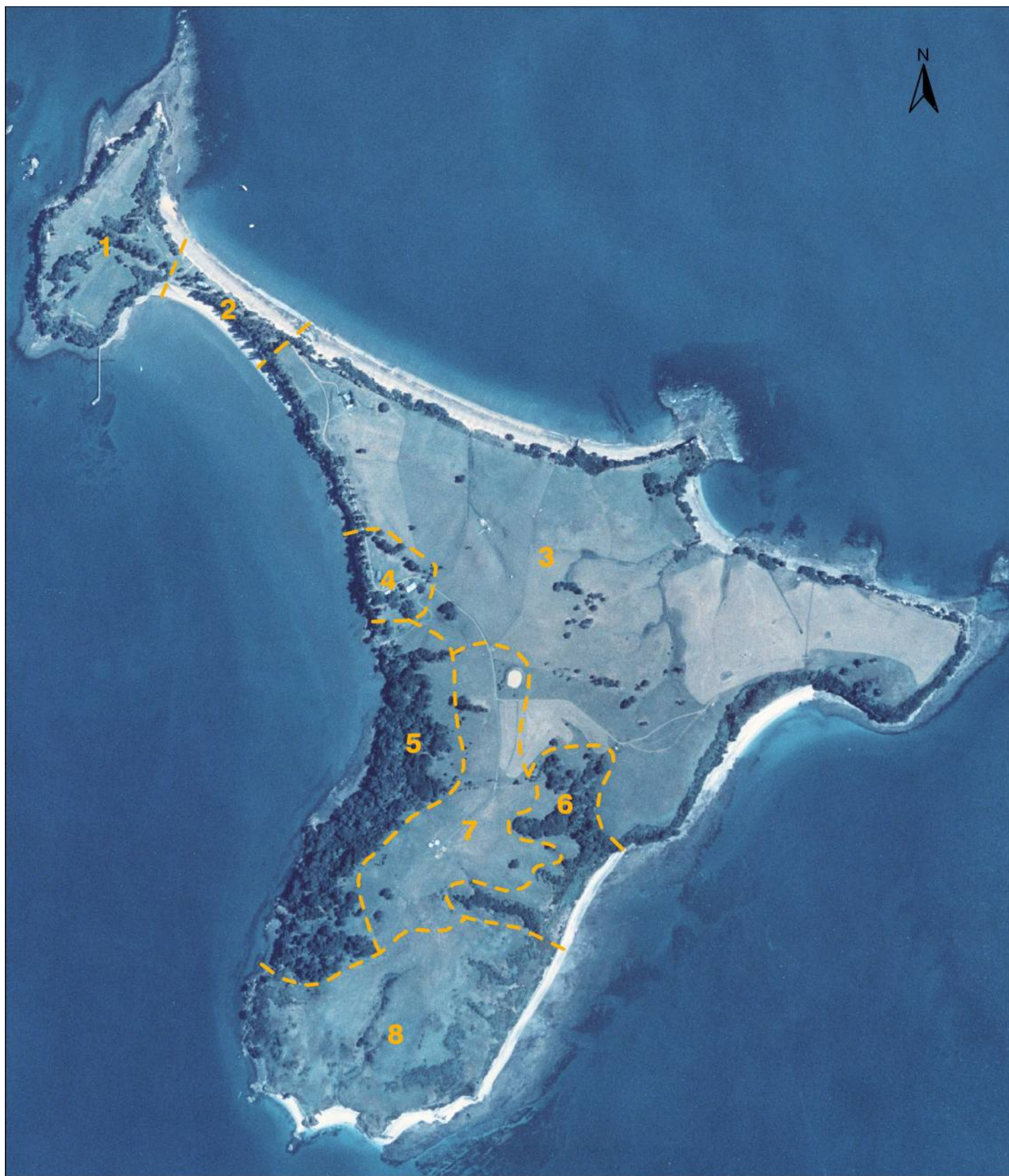
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Contours are in 10m intervals



Plan 5: Landscape Units



Landscape Units

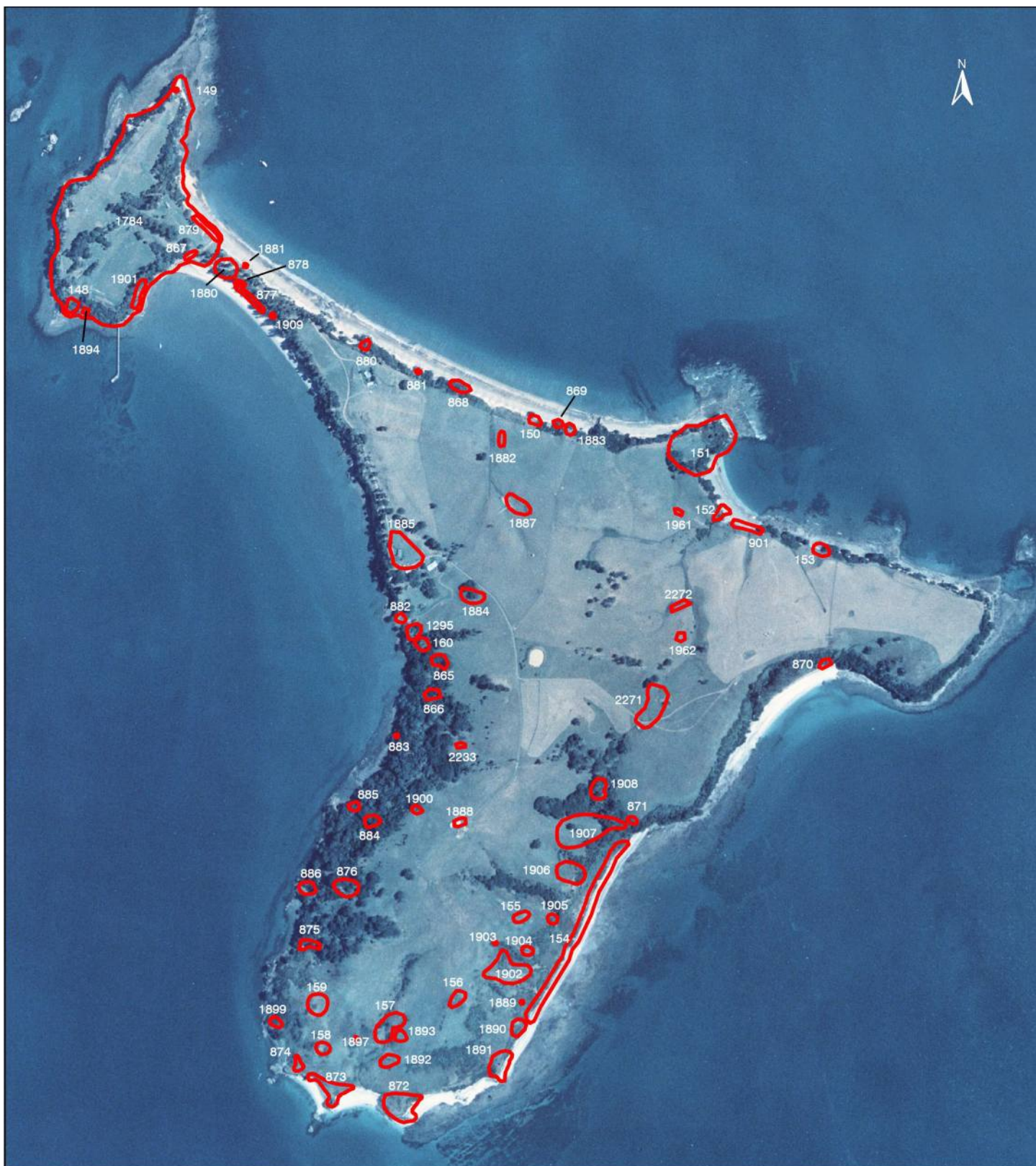
- | | |
|-----------------------|-------------------|
| 1 Northwest peninsula | 5 Orchard bush |
| 2 Isthmus | 6 East coast bush |
| 3 Northern paddocks | 7 Central ridge |
| 4 Farm buildings | 8 Southern end |

Scale: 0.5 0 0.5 1 Kilometers



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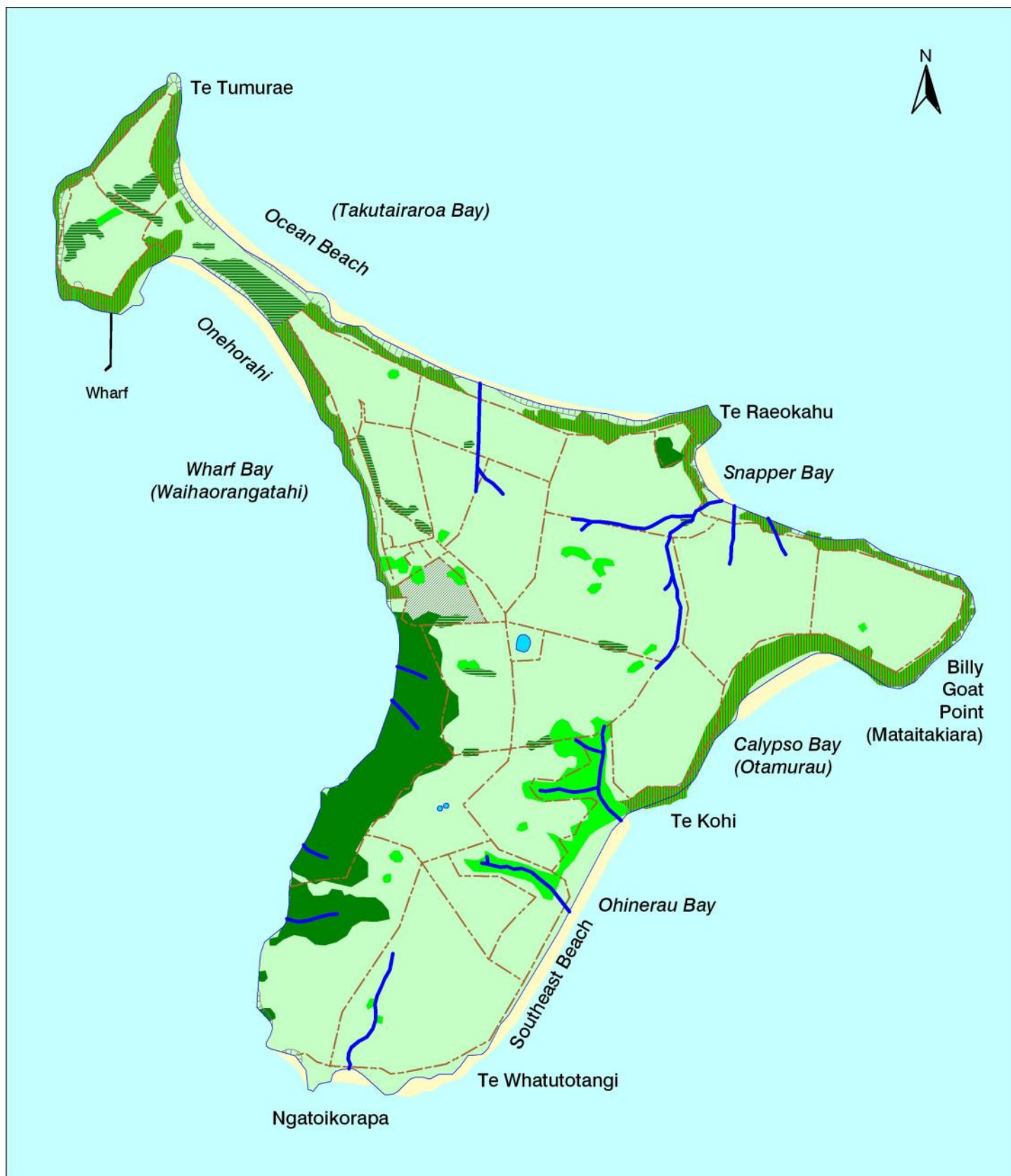




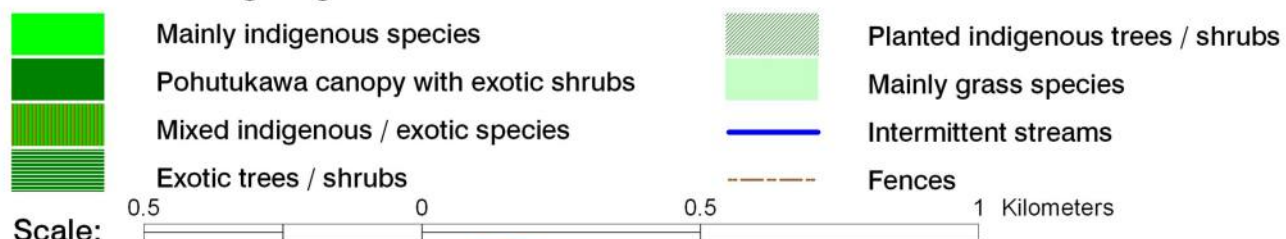
Plan 6: Recorded Archaeological and Historic Sites

 Recorded archaeological and historic sites.
(Numbers refer to NZAA Site Records NZMS 260 R11)

Scale: 0 0.5 1 Kilometers

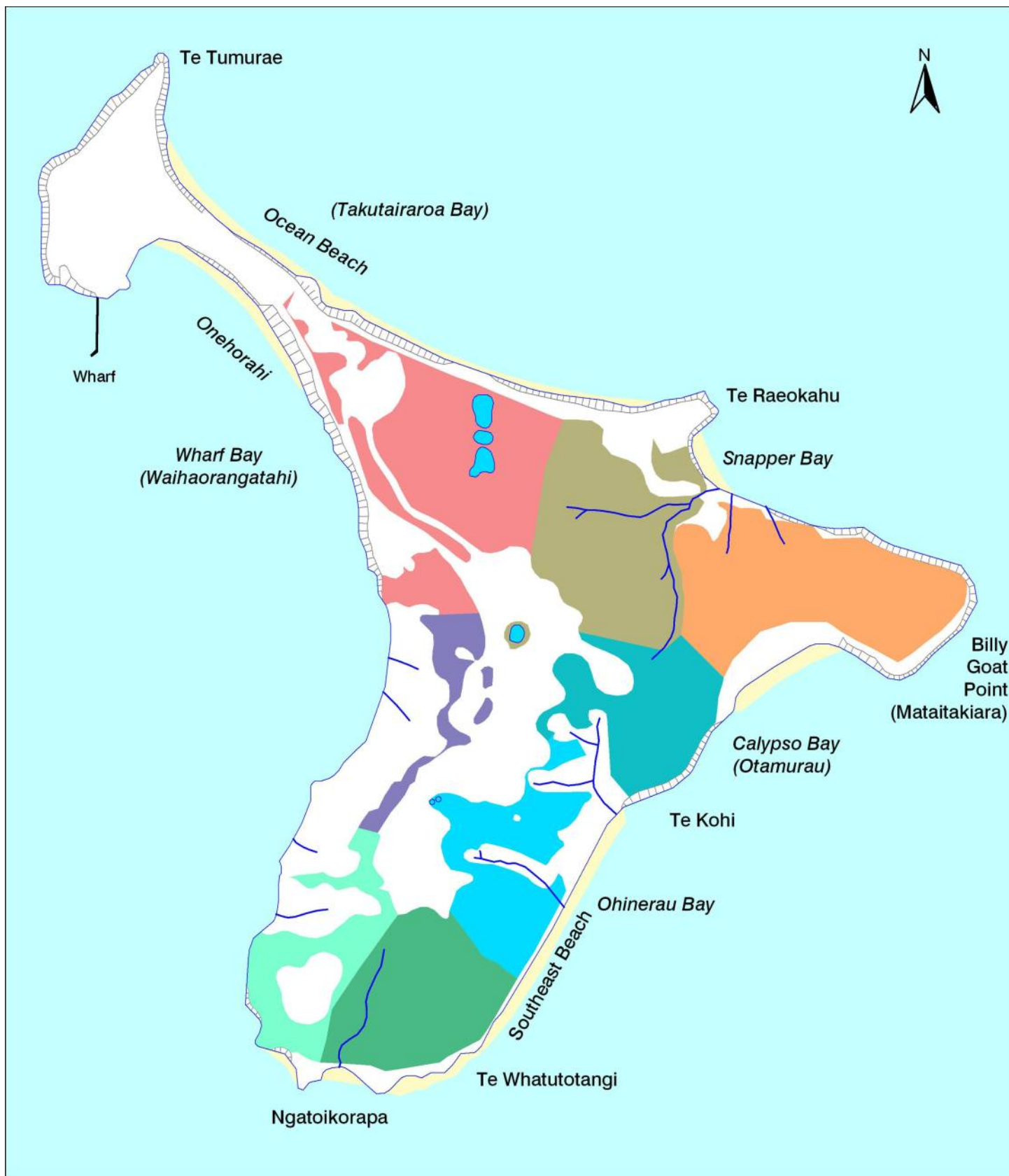


Plan 7: Existing Vegetation



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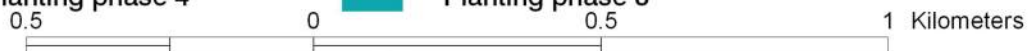




Plan 8: Indicative Planting Sequence

- | | |
|---|---|
| Planting phase 1 | Planting phase 5 |
| Planting phase 2 | Planting phase 6 |
| Planting phase 3 | Planting phase 7 |
| Planting phase 4 | Planting phase 8 |

Scale:



Department of Conservation
Te Papa Atawhai





Plan 9: Existing Visitor Facilities and Farm Infrastructure

--- Vehicle track	Anchorage	Changing / toilets	Picnic areas
--- Fences	Beach recreation	Farmhouse for rent	Shelter
Buildings	Campground	Information	

Scale: 0.5 0 0.5 1 Kilometers



Plan 10: Existing and Proposed Walking Tracks

- | | |
|--|--|
| — Main track with connections to other tracks | — 4. European historic heritage |
| - - Access to Ocean Beach, Snapper and Calypso Bay | — 5. Coastal forest and coastal biodiversity |
| - - 1. Native forest biodiversity | — 6. Stream biodiversity |
| - - 2. Native wetland | |
| - - 3. Maori heritage | |

Scale: 0.5 0 0.5 1 Kilometers



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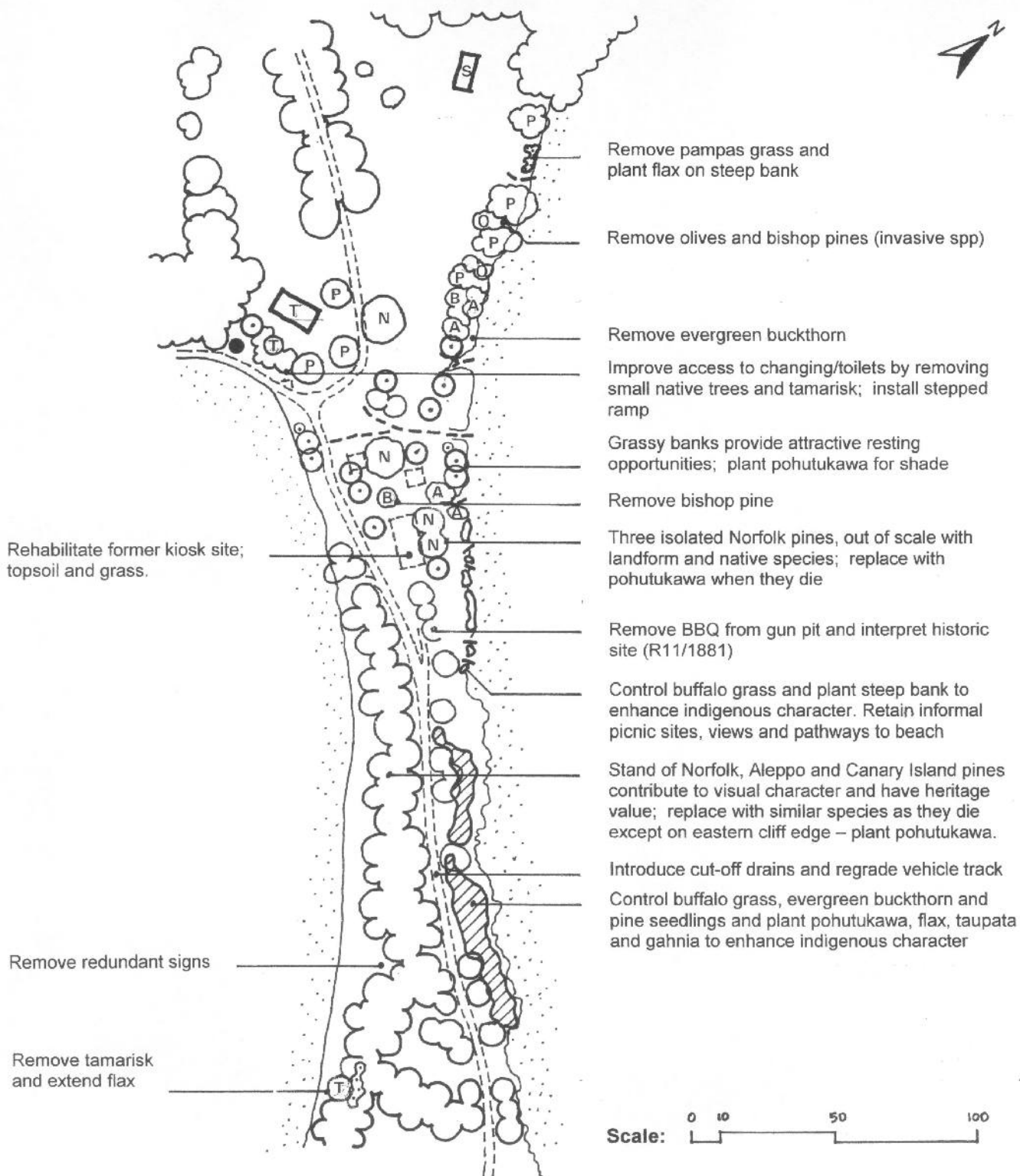


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













Plan 11: Restoration Concept





Plan 12: Isthmus - Landscape Management Proposals

Facilities	Existing trees	Planting
 Changing/toilets	 Aleppo pine	 Pohutukawa
 Sea Cadet house	 Bishop pine	 Flax
 Site for interim information structure	 Norfolk Island pine	 Pohutukawa, flax, coastal cutty grass (<i>Gahnia lacera</i>), taupata
 Vehicle track	 Olive	 Flax to base of bank, knobby club rush, pohuehue, coastal astelia
 Pedestrian tracks	 Tamarisk	
	 Pohutukawa	

APPENDICES

	Page
1. Planning and Policy Documents Relating to Motuihe	A1
2. Characteristics of Landscape Units.....	A2
3. Recorded Archaeological and Historic Sites	A4
4. The Vascular Flora of Motuihe	A5
5. Pasture Management Options	A16
6. Recommended Species for Restoration Planting	A18
7. Threatened Plant Species to be Considered for Reintroduction.....	A20
8. Bird Species Recorded on Motuihe	A21
9. Reptiles Recorded from the Auckland Geographic Region.....	A22
10. Biosecurity Standards for Motuihe Restoration Project	A23
11. Visitor Centre Site Options	A25
12. Koiwi Protocol	A26
13. Memorandum of Understanding	A27

APPENDIX 1

PLANNING AND POLICY DOCUMENTS RELATING TO MOTUIHE

Conservation Management Strategy for Auckland 1995-2005

This document provides a ten-year strategy for the integrated management of all protected lands and marine areas administered by the Department of Conservation 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 Motuihe as a key area because of its high visitor use and potential and its historic sites of significance.

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 the status as a current and operative Conservation Management Plan under the Conservation Act 1987. The plan covers all or part of more than forty islands in the Gulf, including Motuihe, and provides a broad framework of objectives and policies to guide management decisions.

The Hauraki Gulf Marine Park Act (2000)

The Act establishes overall objectives for the Gulf, its islands and catchments so that the effects of urban and rural land use are given proper attention and the life-supporting capacity of the Gulf is protected. It provides for integrated management of the Gulf across twenty one statutes.

Resource Management Act Statutory Plans

The Resource Management Act 1991 establishes a hierarchy of plans which potentially effect the planning of Motuihe. At the national level is the New Zealand Coastal Policy Statement. At the regional level are the Regional Policy Statement and the Regional Plan: Coastal which contains objectives, policies and rules for the coastal marine area. At the district level the Auckland City Council District Plan: Hauraki Gulf Islands Section (ACC. 2000) contains policies and rules relating to land uses. Motuihe is in Land Unit 23 – Conservation Islands. Each land use proposal needs to be individually assessed to determine what consents are required.

Reserves Act 1977

The Act has a number of purposes, including management of areas for the benefit and enjoyment of the public, ensuring as far as is possible the survival of indigenous species, providing for public access, preserving representative samples of natural ecosystems and landscapes, and protecting the natural character of the coast and the margins of lakes and rivers. The Act sets out the purposes and administrative regime for various classes of reserve, including recreation reserves which are defined in section 17 of the Act.

General Policy for the Conservation Act and Related Legislation

A Draft General Policy for the Conservation and Related Acts was issued in August 2003. General policy gives direction and guidance on how to conserve and manage protected areas and species, and gives consistent national direction for management planning. Conservation management strategies and plans must be consistent with general policy.

APPENDIX 2

CHARACTERISTICS OF LANDSCAPE UNITS

1. Northwest peninsula

Physically separate, cliff-bound landform joined to the rest of the island by a narrow strip of land. Formerly intensively developed as a human quarantine station, internment camp and naval training base, it now has a concentration of historic building remnants, trees and archaeological sites. Some of the island's recreational facilities, ie. changing rooms/toilets, picnic site and campground, are located here.

2. Isthmus

Narrow strip of land with beaches either side connects the northwest peninsula with the rest of Motuihe. Characterised by low mounds of sand under grass and scattered trees. A mature stand of Norfolk Island pines is a dominant feature at the main point of arrival for ferry passengers and provides the backdrop to the beach recreation area.

3. Northern paddocks

Undulating topography under pasture with a few scattered indigenous trees and remnants of exotic shelterbelts. Coastal edge mostly formed in cliffs with a peripheral margin of pohutukawa, exotic trees and shrubs. Includes the homestead, stockyards, pump sheds and other farm structures.

4. Farm buildings

Group of buildings on the edge of the pastoral land at the site of the first farm complex (1850s). The woolshed is of traditional design and comfortably sited amongst mature pohutukawa. Other buildings include the farmhouse, storage sheds and the nursery.

5. Orchard bush

A substantial remnant of forest on steep coastal slopes extending down to a rocky shoreline. Predominantly pohutukawa canopy with some large venerable trees and an understorey of native shrubs and plant pests. A very significant visual asset from both the sea and onshore.

6. East coast bush

A series of ridges under pasture alternate with deep gullies draining to Southeast Beach with remnants of kohekohe and taraire, and pohutukawa on the coastal edge. Makes a strong contribution to the visual character of the east coast.

7. Central ridge

A broad elevated ridgeline under grass rising to 63m at the highest point. The water reservoirs and free standing tank are prominent structures on the skyline. The main farm track follows the ridge which offers a sequence of expansive views to the surrounding Gulf, neighbouring islands and the Auckland mainland.

8. Southern end

Windswept southern flanks of the island under a poor pasture cover. Includes the prominent conical hill known as Bald Knob offering exceptional views across Tamaki Strait and Motukorea to the mainland. Coastline comprises a series of small coves and a long sandy beach.

1



2



3



4



5



6



7



8



APPENDIX 3

RECORDED ARCHAEOLOGICAL AND HISTORIC SITES

Refer to Plan 6 for location

Sites relating to Maori occupation

R11/148	Pa	R11/883	Pit
R11/149	Midden	R11/884	Midden
R11/150	Midden	R11/885	Midden
R11/151	Pa	R11/886	Terraces/midden
R11/152	Midden	R11/901	Midden
R11/153	Midden	R11/1295	Pits/midden
R11/154	Midden/working floor	R11/1697	Pits
R11/155	Pits/terraces/midden	R11/1880	Waahi tapu
R11/156	Pits	R11/1882	Hangi/findspot
R11/157	Pits/terraces/midden	R11/1883	Terraces/midden
R11/158	Pits/terraces/midden	R11/1884	Pits/terraces/midden
R11/159	Pits/terraces/midden	R11/1889	Terrace/midden
R11/160	Pits/terrace	R11/1890	Terrace/midden
R11/865	Pits/terraces/midden	R11/1891	Midden
R11/866	Pit/midden	R11/1892	Terraces/midden/findspot
R11/867	Midden	R11/1893	Pit/terraces
R11/868	Midden	R11/1894	Midden
R11/869	Midden	R11/1898	Findspot
R11/870	Midden	R11/1899	Midden
R11/871	Midden	R11/1900	Terrace
R11/872	Midden	R11/1902	Terraces/midden
R11/873	Midden	R11/1904	Midden
R11/874	Midden	R11/1905	Terraces/midden
R11/875	Pits/terraces/midden	R11/1906	Terraces/midden
R11/876	Pits/terraces	R11/1907	Terraces/midden
R11/877	Midden	R11/1908	Pits/terraces/midden
R11/878	Midden	R11/1909	Waahi tapu
R11/879	Midden	R11/1961	Terrace
R11/880	Pits	R11/1962	Pit
R11/881	Pit	R11/2233	Midden
R11/882	Midden	R11/2272	Midden

Sites relating to European occupation

R11/1784	Quarantine Station
R11/1881	Gun emplacement
R11/1885	Historic settlement
R11/1887	Wells/reservoir/pump station
R11/1888	Reservoirs
R11/1897	Pit
R11/1901	Trenches
R11/1903	Hole
R11/2271	Concrete foundations

APPENDIX 4

THE VASCULAR FLORA OF MOTUIHE (Including Tern Rocks)

PJ de Lange and GM Crowcroft, 1999

(Adapted by J Hawley, 2004)

Abbreviations

Ab = Abundant (>50 individuals seen)	C = Common (20-50 individuals seen)
O = Occasional (10-20 individuals seen)	R = Rare (<10 ten individuals seen)
S = Only one individual noted	Ex = Extirpated from survey area
* = Denotes adventive species	# = Exotic species not naturalised
n = Indigenous to island but also known from plantings of unknown provenance	
p = Planted	q = Indigenous but outside natural geographic range
(Esler 1980) = Recorded by Esler and not seen during this survey (5 spp.)	
(Kirk 1879) = Recorded by Kirk and not seen by Esler (1980) or during this survey (2 spp.)	

NATIVE SPECIES

Ferns

Botanical Name	Common Name	Abbrev
<i>Adiantum aethiopicum</i>	true maidenhair fern	C
<i>A. diaphanum</i>	tuberous maidenhair fern	R
<i>A. hispidulum</i>	rosy maidenhair fern	C
<i>Asplenium bulbiferum</i>	hen and chicken fern	S
<i>A. flaccidum</i>	hanging spleenwort	R
<i>A. oblongifolium</i>	shining spleenwort	C
<i>Blechnum chambersii</i>		O
<i>B. filiforme</i>		Ab
<i>B. norfolkianum</i>		O
<i>B. novae-zelandiae</i> (Esler 1980)	kiokio	
<i>Cheilanthes distans</i>	woolly cloak-fern	R
<i>Cyathea dealbata</i>	silver fern, ponga	R
<i>C. medullaris</i>	mamaku	C
<i>Deparia petersenii</i> subsp. <i>congrua</i>		C
<i>Dicksonia squarrosa</i>	wheki	R
<i>Diplazium australe</i>		S
<i>Doodia media</i>		Ab
<i>Histiopteris incisa</i>	bat-wing fern	S
<i>Hypolepis ambigua</i>		C
<i>H. dicksonioides</i>		S
<i>Lastreopsis glabella</i>		Ab
<i>L. microspora</i> subsp. <i>pentangularis</i>		R
<i>L. velutina</i>		R
<i>Microsorium pustulatum</i> subsp. <i>pustulatum</i>		Ab
<i>M. scandens</i>	hounds-tongue fern	R
<i>Paesia scaberula</i>	pig fern	R
<i>Pellaea rotundifolia</i>	button fern	R
<i>Pneumatopteris pennigera</i>		Ab
<i>Polystichum richardii</i> sens. lat		R
<i>Pteridium esculentum</i>	bracken	C
<i>Pteris comans</i>		C
<i>P. macilenta</i> (<i>P. pendula</i>)		R
<i>P. saxatilis</i> (<i>P. macilenta</i>)		
<i>P. tremula</i>	trembling brake	Ab
<i>P. aff. comans</i> x <i>P. saxatilis</i>		R
<i>Pyrrosia elaeagnifolia</i>	leather-leaf fern	Ab

Gymnosperms

<i>Podocarpus totara</i> var. <i>totara</i>	totara	R, p
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Monocotyledonous Trees

<i>Cordyline australis</i>	cabbage tree, ti kouka	R, p
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Dicotyledonous Trees and Shrubs

<i>Avicennia marina</i> subsp. <i>australasica</i>	mangrove	S
<i>Beilschmiedia tarairi</i>	taraire	Ab
<i>B. tawa</i> (incl <i>B. tawaroa</i>)	tawa	S
<i>Brachyglottis kirkii</i> var <i>kirkii</i> (Esler 1980)	kohurangi	
<i>B. repanda</i> (Esler 1980)	rangiora	
<i>Carmichaelia australis</i>		R
<i>Coprosma arborea</i>	mamangi	S
<i>C. lucida</i>	shining karamu	R
<i>C. macrocarpa</i> subsp. <i>minor</i>	coastal karamu	Ab
<i>C. propinqua</i>	mingimingi	S
<i>C. repens</i>	taupata	Ab
<i>C. rhamnoides</i>		S
<i>C. robusta</i>	karamu	R
<i>Coriaria arborea</i>	tutu	O
<i>Corynocarpus laevigatus</i>	karaka	Ab, n
<i>Dodonaea viscosa</i>	akeake	R, p
<i>Dysoxylum spectabile</i>	kohekohe	Ab, n
<i>Entelea arborescens</i>	whau	R
<i>Geniostoma ligustrifolium</i> var. <i>ligustrifolium</i>	hangehange	C
<i>Hebe stricta</i> var. <i>stricta</i>	koromiko	O
<i>Hedycarya arborea</i>	porokaiwhiri	O
<i>Knightia excelsa</i>	rewarewa	R
<i>Kunzea</i> aff. <i>ericoides</i>	kanuka	O
<i>Leptospermum scoparium</i> sens. lat.	manuka	O
<i>Litsea calicaris</i>	mangaeo	R
<i>Macropiper excelsum</i> subsp. <i>excelsum</i>	kawakawa	Ab
<i>Melicope ternata</i>	wharangi	R
<i>Melicytus novae-zelandiae</i> subsp. <i>novaezelandiae</i>	coastal mahoe	R
<i>M. ramiflorus</i> subsp. <i>ramiflorus</i>	mahoe	Ab
<i>Metrosideros excelsa</i>	pohutukawa	Ab
<i>M. kermadecensis</i>	Kermadec pohutukawa	O, p, q
<i>M. robusta</i>	Northern rata	S, p
<i>Mertya sinclairii</i>	pukanui	S, p
<i>Myoporum laetum</i>	ngaio	C, n
<i>Myrsine australis</i>	mapou	Ab
<i>Olearia furfuracea</i>	akepiro	O
<i>O. paniculata</i>	akiraho	R, p, q
<i>Ozothamnus leptophyllus</i> sens. lat.	tauhinu	O
<i>Pimelea arenaria</i> (Kirk 1879)	aute-taranga	Ex
<i>Pittosporum crassifolium</i>	karo	Ab, p
<i>P. tenuifolium</i> subsp. <i>tenuifolium</i>	kohukohu	R, p
<i>Pouteria costata</i>	tawapou	R
<i>Pomaderris apetala</i> subsp. <i>maritima</i>	tainui	R, p, q
<i>Pseudopanax lessonii</i>	houpara	Ab
<i>Rhabdothamnus solandri</i>	taurepo	
<i>Solanum aviculare</i>	poroporo	R
<i>Sophora chathamica</i>	kowhai	O
<i>Vitex lucens</i>	puriri	Ab, n

Dicotyledonous Lianes and Scrambling Plants

<i>Calystegia sepium</i> agg.	pink bindweed	C
<i>C. soldanella</i>	sand bindweed	R
<i>Einadia triandra</i>	pigweed	S
<i>E. trigonos</i> subsp. <i>trigonos</i>	pigweed	S
<i>Muehlenbeckia australis</i>		R
<i>M. complexa</i>	pohuehue	Ab
<i>M. australis</i> x <i>M. complexa</i>	hybrid pohue	O
<i>Parsonsia heterophylla</i>	native jasmine	O
<i>Rubus cissoides</i> sens. str.	bush lawyer	R
<i>Sicyos</i> aff. <i>australis</i> (Kirk 1879)	mawhai	Ex

Grasses

<i>Austrostipa stipoides</i>	coastal immorality grass	O
<i>Cortaderia fulvida</i>	toetoe	S, p
<i>C. splendens</i>	coastal toetoe	O
<i>Dichelachne crinita</i>	plume grass	C
<i>Lachnagrostis billardierei</i>		C
<i>L. filiformis</i>	NZ wind grass	C
<i>Microlaena stipioides</i>	rice grass	Ab
<i>Oplismenus hirtellus</i> subsp. <i>imbecillis</i>	NZ oat grass	Ab
<i>Poa anceps</i> subsp. <i>anceps</i>		Ab
<i>Rytidosperma unarede</i>	bristle grass	O
<i>Spinifex sericeus</i>	spinifex	C

Orchids

<i>Drymonathus adversus</i>		O
<i>Earina mucronata</i> (Esler 1980)	bamboo orchid	

Rushes

<i>Juncus australis</i>	rush	O
<i>J. distegus</i>	rush	S
<i>J. edgariae</i>	rush	C
<i>J. planifolius</i>		R
<i>J. pallidus</i> (Esler 1980)	rush	
<i>J. tenuis</i> var. <i>tenuis</i>	rush	C
<i>J. usitatus</i>	rush	Ab
<i>Luzula picta</i> sens. str.	wood rush	R

Sedges

<i>Bolboschoenus medianus</i>	purua grass	C
<i>Carex breviculmis</i>		R
<i>C. flagellifera</i>	trip-me-up	Ab
<i>C. inversa</i>		O
<i>C. lambertiana</i>		C
<i>C. ochrosaccus</i>		O
<i>C. pumila</i>		C
<i>C. solandri</i>		C
<i>C. testacea</i>		O
<i>C. virgata</i>	kuawa	Ab
<i>C. aff. raoulii</i>		Ab
<i>Cyperus ustulatus</i> f. <i>ustulatus</i>	coastal cutty grass	Ab
<i>Eleocharis acuta</i>	spikerush	C

<i>Ficinia nodosa</i>	knobby club rush	O
<i>Gahnia lacera</i>		Ab
<i>G. xanthocarpa</i>	kauri sedge	O
<i>Isolepis cernus</i>		C
<i>I. reticularis</i>		R
<i>Schoenoplectus tabernaemontani</i>		R
<i>Schoenus maschalinus</i>		S
<i>Uncinia uncinata</i>	bastard grass	R

Monocotyledonous Herbs

<i>Arthropodium cirratum</i>	rengarenga lily	O
<i>Astelia banksii</i>	coastal astelia	Ab
<i>Dianella nigra</i>	blueberry	R
<i>Lemna minor</i>	duckweed	R
<i>Phormium tenax</i>	harakeke	Ab, n
<i>Triglochin striata</i>	marsh arrow grass	O

Composite Herbs

<i>Cotula australis</i>		R
<i>C. coronopifolia</i>	bachelors buttons	R
<i>Pseudognaphalium</i> aff. <i>luteoalbum</i>		O
<i>Senecio hispidulus</i>	fireweed	C
<i>S. laetus</i> var. <i>laetus</i>	shore groundsel	K
<i>S. scaberulus</i>		R

Dicotyledonous Herbs (Other than Composites)

<i>Acaena anserinifolia</i>		S
<i>Apium prostratum</i> subsp. <i>prostratum</i> var. <i>filiforme</i>	New Zealand celery	O
<i>Callitriche muelleri</i>	starwort	Ab
<i>Crassula sieberiana</i>		R
<i>Dichondra repens</i> agg.	Mercury Bay	Ab
<i>Disphyma australe</i> subsp. <i>australe</i>	horokaka	O
<i>Epilobium nummularifolium</i>		R
<i>E. pubens</i>		R
<i>Galium propinquum</i>		R
<i>Geranium retrorsum</i>		S
<i>G. solanderi</i> sens. str.		R
<i>Haloragis erecta</i> subsp. <i>erecta</i>		O
<i>Lobelia anceps</i>		C
<i>Oxalis exilis</i>	creeping oxalis	Ab
<i>O. rubens</i>		O
<i>Palargonium inodorum</i>	kopata	R
<i>Peperomia urvilleana</i>	peperomia	R
<i>Samolus repens</i> var. <i>repens</i>	marsh primrose	C
<i>Sarcocornia quinqueflora</i> subsp. <i>quinqueflora</i>	salicornia	C
<i>Solanum americanum</i>		O
<i>Spergularia media</i>	sand spurrey	R
<i>Stellaria parviflora</i>		R
<i>Wahlenbergia littoricola</i> subsp. <i>vernica</i>	harebell	R
<i>W. violacea</i>	harebell	S

ADVENTIVE AND EXOTIC SPECIES

Ferns

# <i>Adiantum raddianum</i>	maidenhair fern	R, p
# <i>Cyrtomium falcatum</i>		R
# <i>Nephrolepis cordifolia</i>	Japanese ladder fern	S, p

Gymnosperms

# <i>Araucaria columnaris</i>	cook pine	S, p
# <i>A. cunninghamii</i>	hoop pine	S, p
* <i>A. heterophylla</i>	Norfolk Island Pine	Ab, p
# <i>Cryptomeria japonica</i>	Japanese red cedar	S, p
# <i>C. japonica</i> 'Elegans'	Japanese plum cedar	R, p
* <i>Cupressus macrocarpa</i>	monterey cypress	Ab, p
# <i>C. macrocarpa</i> 'Aurea'	golden monterey cypress	R, p
# <i>C. sempervirens</i>	Italian cypress	S, p
# <i>Pinus canariensis</i>	Canary Island pine	S, p
* <i>P. halpensis</i>	allepo pine	Ab, p
* <i>P. muricata</i>	bishop pine	R, p
# <i>P. nigra</i>	Austrian pine	R, p
* <i>P. pinaster</i>	maritime pine	Ab, p
# <i>P. radiata</i>	monterey pine	S, p
*# <i>P. sylvestris</i>	scots pine	R, p
# <i>Podocarpus elatus</i>	brown pine	S, p
# <i>Thuja plicata</i> 'Old gold'	western red cedar	S, p

Dicotyledonous Trees and Shrubs

* <i>Acmena smithii</i>	monkey apple	C, p
# <i>Agonis flexuosa</i>		O, p
# <i>Ailanthus altissima</i>	tree of heaven	S, p
# <i>Alnus cordata</i>	Italian alder	R, p
* <i>Argyranthemum frutescens</i>	marguerite	R, p
# <i>Artemisia arborescens</i>	hedge artemisia	S, p
# <i>Berberis glaucophylla</i>	barberry	S
# <i>Buddleja salviifolia</i>	South African buddleia	S, p
* <i>Carica pubescens</i>	mountain pawpaw	R
* <i>Casuarina glauca</i>	river oak	C, p
# <i>Chaenomeles japonica</i>	japonica	S
* <i>Chrysanthemoides monilifera</i>	boneseed	R
# <i>Citrus limon</i>	lemon	R, p
# <i>C. paradisi</i>	grapefruit	R, p
# <i>C. sinensis</i>	orange	R, p
# <i>Clethra arborea</i>		S, p
# <i>Corymbia ficifolia</i>	red-flowering gum	R, p
* <i>Cotoneaster glaucophylla</i> f. <i>serotinus</i>		S
* <i>Crataegus monogyna</i>	hawthorn	R
* <i>Cyphomandra betacea</i>	tamarillo	S
* <i>Elaeagnus x reflexa</i>	elaeanthus	C
* <i>Eucalyptus botryoides</i>	southern mahogany	C, p
# <i>E. globulus</i> subsp <i>pseudoglobulos</i>	Victorian eucalypt	S, p
* <i>E. leucoxydon</i> (form 1)		R, p
# <i>E. leucoxydon</i> (form 2)		S, p
* <i>E. pilularis</i>	black butt	p
# <i>E. ? propinqua</i> var. <i>propinqua</i>		S, p
* <i>E. saligna</i>	Sydney blue gum	C, p

* <i>Euonymus japonicus</i>	Japanese spindleberry	Ab, p
# <i>Fatsia japonica</i>	fatsia	R, p
# <i>Feijoa sellowiana</i>	feijoa	S, p
# <i>Ficus elastica</i>	rubber plant	S, p
* <i>F. macrophyllus</i>	Moreton Bay fig	R, p
# <i>F. rubiginosa</i>	Port Jackson fig	S, p
# <i>Forsythia x intermedia</i>	forsythia	S, p
# <i>Fraxinus excelsior</i>	mountain ash	S, p
# <i>Fuchsia x hybrida</i> 'Pink Darling'	fuchsia	R, p
# <i>Grevillea robusta</i>	silky oak	S, p
# <i>Hibiscus syriacus</i> 'Bluebird'	rose of sharon	S, p
# <i>Jasminum mesnyi</i>		S, p
# <i>Malus x domestica</i>	apple	R, p
# <i>Myoporum</i> aff. <i>insulare</i>	Tasmanian ngaio	R, p
* <i>M.</i> aff. <i>Insulare</i> x <i>M. laetum</i>	hybrid ngaio	R, p
# <i>Nerium oleander</i>	oleander	O, p
* <i>Olea europaea</i> subsp. <i>europaea</i>	olive	Ab, p
* <i>Opuntia vulgaris</i>	prickly pear	C, p
* <i>Phytolacca octandra</i>	inkweed	C
* <i>Polygala myrtifolia</i> 'Grandiflora'	sweet pea shrub	R, p
# <i>Populus albus</i>	white poplar	S, p
# <i>P. nigra</i> 'Italica'	lombardy poplar	R, p
# <i>Prunus x domestica</i>	plum	S, p
# <i>P. persica</i>	peach	S, p
* <i>Pyrus communis</i>	pear	R, p
* <i>Quercus ilex</i>	holm oak	O, p
* <i>Rhamnus alaternus</i>	evergreen buckthorn	Ab, p
# <i>Rosa multiflora</i>		S, p
* <i>R. rubiginosa</i>	briar rose	R
* <i>R. wichuraiana</i> cv 'Dorothy perkins'		R, p
# <i>Salix matsudana</i> 'Tortuosa'	tortured willow	S, p
# <i>Salvia rutilans</i>		S, p
# <i>Schinus molle</i>	pepper tree	S, p
* <i>Solanum linnaeanum</i>	apple of sodom	C
* <i>S. mauritianum</i>	tobacco weed	Ab
# <i>Teucrium fruitcans</i>	germander	S, p
# <i>Tamarix chinensis</i>	tamarisk	R, p
# <i>Lophostemon confertus</i>		R, p
* <i>Ulex europaeus</i>	gorse	C
# <i>Virburnum</i> sp.		S, p

Dicotyledonous Lianes and Scrambling Plants

* <i>Araujia sericifera</i>	moth plant	Ab
# <i>Clematis montana</i> 'Rubens'	clematis	S, p
* <i>Passiflora tripartita</i> var. <i>mollissima</i>	banana passionfruit	O
# <i>Plectranthus saccatus</i> 'Variegata'		S, p
# <i>Rubus idaeus</i>	raspberry	S, p
* <i>R. ulmifolius</i>	blackberry	R
* <i>R. sp. fruticosus</i> agg.	blackberry	S
# <i>Vitis vinifera</i> ? 'Brandt'	ornamental grape	S, p

Grasses

* <i>Agrostis capillaris</i>	browntop	Ab
* <i>A. stolonifera</i>	creeping bent	O
* <i>Ammophila arenaria</i>	marram	O
* <i>Anthoxanthum odoratum</i>	sweet vernal grass	C
* <i>Arrhenatherum elatius</i> subsp. <i>elatius</i>	tall oat grass	O

* <i>Avena barbata</i>	oat grass	O
* <i>Botriochloa macra</i>	red kneed grass	C
* <i>Brizia minor</i>	small quaking grass	O
* <i>Bromus arenarius</i>	sand brome	O
* <i>B. diandrus</i>	rip-gut brome	Ab
* <i>B. lithobius</i>		Ab
* <i>B.hordaceous</i>		Ab
* <i>B. willdenowii</i>	prairie grass	Ab
* <i>Cortaderia jubata</i>	purple pampas	Ab
* <i>C. selloana</i>	pampas	C
* <i>Cynodon dactylon</i>	indian doab	Ab
* <i>Cynosurus cristatus</i>	crested dogs-tail	O
* <i>Dactylis glomerata</i>	cocksfoot	Ab
* <i>Digitaria sanguinalis</i>	summer grass	R
* <i>Echinochloa crus-galli</i>	barnyard grass	S
* <i>Eleusine indica</i>	crowsfoot	O
* <i>Elymus rectisetus</i>	wheat grass	C
* <i>Gastridium ventricosum</i>	nit grass	S
* <i>Glyceria declinata</i>	floating sweet grass	O
* <i>Hordeum murinum</i>	barley grass	Ab
* <i>Holcus lanatus</i>	Yorkshire fog	C
* <i>Lagurus ovatus</i>	haretail	Ab
* <i>Lolium perenne</i>	ryegrass	Ab
* <i>L. rigidum</i>	ryegrass	C
* <i>Panicum dichotomiflorum</i>		R
* <i>Paspalum dilatatum</i>	paspalum	Ab
* <i>P. distichum</i>	mercier grass	Ab
* <i>P. urvillei</i>	vasey grass	R
* <i>P. vaginatum</i>	saltwater paspalum	C
* <i>Parapholis incurva</i>	sickle grass	Ab
* <i>Pennisetum clandestinum</i>	kikuyu	Ab
* <i>P. annua</i>	annual poa	O
* <i>P. pratensis</i>	Kentucky bluegrass	O
* <i>Polypogon fugax</i>		R
* <i>P. monspeliensis</i>	beard grass	Ab
* <i>P. viridis</i>	water bent	Ab
* <i>Rytidosperma penicillata</i>	danthonia	O
* <i>R. racemosa</i>	danthonia	Ab
* <i>Schedonorus phoenix</i>	tall fescue	R
* <i>Sporobolus africanus</i>	rats-tail	Ab
* <i>Stenotaphrum secundatum</i>	buffalo grass	C
* <i>Vulpia bromoides</i>	vulpia hair grass	Ab

Rushes

* <i>Juncus articulatus</i>	articulated rush	R
* <i>J. bufonius</i> var. <i>bufonius</i>	toad rush	R
* <i>J. effusus</i> var. <i>effusus</i>	soft rush	O
* <i>J. tenuis</i> var. <i>tenuis</i>	rush	C

Sedges

* <i>Carex divisa</i>		R
* <i>C. divulsa</i>		Ab
* <i>Cyperus brevifolius</i>		S
* <i>C. eragrostis</i>		C
* <i>Isolepis sepulchralis</i>		O

Monocotyledonous Herbs (other than Grasses, Orchids, Rushes and Sedges)

* <i>Agave americana</i>	century plant	O, p
* <i>Allium vineale</i>	wild onion	O
* <i>Amaryllis belladonna</i>	naked ladies	O, p
* <i>Arum italicum</i>	Italian arum	R
# <i>Asparagus densiflorus</i>		R, p
* <i>Crocasmia x crocosmifolia</i>	montebretia	O, p
* <i>Iris foetidissima</i>	stinking iris	O, p
# <i>I. germanica</i>	bearded iris	R, p
# <i>Kniphofia</i> sp.	hotpoker	S, p
* <i>Leucojum aestivum</i>	snowflake	R
* <i>Narcissus poeticus</i>	winterbells	Ab
* <i>N. tazetta</i>		Ab
* <i>Zantedeschia aethiopica</i>	arum lily	O

Composite Herbs

* <i>Anthemis cotula</i>	stinking mayweed	R
* <i>Arctotheca calendula</i>	cape daisy	S
# <i>Arctotis x hybrida</i> cv.	arctotis daisy	R
# <i>Aster amellus</i>	Italian aster	S
# <i>A. novi-belgii</i> hybrids	michaelmas daisy	S
* <i>A. subulatus</i>	sea aster	O
# <i>A. sp.</i> garden cultivar	?Easter daisy	S, p
* <i>Bellis perennis</i>	lawn daisy	C
* <i>Carduus pycnocephalus</i>	winged thistle	Ab
* <i>C. tenuiflorus</i>	winged thistle	C
* <i>Chrysanthemum segetum</i>	corn marigold	R, p
* <i>Cirsium arvense</i>	Californian thistle	C
* <i>C. palustre</i>	marsh thistle	S
* <i>C. vulgare</i>	scotch thistle	Ab
* <i>Conyza albida</i>	fleabane	O
* <i>Crepis capillaris</i>	hawkbeard	Ab
* <i>Dahlia coccinea x D. pinnata</i>	dahlia	R, p
# <i>Dendranthema</i> .	Chinese chrysanthemum	S, p
# <i>Felicia bergeriana</i>	felicia	S, p
# <i>Gazania linearis</i>	gazania	R,
* <i>Gnaphalium coarctatum</i>	purple cudweed	S
* <i>G. simplicicaule</i>		O
* <i>Helminthotheca echioides</i>	oxtongue	Ab
* <i>Hypochoeris glabra</i>	smooth catsear	R
* <i>H. radicata</i>	catsear	Ab
* <i>Lactuca virosa</i>	acrid lettuce	S
* <i>Lapsana communis</i>	nipplewort	Ab
* <i>Leontodon taraxacoides</i>	hawkbit	Ab
* <i>Matricaria dioscoidea</i>	rayless chamomile	R
* <i>Mycelis muralis</i>	wall lettuce	R
# <i>Osteospermum fruticosum</i>	dimorphotheca	O, p
# <i>O. jucundum</i>		R, p
* <i>Senecio bipinnatisectus</i>	Australian fireweed	R
* <i>S. eslerii</i>		S
* <i>S. jacobaea</i>	ragwort	S
* <i>S. skirrhodon</i>	gravel groundsel	O
* <i>S. vulgaris</i>	groundsel	C
* <i>Silybum marianum</i>	variegated thistle	Ab
* <i>Solvia sessilis</i>	onehunga weed	O
* <i>Sonchus asper</i>	prickly sow thistle	O
* <i>S. oleraceus</i>	sow thistle	Ab

# <i>Tagetes patula</i>	French marigold	S, p
# <i>Tanacetum parthenicum</i>	feverfew	R, p
* <i>Taraxacum officinale</i>	dandelion	O
* <i>Xanthium spinosum</i>	Bathurst bur	Ab

Dicotyledonous Herbs (Other than Composites)

* <i>Acaena novae-zelandiae</i>	piripiri	C
* <i>Amaranthus deflexus</i>		C
* <i>A. lividus</i>		C
* <i>A. powellii</i>		O
* <i>Anagallis arvensis</i> subsp. <i>arvensis</i> var. <i>arvensis</i>	scarlet pimpernel	Ab
# <i>Angelia pachycarpa</i>	garden angelica	S, p
* <i>Atriplex prostrata</i>	orache	Ab
# <i>Bergenia cordifolia</i>		S, p
* <i>Beta vulgaris</i> subsp. <i>vulgaris</i>	silverbeet	R, p
# <i>Brassica oleracea</i>	broccoli	R, p
* <i>Cakile edentula</i>	sea rocket	Ab
* <i>C. maritima</i>	sea rocket	C
* <i>Callitriche stagnalis</i>	starwort	O
* <i>Capsella bursa-pastoris</i>	shepherds purse	R
* <i>Centaurium erythraea</i>	century	O
* <i>Cerastium glomeratum</i>	annual mouse-ear chickweed	O
# <i>C. tomentosum</i>	snow in the summer	S
* <i>Chenopodium album</i>	fat hen	O
* <i>C. murale</i>	nettle-leaved fat-hen	Ab
* <i>C. pumilio</i>	clammy goosefoot	R
* <i>Crassula multicava</i>	fairy crassula	C
# <i>Cynoglossum amabile</i>	Chinese forget-me-not	R, p
* <i>Duchesnea indica</i>	Indian strawberry	O
# <i>Echeveria x imbricata</i>		S, p
* <i>Erodium cicutarium</i>	storksbill	O
* <i>E. moschatum</i>	musky storksbill	O
* <i>Euphorbia depauperata</i> var. <i>pubescens</i>		O, p
* <i>E. peplus</i>	milkweed	Ab
* <i>Galium aparine</i>	cleavers	C
* <i>G. divaricatum</i>	slender bedstraw	C
* <i>Geranium dissectum</i>	cut-leaved cranesbill	O
* <i>G. homeanum</i>		O
* <i>G. molle</i>	dove's foot cranesbill	O
* <i>G. solanderi</i> "coarse hairs"		Ab
# <i>Gomphocarpus fruticosus</i>	swan plant	R, p
# <i>Greenovia aurea</i>		S, p
* <i>Hoteophyllum spectabile</i> 'Brilliant'	orpine	S, p
# <i>Impatiens sodenii</i>	shrub balsam	R
* <i>I. walleriana</i>	busy lizzie	O
* <i>Lepidium desvauxii</i>	bushy peppergrass	O
* <i>Lepidium didymum</i>	twin cress	Ab
* <i>L. squamatum</i>	wart cress	R
* <i>Linaria purpurea</i>	purple toadflax	O
* <i>L. vulgaris</i>	toadflax	O, p
* <i>Linum trigynum</i>	yellow flax	O
# <i>Lobularia maritima</i>	alyssum	R, p
* <i>Lycopersicon esculentum</i>	tomato	S
* <i>Lythrum hyssopifolium</i>	hyssop loosestrife	O
* <i>L. junceum</i>	rose loosestrife	O
* <i>Lotus angustissimus</i>	slender birdsfoot trefoil	C

* <i>L. pedunculatus</i>	lotus	Ab
* <i>L. suaveolens</i>	hairy birdsfoot trefoil	Ab
* <i>L. tenuis</i>		R
* <i>Malva nicaeensis</i>	French mallow	Ab
* <i>Medicago arabica</i>	spotted bur medick	Ab
* <i>M. lupulina</i>	black medick	R
* <i>M. nigra</i>	bur medick	C
* <i>Melilotus indica</i>	King Island melilot	Ab
* <i>Mentha pulegium</i>	pennyroyal	Ab
# <i>Mentha spicata</i> subsp. <i>spicata</i>	spearmint	O
* <i>Modiola caroliniana</i>	creeping mallow	Ab
* <i>Myosotis discolor</i>	grassland forget-me-not	R
# <i>M. sylvatica</i>	garden forget-me-not	R
* <i>Orobanche minor</i>	broomrape	O
* <i>Oxalis corniculata</i>	horned oxalis	O
* <i>O. pes-caprae</i>	Bermuda buttercup	O
# <i>Pelargonium crispum</i>	lemon-scented pelargonium	S, p
# <i>P. peltatum</i>	ivy-leaved pelargonium	O, p
# <i>Pelargonium tomentosum</i>	peppermint-scented pelargonium	S, p
# <i>P. x domesticum.</i>	regal pelargonium	O, p
* <i>P. x hortorum</i>	zonal pelargonium	O, p
# <i>Petroselinum crispum</i>	parsley	R, p
* <i>Physalis peruviana</i>	cape gooseberry	O
* <i>Plantago lanceolata</i>	narrow-leaved plantain	Ab
* <i>P. major</i>	broad-leaved plantain	O
* <i>Polycarpon tetraphyllum</i>	allseed	Ab
* <i>Polygonum aviculare</i>	wireweed	Ab
* <i>Portulaca oleracea</i>	purslane	Ab
* <i>Prunella vulgaris</i>	selfheal	C
* <i>Ranunculus parviflorus</i>	small-flowered buttercup	O
* <i>R. repens</i>	creeping buttercup	Ab
* <i>R. sardous</i>	hairy buttercup	C
* <i>R. sceleratus</i>	celery-leaved buttercup	S
* <i>Rorippa nasturtium-aquaticum</i>	watercress	Ab
* <i>Rumex acetosella</i>	sheep's sorrel	Ab
* <i>R. brownii</i>	hooked dock	R
* <i>R. conglomeratus</i>	clustered dock	Ab
* <i>R. crispus</i>	curled dock	O
* <i>R. obtusifolius</i>	broad-leaved dock	O
* <i>R. pulcher</i>	fiddle dock	C
* <i>Salsola kali</i>	saltwort	Ab
* <i>Sherardia arvensis</i>	field madder	O
* <i>Silene gallica</i>	catchfly	C
* <i>Sisymbrium orientale</i>	hedge mustard	O
* <i>Solanum nigrum</i>	black nightshade	C
* <i>S. pseudocapsicum</i>	Jerusalem cherry	O
* <i>Spergularia rubra</i>		Ab
* <i>Stellaria media</i>	chickweed	C
* <i>Torilis arvensis</i>	spreading hedge-parsley	Ab
* <i>Trifolium dubium</i>	suckling clover	C
* <i>T. fragiferum</i>	strawberry clover	O
* <i>T. repens</i>	white clover	Ab
* <i>T. subterraneum</i>	subterranean clover	O
* <i>Tropeolum majus</i>	nasturtium	R
* <i>Urtica urens</i>	nettle	C
* <i>Verbascum creticum</i>	cretan mullein	R
* <i>V. thapsus</i>	woolly mullein	S

* <i>Veronica arvensis</i>	field speedwell	C
* <i>V. persica</i>	scrambling speedwell	R
* <i>V. seryphyllifolia</i>	turf speedwell	R
* <i>Vicia tetrasperma</i>	smooth tare	O
* <i>V. sativa</i>	vetch	O
* <i>Verbena officinalis</i>	vervain	R

APPENDIX 5

PASTURE MANAGEMENT OPTIONS

Four options for management of pasture during the transition to forest have been considered.

Option 1

Graze with stock and control any pasture weeds as necessary by tractor or knapsack sprayer. Maintain tracks with a tractor/mower. Retire paddocks, ideally two years in advance of planting, to allow compacted soil to recover and grass to go rank. Progressively plant until the restoration programme is complete/nearly complete. Cease grazing and manage remaining grass areas by tractor/mower.

Benefits	Disadvantages
<ul style="list-style-type: none"> - Grazing will largely confine weeds to coastal remnants and margins and the focus can be on controlling weeds here. 	<ul style="list-style-type: none"> - Grazing will require investment and management. - Remnants will need to be fenced. - Requirements of grazing may influence the sequence of planting - Cowpats, pugged soil, stock challenging. - Continued erosion and deflation of archaeological features

Option 2

Remove stock and allow grass paddocks to go fallow. Manage weed growth as required, by helicopter, tractor and knapsack sprayer. Mow tracks and areas required for access or views. Progressively plant until the programme is complete.

Benefits	Disadvantages
<ul style="list-style-type: none"> - Forest remnants are protected. - The export of nutrients ceases. - Pugged soil starts to recover. - Fences can be removed. - No cowpats or stock challenging. - Rank grass allows invertebrates and reptiles to multiply. - Planting is not influenced by the requirements of grazing. - Reduced erosion and deflation of archaeological features 	<ul style="list-style-type: none"> - Weeds may take over paddocks as in ungrazed areas, thereby exacerbating weed control problems. - Weeds may need to be managed on an island-wide scale by helicopter, tractor and knapsack sprayer.

Option 3

Remove stock and mow grass paddocks to control weeds. Progressively plant until the programme is complete.

Benefits	Disadvantages
<ul style="list-style-type: none"> - Forest remnants are protected. - The export of nutrients ceases. - Pugged soil starts to recover. - Fences can be removed. - No cowpats or stock challenging. - Planting is not influenced by the requirements of grazing. - Reduced erosion and deflation of archaeological features 	<ul style="list-style-type: none"> - 130ha approx. to mow several times a year. - Soil compaction in specific areas. - Reinstating grazing to control weeds is not an option once fences are removed.

Option 4

Combine some grazing with some fallow land to suit particular circumstances and mow tracks and areas required for access or views. Progressively retire paddocks and plant until the programme is complete. Remove stock.

Benefits	Disadvantages
<ul style="list-style-type: none"> - Weed problems are not significantly increased - Grazing remains as an effective weed control mechanism - There is flexibility to retire paddocks if beneficial, ie. to protect remnants. - Mowing maintains tracks and areas most accessible to visitors - Cowpats, pugged soil, stock challenging are reduced. 	<ul style="list-style-type: none"> - Grazing will require investment and management - Some remnants will need to be fenced. - Requirements of grazing may influence the sequence of planting. - Continued erosion and deflation of some archaeological features

APPENDIX 6

RECOMMENDED SPECIES FOR RESTORATION PLANTING

Adapted from Motuihe species list prepared by Shelley Heiss-Dunlop, 2003

NB. Wetland spp are not included.

Abbreviations

- * = No or limited seed source on Motuihe
- # = Species particularly tolerant of coastal exposure
- = Important food sources for birds
- S = Species suitable for reverted grassland/low shrubland

PIONEER SPECIES		EARLY-MID SUCCESSIONAL SPECIES	
Common Name	Botanical Name	Common Name	Botanical Name
Akeake	<i>Dodonaea viscosa</i> * #	Akepiro	<i>Olearia furfuracea</i>
Coastal astelia	<i>Astelia banksii</i> #	Hangehange	<i>Geniostoma rupestre</i> •
Cabbage tree, Ti kouka	<i>Cordyline australis</i> # • S	Lancewood	<i>Pseudopanax crassifolius</i> *
Carex	<i>Carex flagellifera</i> S		
Carex	<i>C. testacea</i> S	Kawakawa	<i>Macropiper excelsum</i> •
Coastal cutty grass	<i>Gahnia lacera</i> # S	Kowhai	<i>Sophora chathamica</i> •
Coastal karamu	<i>Coprosma macrocarpa</i> * #•	Mamaku, black tree fern	<i>Cyathea medullaris</i>
Coastal toetoe	<i>Cortaderia splendens</i> # S	Mamangi	<i>Coprosma arborea</i> *
Five finger	<i>Pseudopanax arboreus</i> * •	Mapou	<i>Myrsine australis</i>
Giant umbrella sedge	<i>Cyperus ustulatus</i> S	Mingimingi	<i>Leucopogon fasciculatus</i> * S
Harakeke, flax	<i>Phormium tenax</i> # • S	Nikau	<i>Rhopalostylis sapida</i> * •
Houhere	<i>Hoheria populnea</i> *	Pigeonwood	<i>Hedycarya arborea</i> •
Houpara	<i>Pseudopanax lessonii</i> # •	Poroporo	<i>Solanum aviculare</i> S
Knobby club rush	<i>Ficinia nodosa</i> # S	Prickly mingimingi	<i>Cyathodes juniperina</i> *
Kanono	<i>Coprosma grandifolia</i> * •	Putaputaweta	<i>Carpodetus serratus</i> * •
Kanuka	<i>Kunzea ericoides</i>	Rangiora	<i>Brachyglottis repanda</i>
Karamu	<i>Coprosma robusta</i> •	Rewarewa	<i>Knightia excelsa</i> •
Karo	<i>Pittosporum crassifolium</i> # •	Silver tree fern	<i>Cyathea dealbata</i>
Kohuhu	<i>Pittosporum tenuifolium</i> *	Titoki	<i>Alectryon excelsus</i> *
Koromiko	<i>Hebe stricta</i> var. <i>stricta</i> # S	Twiggy coprosma	<i>Coprosma rhamnoides</i> *
Mahoe	<i>Melicytus ramiflorus</i> * •	Wharangi	<i>Melicope ternata</i>
Manuka	<i>Leptospermum scoparium</i> #	Whau	<i>Entelia arborescens</i> •
Ngaio	<i>Myoporum laetum</i> #	Wheki	<i>Dicksonia squarrosa</i>
North Island broom	<i>Carmichaelia aligera</i> *		
Pate	<i>Schefflera digitata</i> * •		
Pig fern	<i>Paesia scaberula</i> S		
Pohuehue	<i>Muehlenbeckia complexa</i> #		
Pohutukawa	<i>Metrosideros excelsa</i> # •		
Shiny karamu	<i>Coprosma lucida</i> •		
Tarata, lemonwood	<i>Pittosporum eugenoides</i> *		
Taupata	<i>Coprosma repens</i> #		
Tutu	<i>Coriaria arborea</i>		

CANOPY SPECIES		ADDITIONAL SPECIES	
Common Name	Botanical Name	Common Name	Botanical Name
Hinau	<i>Elaeocarpus dentatus</i> * ●	Bush lawyer	<i>Rubus cissoides</i>
Kahikatea	<i>Dacrycarpus dacydioides</i> *●	Clematis	<i>Clematis paniculata</i> *
Karaka	<i>Corynocarpus laevigatus</i> # ●	Coastal mahoe	<i>Melicytus novae-zealandiae</i> subsp. <i>novaezealandiae</i> * ●
Kauri	<i>Agathis australis</i> *	Forest cabbage tree	<i>Cordyline banksii</i> *
Kohekohe	<i>Dysoxylum spectabile</i> ●	Heketara	<i>Olearia rani</i> * ●
Maire white	<i>Nestegis lanceolata</i> * ●	Kiekie	<i>Freycinetia banksii</i>
Maire tawake, swamp maire	<i>Syzygium maire</i> *	Milk tree	<i>Streblus banksii</i> *
Mangeao	<i>Litsea calicaris</i> * ●	Mingimingi	<i>Coprosma propinqua</i> * ●
Matai	<i>Prumnopitys taxifolia</i> *	Northern rata	<i>Metrosideros robusta</i> * ●
Miro	<i>Prumnopitys ferruginea</i> * ●	NZ gloxinia	<i>Rhabdotheramnus solandri</i> * ●
Puka	<i>Griselinia lucida</i> *	NZ jasmine	<i>Parsonsia heterophylla</i>
Pukatea	<i>Laurelia novae-zealandiae</i> *	NZ passionfruit	<i>Passiflora tetrandra</i> *
Puriri	<i>Vitex lucens</i> ●	Pittosporum cornifolium	<i>Pittosporum cornifolium</i> *
Rimu	<i>Dacrydium cupressinum</i> *	Pohuehue	<i>Muehlenbeckia australis</i>
Tanekaha	<i>Phyllocladus trichomanoides</i> *	Rata - white climbing	<i>Metrosideros diffusa</i> *
Tarairae	<i>Beilschmiedia tarairi</i> ●	Rata - orange	<i>Metrosideros fulgens</i> *
Tawa	<i>Beilschmiedia tawa</i> * ●	Rata - small white	<i>Metrosideros perforata</i> *
Tawapou	<i>Pouteria costata</i>	Swamp lawyer	<i>Rubus australis</i> *
Totara	<i>Podocarpus totara</i> *	Toropapa, native honeysuckle	<i>Alseuosmia macrophylla</i> * ●
		Tree fuchsia	<i>Fuchsia excorticata</i> * ●
		Turepo	<i>Streblus heterophyllus</i> *
		Wineberry	<i>Aristotelia serrata</i> *

APPENDIX 7

THREATENED PLANT SPECIES TO BE CONSIDERED FOR REINTRODUCTION

Botanical name	Common name	Source	Habitat type
Species once found on Motuihe (Kirk, 1879)			
<i>Euphorbia glauca</i>	Shore spurge	Motukorea	Coastal, open
<i>Pimelea arenaria</i>	Sand daphne	Ngunguru Bay	Coastal, sand dunes
<i>Sicyos australis</i>	Mawhai	Hauturu	Coastal, banks, bush margins
Species known from the wider Gulf			
<i>Austrofestuca littoralis</i>	Sand tussock	Pakiri	Coastal foredune
<i>Dactylanthus taylori</i>	Wood rose	Hauturu	Successional species
<i>Desmoschoenus spiralis</i>	Pingao	Waiheke	Coastal foredune
<i>Pimelea tomentosa</i>		Waiheke	Scrub, open bush
<i>Pomaderris phyllicifolia</i>		Waiheke	Scrub, open sites
<i>Streblus banksii</i>	Coastal milk tree	Tarahiki	Coastal forest

APPENDIX 8

BIRD SPECIES RECORDED ON MOTUIHE

Data derived from Stubbs, A L, 1996. *Management Recommendations for the Ecological Rehabilitation of Motuihe Island.*

FOREST: Total 14 species			
Native: 7 species		Introduced: 7 species	
Tui	<i>Prothemadera novaeseelandiae</i>	Goldfinch	<i>Carduelis carduelis</i>
Silvereye	<i>Zosterops lateralis</i>	Greenfinch	<i>Carduelis chloris</i>
Fantail	<i>Rhipidura fuliginosa</i>	Chaffinch	<i>Fringilla coelebs</i>
Grey warbler	<i>Gerygone igata</i>	Blackbird	<i>Turdus merula</i>
Kingfisher	<i>Halcyon sancta</i>	Song thrush	<i>Turdus philomelos</i>
New Zealand pigeon	<i>Hemiphaga novaeseelandiae</i>	Yellowhammer	<i>Emberiza citrinella</i>
Morepork	<i>Ninox novaeseelandiae</i>	House sparrow	<i>Passer domesticus</i>
OPEN COUNTRY/WETLAND: Total 12 species			
Native: 7 species		Introduced: 5 species	
Welcome swallow	<i>Hirundo tahitica neoxena</i>	Mallard	<i>Anas platyrhynchos</i>
Australasian harrier	<i>Circus approximans</i>	Skylark	<i>Alauda arvensis</i>
Pukeko	<i>Porphyrio porphyrio</i>	Australian magpie	<i>Gymnorhina tibicen</i>
New Zealand scaup	<i>Aythya novaeseelandiae</i>	Starling	<i>Sturnis vulgaris</i>
Paradise shelduck	<i>Tadorna variegata</i>	Indian myna	<i>Acridotheres tristis</i>
Grey duck	<i>Anas superciliosa</i>		
New Zealand pipit	<i>Anthus novaeseelandiae</i>		
COASTAL: Total 12 species			
Native: 12 species			
Reef heron	<i>Egretta sacra</i>		
White-faced heron	<i>Ardea novaehollandiae</i>		
White-fronted tern	<i>Sterna striata</i>		
Caspian tern	<i>Sterna caspia</i>		
New Zealand dotterel	<i>Charadrius obscurus</i>		
Spur-winged plover	<i>Vanellus miles</i>		
Variable oystercatcher	<i>Haematopus unicolor</i>		
Little shag	<i>Phalacrocorax melanoleucos</i>		
Pied shag	<i>Phalacrocorax varius</i>		
Little black shag	<i>Phalacrocorax sulcirostris</i>		
Black-backed gull	<i>Larus dominicanus</i>		
Red-billed gull	<i>Larus novaehollandiae</i>		

The following bird species have subsequently been recorded on the island:

Banded dotterel	<i>Charadrius bicinctus</i>
Barbary dove	<i>Streptopelia roseogrisea</i>
Black shag	<i>Phalacrocorax carbo</i>
Blue penguin	<i>Eudyptula minor</i>
Eastern rosella	<i>Platycercus eximius</i>

APPENDIX 9

REPTILES RECORDED FROM THE AUCKLAND GEOGRAPHIC REGION

Based on data from local extant species and subfossil deposits in dunes and caves.
Data from Hardy (1977), Newman and Towns (1985), Pickard and Towns (1988)
and Worthy (1987a, 1987b, 1991).

Habits are defined as: D = diurnal; C = crepuscular; N = nocturnal.

Status is defined using Hitchmough (2002):

NE = nationally endangered; GD = gradual decline; S = sparse;

RR = range restricted; DD = data deficient.

Species marked RP have an existing recovery plan.

* = potential species for Motuihe

SPECIES	STATUS	HABIT	NEAREST LIVING POPULATION
* <i>Sphenodon</i> : Tuatara	RP, S	N	Little Barrier
* <i>Hoplodactylus</i> : Common gecko	Not threatened	N	Waiheke
*Duvaucel's gecko	S	N	Little Barrier
Forest gecko	Not threatened	D-N	Waiheke
*Pacific gecko	GD	N	Great Barrier
<i>Naultinus</i> : Auckland green gecko	Not threatened	D	Waiheke
* <i>Cyclodina</i> : Copper skink	Not threatened	C	Waiheke
*Marbled skink	RP, S	C-N	Little Barrier
McGregor's skink	RP, RR	N	Sail Island
*Ornate skink	Not threatened	C	Rakino
*Robust skink	RP, RR	N	Mercury Islands
*Whitaker's skink	RP, RR	N	Mercury Islands
* <i>Oligosoma</i> : Chevron skink	NE	D	Little Barrier
*Moko skink	S	D	Rangitoto
*Shore skink	Not threatened	D	Rangitoto
*Striped skink	RP, DD	D	Great Barrier
Suter's skink	Not threatened	N	Motutapu
Total species in region: 17			
Potential species for Motuihe: 12-14			

APPENDIX 10

BIOSECURITY STANDARDS FOR MOTUIHE RESTORATION PROJECT

INTRODUCTION

Motuihe is free of many introduced pests and weeds and it is important that this status is maintained so as not to compromise any future introductions of rare birds and other animals.

Pests such as rodents and weeds can potentially be introduced by visitors. For example Argentine ants are believed to have been brought on to Tiritiri Matangi on unclean machinery or building materials during the construction of the new wharf in 1999.

The Department of Conservation wishes to ensure there are no introductions of weeds and pests to Motuihe. It is therefore important that all volunteers and contractors observe the standards. Volunteers are to be briefed on the 'basic' standards before travelling to the island. In addition, the Motuihe Trust, and associated contractors, must commit to, and meet the 'Trust/contractor' standards outlined below.

BASIC STANDARDS (for volunteers)

- Prior to departure, the soles of boots, packs, socks, cuffs of trousers, packs, pockets and any work clothing that may have weed seeds attached, should be thoroughly checked and cleaned. Volunteers should be encouraged to thoroughly clean the soles of boots if they have recently been in an area with *Selaginella* moss.
- All food should be in sealed containers. Fish bins, chilly bins or cardboard boxes (no holes) with tight fitting lids are preferred. Tightly sealing packs can be used as an alternative. Food should not be in open boxes or supermarket bags.
- Any Volunteers travelling on DOC transport to Motuihe for overnight stays need to deliver their equipment to the Fleet St Store, Devonport for processing through the Quarantine store a day prior to departure.
- Volunteers making their own way to Motuihe are responsible for checking their own boat and gear for the presence of rodents, ants or other pests prior to departure.
- Boxes of food and equipment are to be opened in an enclosed area once on the island and inspected for the presence of rodents, ants and other pests.
- All tents should be cleaned, exposed to sunlight, dried and be thoroughly checked for soil, seeds and plant material, invertebrates and rodents, etc.
- Any equipment and supplies where there are cavities which cannot be adequately inspected (e.g. curled hollow objects), and that could hold an ants nest, over-wintering wasps etc, should be tapped or banged to dislodge hiding invertebrates.
- All bags, packs, etc should have all openings securely fastened and must not have any holes. They must also be packed or re-packed on the day of departure.
- Any suspected incursion or invasion on Motuihe must be immediately contained as far as possible and reported without delay to the Department of Conservation.

TRUST/CONTRACTOR STANDARDS

- No plant material can be taken to the island without prior written permission of the Department of Conservation.
- Digging tools, spades, shovels, post-hole diggers etc are to be cleaned and soil and seed-free before landing on the island.
- All machinery, diggers, excavators, trucks and vehicles must be thoroughly cleaned and inspected to ensure they are free of all pests, dirt, soil, plant material and seeds before they are loaded on to barges for transport to the island.
- Particular attention must be paid to the tracks and buckets of excavators. These should be thoroughly cleaned and inspected for pests, plant material and seeds before loading on to barges for transport to the island.
- Any tarpaulins or covers are to be unrolled and inspected before loading onto barges. Stored tarpaulins and covers are hiding places for rats, mice, insects and seeds.
- Rodents, seeds and unwanted predators – including insects – can be secreted in a number of hiding places. Sacks, bags, covers, open pipes and concrete blocks are all potential hiding places, and the contractor needs to be aware and vigilant against any invasion of pests.
- Boxes of tools and food are to be opened in an enclosed area once on the island and inspected for the presence of rodents and other pests.
- Barges or boats used for transporting machinery to the island will need to be pest free. Barges need to have on board pest tracking tunnels and poison bait stations at least three days prior to departure. These will need to be inspected prior to departure by an inspector appointed by the Department of Conservation. If animal tracks are recorded then the barge will not be allowed to land on Motuihe. The tracking tunnels can be arranged and supplied by the Department of Conservation's Auckland Area Office. Please allow sufficient lead-in time for this service. It is the responsibility of the contractor to see that this is done.
- Barges must also be inspected to ensure that they are free of Argentine ant nests. Such inspections can be carried out by a reputable pest control company and Flybusters Anti-Ants (Ph. 09-486 4411) is highly recommended as they specialise in ants and have considerable experience with Argentine ants.
- Barges and boats are only allowed to stay alongside the wharf at Motuihe for unloading and loading only.
- Any suspected rodent, pest or weed invasion on Motuihe Island, whether caused by the contractor or not, must be immediately contained as far as possible and reported without delay by the contractor to the Department of Conservation's Auckland Area Office (09 445 9142).
- In the event of an invasion or suspected invasion, the contractor will be required to help and cooperate with the island staff in carrying out the island's Pest Invasion Contingency Plan. This requirement applies to weeds and weed seeds if the contractor is responsible for their introduction.

Signed as read _____

Date: _____

APPENDIX 11

VISITOR CENTRE SITE OPTIONS

Four options for the location of a visitor centre have been assessed in detail (Plan 11).

Northwest peninsula sites (1, 2, and 3)

Benefits	Disadvantages
<ul style="list-style-type: none"> - Information about Motuihe is provided to visitors at the point of arrival via the wharf and main boat anchorages. - Visibility of the centre from arrival zones will attract visitors - Visitors may spend time here while waiting for ferry departures. - Visitors who come to enjoy existing recreational activities are exposed to recreation and conservation opportunities in the wider Hauraki Gulf – the ‘gateway’ function. - The isthmus is a convenient rendezvous for guided tours or, if needed, a place to pick up transport to the ‘lookout’. - Accessible to the most popular beaches and has the potential to generate revenue from the sale of refreshments and other goods during the season. - The landscape provides a mature context and there is a close association with, and views of the water. - Proximity to historic places will facilitate interpretation of this aspect of the island’s heritage. 	<ul style="list-style-type: none"> - All three sites could compromise the heritage values of archaeological site R11/1784 and an Authority to Modify is likely to be required from the New Zealand Historic Places Trust. - The visitor centre is identified with the European historic area rather than the restored landscape. - Limited potential to create a restored biodiversity context. - A building on site 1 has potential for offshore visual impact. - Capacity to generate solar power is restricted on Site 2. - A building on site 3 has the potential to visually dominate the narrow isthmus area, reduce the current area available for recreation, and contribute to overcrowding by concentrating visitor activities.

Farm site (4)

Benefits	Disadvantages
<ul style="list-style-type: none"> - Close association with the restored ecosystem including a view over the northern part of the island. - Building design and site development is unencumbered by heritage, visual sensitivity or visitor overcrowding issues. 	<ul style="list-style-type: none"> - Distance from the main arrival point may result in some visitors not going to the visitor centre and therefore missing out on information about recreation and conservation opportunities on the island and the wider Hauraki Gulf. - It may not generate revenue from the sale of refreshments and other goods to beach users during the season.

APPENDIX 12

KOIWI PROTOCOL

In the event of a burial site/bones being disturbed the following procedure will apply:

- Work in the area ceases immediately.
- The site is clearly isolated, for example, using marker pegs and tape.
- The Department of Conservation Duty Officer is notified via the DOC Hotline: 0800 362 468.
- The Duty Officer notifies Historic Resources Staff of the finding.
- Historic Resources Staff establish whether the bones are of human origin.
- If the bones are confirmed as being of human origin the police and iwi are informed.
- Police investigate the circumstances.
- If the koiwi/bones are confirmed as being of Maori origin, iwi determine the proceedings thereafter.

APPENDIX 13

MEMORANDUM OF UNDERSTANDING

Text to be agreed following consultation.

TABLES

Indicative Restoration Activities

Table 1 – Year 1

Table 2 – Year 2

Table 3 – Year 3

Table 4 – Year 4

Table 5 – Year 5

TABLE 1 - YEAR 1 - INDICATIVE RESTORATION ACTIVITIES

PHYSICAL AND CULTURAL LANDSCAPE MANAGEMENT	ECOSYSTEM MANAGEMENT	PROVISION OF VISITOR FACILITIES AND SERVICES	COMMUNITY PARTICIPATION AND PROGRAMME SUPPORT
<p>Landscape</p> <ul style="list-style-type: none"> Remove selected trees near toilets Select and retain viewshafts through plantings on Wharf Bay cliffs Clean up island-wide rubbish, ie. oil drums, wire coils Rehabilitate and re-grass former kiosk site Target weeds on wharf approach road and isthmus Remove redundant signs <p>Maori Archaeological Sites</p> <ul style="list-style-type: none"> Apply for NZHPT authority to modify. Mark out sites R11/148, 865, 866, 868, 870, 871, 875, 883, 884, 885, 886, 1899 and 1908 in bush and reserve from infill planting In liaison with iwi, control exotic vegetation on the pa site R11/151 Delineate sites affected by Year 2 planting <p>European Historic Sites</p> <ul style="list-style-type: none"> Identify exotic heritage trees to be retained Remove invasive exotic trees from coastal margins of R11/1784 and replace with native species Remove barbecue from R11/1881 	<p>Vegetation</p> <ul style="list-style-type: none"> Identify location of threatened and uncommon plant species and protect from weed control activities Implement weed control strategy <p>Fencing</p> <ul style="list-style-type: none"> Fence remnants in puriri paddock from stock Upgrade fencing as necessary <p>Planting</p> <ul style="list-style-type: none"> Prepare a planting leaflet Prepare planting plans in advance, including species requirements Retire paddocks in advance of planting Collect relevant seed and propagate plants to suit requirements Progressively plant, starting with phase 1 planting zone (Plan 8) Monitor growth rates and survival of species <p>Wetlands</p> <ul style="list-style-type: none"> Commission detailed design for wetlands <p>Fauna</p> <ul style="list-style-type: none"> Apply for Transfer Permits to introduce bird species Survey reptile species and habitat Survey invertebrate species and habitat Monitor compliance with domestic pet rules Monitor wasp populations Monitor populations and impacts of undesirable bird species <p>Animal Pests</p> <ul style="list-style-type: none"> Implement the Biosecurity Standards for Motuihe Restoration Project Monitor for presence of cats Monitor for presence of rabbits 	<p>Visitor Facilities</p> <ul style="list-style-type: none"> Plan for an information structure at the isthmus <p>Walking Tracks</p> <ul style="list-style-type: none"> Confirm routes of all tracks Prepare comprehensive sign system Track 4 – European historic heritage <ul style="list-style-type: none"> Cease grazing on northwest peninsula and manage by mowing Remove subdivisional fences Mow track route Track 1 – survey to define routes of short and long loops, potential sites for spur tracks and connections to Limestone Point and site R11/876 Track 1 – commission designs for structures Mow routes of tracks in grassland – ridgelines, Tracks 3 and 4 and access to Snapper and Calypso Bays <p>Interpretation</p> <ul style="list-style-type: none"> Prepare interpretation strategy Record oral history interviews Prepare video recordings of restoration activities 	<p>Community Support</p> <ul style="list-style-type: none"> Develop working relationships with schools, tertiary institutions and community groups Promote annual conservation events, eg. Arbor Day (5 June) Promote regular restoration programme events Promote special restoration events, ie. start of planting season Emphasise to visitors, the threat posed by plant and animal pest introductions and domestic pets Post 'No Dogs' policy in boat/yacht/fishing club newsletters and magazines Expand volunteer network Organise speakers to community groups <p>Community partnerships</p> <ul style="list-style-type: none"> Enter into Memorandum of Understanding Encourage involvement of iwi in management and interpretation of sites and cultural plantings. Encourage involvement of tertiary institutions in research <p>Programme Management</p> <ul style="list-style-type: none"> Appoint project co-ordinator Prepare annual work programme Appoint additional Trustees to the Board Maintain records of activities Prepare annual report Erect 'No Fire' signs at Wharf Bay, Ocean Beach, Snapper and Calypso Bays Set up photo points <p>Sponsorship</p> <ul style="list-style-type: none"> Generate and administer Trust funds Arrange special events for sponsors Prepare Motuihe Business Plan

TABLE 2 - YEAR 2 - INDICATIVE RESTORATION ACTIVITIES

PHYSICAL AND CULTURAL LANDSCAPE MANAGEMENT	ECOSYSTEM MANAGEMENT	PROVISION OF VISITOR FACILITIES AND SERVICES	COMMUNITY PARTICIPATION AND PROGRAMME SUPPORT
<p>Landscape</p> <ul style="list-style-type: none"> Plant specimen trees at the isthmus (Plan 12) Commission planting plan for the farm complex Install ramped steps to toilets Remove water troughs from retired paddocks <p>Maori Archaeological Sites</p> <ul style="list-style-type: none"> Apply for NZHPT authority to modify Mark out and plant rice grass on sites R11/158, 159 and 876 and pohuehue on sites R11/154, 872 and 873 <p>European Historic Sites</p> <ul style="list-style-type: none"> Undertake research to confirm or identify the location of Von Luckner's hiding place Commission Conservation Management Plan for site R11/1784 Remove weeds and invasive exotic trees from coastal margins of R11/1784; replace with native species Remove invasive exotic trees from northwest peninsula and isthmus Repair roof of pump shed 	<p>Vegetation</p> <ul style="list-style-type: none"> Implement weed control strategy Assess timber value of exotic trees on farm Remove invasive exotic trees from the isthmus <p>Fencing</p> <ul style="list-style-type: none"> Remove redundant fencing on Bald Knob Fence remnants in orchard paddock from stock Upgrade fencing as necessary <p>Planting</p> <ul style="list-style-type: none"> Prepare planting plans in advance, including species requirements Retire paddocks in advance of planting Collect relevant seed and propagate plants to suit requirements Continue planting <p>Wetlands</p> <ul style="list-style-type: none"> Implement earthworks to create wetlands; carry out initial planting <p>Fauna</p> <ul style="list-style-type: none"> Apply for Transfer Permits to introduce bird and reptile species Survey freshwater habitat Monitor compliance with domestic pet rules Monitor wasp populations Monitor populations and impacts of undesirable bird species <p>Animal Pests</p> <ul style="list-style-type: none"> Monitor for presence of cats Monitor for presence of rabbits 	<p>Visitor Facilities</p> <ul style="list-style-type: none"> Remove wood-fired barbecues; supply gas-fired barbecues for hire Commission design for information structure at the isthmus <p>Walking Tracks</p> <ul style="list-style-type: none"> Track 1 – implement structures and track for short loop Track 2 – commission designs for wetland structures <p>Interpretation</p> <ul style="list-style-type: none"> Prepare brochures and fact sheets on restoration programme, open sanctuary concept, remnants of coastal forest, coastal marine area, European historic sites, Maori heritage Prepare video recordings of restoration activities Record oral history interviews 	<p>Community Support</p> <ul style="list-style-type: none"> Develop working relationships with schools, tertiary institutions and community groups Promote annual conservation events, eg. Conservation Week Offer volunteer training Promote regular restoration programme events Promote special restoration events, eg. species release Emphasise to visitors, the threat posed by plant and animal pest introductions and domestic pets Post 'No Dogs' policy in boat/yacht/fishing club newsletters and magazines Expand volunteer network Organise speakers to community groups Promote 'pack in-pack out' policy <p>Community Partnerships</p> <ul style="list-style-type: none"> Contact interested parties to assemble historic database for use in interpretation Develop partnership with ASB and Zoo Involve tertiary institutions in research <p>Programme Management</p> <ul style="list-style-type: none"> Prepare annual work programme Maintain records of activities Prepare annual report Review structures and fences at the operations centre Set up photo points <p>Sponsorship</p> <ul style="list-style-type: none"> Generate and administer Trust funds Arrange special events for sponsors

TABLE 3 - YEAR 3 - INDICATIVE RESTORATION ACTIVITIES

PHYSICAL AND CULTURAL LANDSCAPE MANAGEMENT	ECOSYSTEM MANAGEMENT	PROVISION OF VISITOR FACILITIES AND SERVICES	COMMUNITY PARTICIPATION AND PROGRAMME SUPPORT
<p>Landscape</p> <ul style="list-style-type: none"> • Plant coastal scarp at isthmus (Plan 12) • Commission colour scheme for buildings • Progressively paint/repaint all buildings – start with woolshed <p>Maori Archaeological Sites</p> <ul style="list-style-type: none"> • Monitor growth of rice grass on sites R11/158, 159 and 876 <p>European Historic Sites</p> <ul style="list-style-type: none"> • Research history of exotic planting on the island • Engage arborist for advice on heritage trees • Obtain historic advice on wharf shelter • Remove weeds and invasive exotic trees from coastal margins of R11/1784 and replace with native species 	<p>Vegetation</p> <ul style="list-style-type: none"> • Implement weed control strategy • Progressively remove exotic trees from farm <p>Fencing</p> <ul style="list-style-type: none"> • Fence remnants in Von Luckner's paddock and dam paddock • Upgrade fencing as necessary <p>Planting</p> <ul style="list-style-type: none"> • Prepare planting plans in advance, including species requirements • Retire paddocks in advance of planting • Collect relevant seed and propagate plants to suit requirements • Continue planting <p>Wetlands</p> <ul style="list-style-type: none"> • Continue to plant wetlands <p>Fauna</p> <ul style="list-style-type: none"> • Apply for Transfer Permits to introduce bird, reptile and invertebrate species • Prepare proposals for enhancing coastal habitat for birds and reptiles • Monitor compliance with domestic pet rules • Monitor wasp populations • Monitor populations and impacts of undesirable bird species <p>Marine Habitat</p> <ul style="list-style-type: none"> • Investigate management measures in support of the marine habitat 	<p>Visitor Facilities</p> <ul style="list-style-type: none"> • Introduce cutoff drains and regrade vehicle track through isthmus <p>Walking Tracks</p> <ul style="list-style-type: none"> • Commission design for pedestrian bridge across Snapper Bay Stream • Track 2 – implement wetland structures and track <p>Interpretation</p> <ul style="list-style-type: none"> • Prepare brochures and fact sheets on Maori heritage, native forest/shrubland/grassland biodiversity, wetland and stream ecology • Prepare video recordings of restoration activities • Record oral history interviews • Assemble database for interpretation subjects 	<p>Community Support</p> <ul style="list-style-type: none"> • Develop working relationships with schools, tertiary institutions and community groups • Promote annual conservation events, eg. World Wetland Day • Promote regular restoration programme events • Promote special restoration events, ie. completion of wetland • Emphasise fire danger of smoking • Emphasise to visitors, the threat posed by plant and animal pest introductions and domestic pets • Post 'No Dogs' policy in boat/yacht/fishing club newsletters and magazines • Expand the volunteer network • Organise speakers to community groups <p>Community Partnerships</p> <ul style="list-style-type: none"> • Encourage involvement of tertiary institutions in research <p>Programme Management</p> <ul style="list-style-type: none"> • Audit water supply • Prepare annual work programme • Maintain records of activities • Prepare annual report • Purchase quad bike and trailer <p>Sponsorship</p> <ul style="list-style-type: none"> • Generate and administer Trust funds • Arrange special events for sponsors

TABLE 4 - YEAR 4 - INDICATIVE RESTORATION ACTIVITIES

PHYSICAL AND CULTURAL LANDSCAPE MANAGEMENT	ECOSYSTEM MANAGEMENT	PROVISION OF VISITOR FACILITIES AND SERVICES	COMMUNITY PARTICIPATION AND PROGRAMME SUPPORT
<p>Landscape</p> <ul style="list-style-type: none"> • Replace concrete water tank at trig within water reservoirs enclosure • Realign fence to farmhouse • Replant farmhouse surrounds <p>Maori Archaeological Sites</p> <ul style="list-style-type: none"> • Plant pohuehue on sites R11/154, 872 and 873 <p>European Historic Sites</p> <ul style="list-style-type: none"> • Carry out arboricultural work on heritage trees • Upgrade wharf shelter • Commission design for Te Tumurae lookout 	<p>Vegetation</p> <ul style="list-style-type: none"> • Implement weed control strategy • Remove exotic trees from farm <p>Fencing</p> <ul style="list-style-type: none"> • Upgrade fencing as necessary • Extend fencing around water reservoirs at trig <p>Planting</p> <ul style="list-style-type: none"> • Prepare planting plans in advance, including species requirements • Retire paddocks in advance of planting • Collect relevant seed and propagate plants to suit requirements • Continue planting • Plant enclosure around water reservoirs <p>Fauna</p> <ul style="list-style-type: none"> • Apply for Transfer Permits to introduce wetland bird species, reptiles and invertebrates • Monitor compliance with domestic pet rules • Monitor wasp populations • Monitor populations and impacts of undesirable bird species • Provide blue penguin nest boxes on Orchard Bush coast and at back of Wharf Bay beach 	<p>Visitor Facilities</p> <ul style="list-style-type: none"> • Evaluate visitor centre site options <p>Walking Tracks</p> <ul style="list-style-type: none"> • Track 5 – commission design for structures • Track 1 – implement structures and track on long loop • Track to Snapper Bay – implement bridge over Snapper Bay Stream <p>Interpretation</p> <ul style="list-style-type: none"> • Prepare video recordings of restoration activities • Prepare information tapes for hire 	<p>Community Support</p> <ul style="list-style-type: none"> • Develop working relationships with schools, tertiary institutions and community groups • Promote annual conservation events, eg. Sea week • Promote regular restoration programme events • Promote special restoration events, ie. completion of track • Emphasise to visitors, the threat posed by plant and animal pest introductions and domestic pets • Post ‘No Dogs’ policy in boat/yacht/fishing club newsletters and magazines • Expand volunteer network • Organise speakers to community groups • Liaise with ferry companies and tour operators • Refurbish volunteer accommodation <p>Community Partnerships</p> <ul style="list-style-type: none"> • Encourage specialists to guide tours <p>Programme Management</p> <ul style="list-style-type: none"> • Prepare annual work programme • Maintain records of activities • Prepare annual report <p>Sponsorship</p> <ul style="list-style-type: none"> • Generate and administer Trust funds • Arrange special events for sponsors

TABLE 5 - YEAR 5 - INDICATIVE RESTORATION ACTIVITIES

PHYSICAL AND CULTURAL LANDSCAPE MANAGEMENT	ECOSYSTEM MANAGEMENT	PROVISION OF VISITOR FACILITIES AND SERVICES	COMMUNITY PARTICIPATION AND PROGRAMME SUPPORT
<p>Landscape</p> <ul style="list-style-type: none"> Demolish redundant water tanks in paddock 14 ('pug' paddock) <p>Maori Archaeological Sites</p> <ul style="list-style-type: none"> Monitor growth of rice grass and pohuehue on archaeological sites <p>European Historic Sites</p> <ul style="list-style-type: none"> Implement Te Tumurae lookout Repair steel structure of former pumpshed in Ocean Beach catchment and reclad 	<p>Vegetation</p> <ul style="list-style-type: none"> Implement weed control strategy Remove exotic trees from farm <p>Fencing</p> <ul style="list-style-type: none"> Upgrade fencing as necessary <p>Planting</p> <ul style="list-style-type: none"> Prepare planting plans in advance, including species requirements Retire paddocks in advance of planting Collect relevant seed and propagate plants to suit requirements Continue planting <p>Fauna</p> <ul style="list-style-type: none"> Apply for Transfer Permits to introduce bird, reptile and invertebrate species Evaluate potential to enhance fish habitat Monitor compliance with domestic pet rules Monitor wasp populations Monitor populations and impacts of undesirable bird species 	<p>Visitor Facilities</p> <ul style="list-style-type: none"> Construct hide at wetland Commission design for viewing platform overlooking Southeast Beach Commission visitor centre design Assess need for additional public toilet facilities <p>Walking Tracks</p> <ul style="list-style-type: none"> Track 5 – implement structures <p>Interpretation</p> <ul style="list-style-type: none"> Prepare video recordings of restoration activities 	<p>Community Support</p> <ul style="list-style-type: none"> Develop working relationships with schools, tertiary institutions and community groups Promote annual conservation events, eg. Earth Day Extend cultural planting Promote regular restoration programme events Promote special restoration events Emphasise to visitors, the threat posed by plant and animal pest introductions and domestic pets Post 'No Dogs' policy in boat/yacht/fishing club newsletters and magazines Expand volunteer network Organise speakers to community groups <p>Community Partnerships</p> <ul style="list-style-type: none"> Encourage specialists to guide tours <p>Programme Management</p> <ul style="list-style-type: none"> Prepare annual work programme Maintain records of activities Prepare annual report Plan programme of restoration activities for years 6-10 <p>Sponsorship</p> <ul style="list-style-type: none"> Generate and administer Trust funds Arrange special events for sponsors