



TIRITIRI MATANGI WORKING PLAN

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FOREWORD

The original Working Plan for Tiritiri Matangi published in 1982 had as its goal,

"To manage Tiritiri Matangi as a suitable habitat for some of our rarer and endangered fauna and flora, where people, especially Aucklanders, can view them."

Fourteen years on, substantial progress has been made towards achieving this goal. The revegetation programme is all but complete, with over 250,000 trees and shrubs planted since 1984. Several threatened bird species have been released and the island is alive with bird calls. Kiores have been eradicated and weeds are being brought under control. A network of open space and tracks has been established, with boardwalks through vulnerable bush areas. All of this has been achieved with the support and involvement of Auckland University staff and thousands of volunteers from conservation groups, service organisations, schools and the general public. The Supporters of Tiritiri Matangi (Inc) has provided a means of increasing the effectiveness of volunteers and has served to represent the interests of volunteers in the island's management. Tiritiri Matangi has become a model of community involvement and its success has stimulated interest in the restoration of nearby Motutapu and Motuora Islands, and elsewhere in New Zealand. It has also captured the interest of the international conservation movement through visitors from overseas, published research, and papers given by scientists, staff and volunteers at international gatherings.

The number of visitors attracted to the island grows every year, and increasingly they come both to enjoy the young forest which is now evolving and to learn about the birds living there. Tiritiri Matangi is already contributing to conservation education and its high public profile, together with opportunities for participation in restoration activities, means that visitor demand is likely to increase.

It is now time to review the progress made and to identify new goals in line with the strategic objectives and implementation statements in the Conservation Management Strategy for conservation management over the next decade. In addition to future introductions of threatened plants and animals, which will consolidate its already significant contribution to species conservation, there are great opportunities to realise the island's potential for conservation education and to interpret its historical aspects. New facilities and services will be required to meet this next phase of the island's development. The Department sees the involvement and support of the wider community as central to achieving its management objectives.

1. INTRODUCTION

In June 1993 individuals and groups with a particular interest in Tiritiri Matangi were invited to contribute to the planning of its future conservation management. Twenty submissions were received and a hearing review, held over two days in May 1994, enabled submitters to present their ideas.

This Working Plan draws substantially on the review submissions. It has been prepared by Department of Conservation staff with the help of a core group comprising representatives of iwi, Supporters of Tiritiri Matangi Inc (SoTM), Auckland University, Royal Forest & Bird Protection Society of New Zealand (Inc) and the Auckland Conservation Board. Comments on drafts of the Plan were sought from this group, island concessionaires and other interested members of the public.

The Working Plan is designed to give practical guidance to the implementation of the Conservation Management Strategy (CMS, 1995) strategic objectives and implementation statements for the island over the next ten years. The Plan outlines a programme of conservation activities under the headings of ecosystem management; cultural landscape management; the provision of visitor facilities and services; and work programme support.

2. THE PLANNING CONTEXT

Strategic objectives for Tiritiri Matangi are defined in the Auckland Conservation Management Strategy as follows:

Treaty of Waitangi

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

Heritage Protection

- Restore Tiritiri Matangi as an open sanctuary for native fauna and flora, with particular emphasis on the introduction and breeding in the wild of threatened bird species.
- Protect the historic integrity of sites associated with Maori habitation, and the lighthouse complex.

Accessibility

- Continue to develop the island as a focus for community involvement in conservation through the use of volunteers.

- Progressively provide visitor facilities and interpretation to cater for a maximum visitor capacity of 32,000 per year (including a maximum of 150 ferry passengers per day), consistent with visitors having a quality experience of birds in the wild.
- Make this the premier site for interpretation of threatened birds.

CMS also contains implementation statements under the headings of Treaty of Waitangi, Heritage Protection and Accessibility. Other plans and policies which help to guide the management of the island are set out in Appendix 1.

3. THE STATUS OF THE ISLAND

Tiritiri Matangi is an island of some 220 ha situated in the Hauraki Gulf, 4 kms east of the Whangaparoa Peninsula (Plan 1). It is owned by the Crown and administered by the Department of Conservation. It comes within the jurisdiction of the Rodney District Council. The island is classified as a Scientific Reserve under the Reserves Act (1977) that includes the foreshore down to mean high water mark. It is managed as an open sanctuary with the public being free to visit at any time.

The lighthouse which is owned and managed by the Maritime Safety Authority (MSA) has been registered as Category 1 by the Historic Places Trust.

4. ECOSYSTEM MANAGEMENT

The island's long history of human occupation, cultivation and in particular pastoral farming, had reduced the original vegetation cover to a few small remnants in some of the gullies, and pohutukawa¹ around the coastal fringe. It is likely that many species of indigenous plants were extirpated from the island, while others have been reduced to a few individuals. In 1975 (3 years after the cessation of grazing) grass covered 52% of the island, bracken fern 27%, manuka and kanuka stands 10%, and mixed pohutukawa, kohekohe and taraire forest 11% (Esler, 1978). The loss of the forest habitat, stock trampling, together with fire and predation by cats and kiore, had severely depleted the islands fauna. Of the birds only the more resilient species remained.

The 1982 Tiritiri Matangi Working Plan (Drey, 1982) promoted active habitat enhancement rather than leaving the island to regenerate naturally. There were two main reasons for this approach. First, the prospect of recolonisation by indigenous species through bracken fern and grass was slow (West, 1982) and secondly, planting would create habitat and facilitate liberation of selected fauna at an earlier stage. The potential for public involvement in the development of the

reserve to engender a greater conservation awareness was also a consideration.

The planting programme, the introduction of pollinating and seed dispersing birds, and the removal of kiore has given the natural regeneration processes a kick start. The introduced native birds are breeding and some of the larger insects are more evident. Already, seedlings are germinating under the initial planted cover. The next ten years will see a fundamental change in the island's aspect as the young plants coalesce to form a closed canopy.

In time Tiritiri Matangi will almost certainly revert to a forested island whose biota is heavily influenced by seabirds that burrow and enrich the soil. The natural process of regeneration to forest will make the island more suitable for many forest-inhabiting species (eg. bellbirds and saddlebacks) but less suitable for species now inhabiting transitory or managed habitats (eg. pukeko). It will allow the re-establishment of the complex plant-invertebrate-reptile-seabird ecosystem that would have once been present on Tiritiri Matangi.

General policy direction for ecosystem management is outlined in the Implementation section of CMS where 14.7.1 states:

“Restore a thriving indigenous ecosystem representative of the Inner Gulf, capable of supporting a range of common and threatened native animal species, especially birds”.

‘Representative of the Inner Gulf’ has been interpreted here in its broadest sense to include the inner Gulf islands (as defined in the Inner Gulf Islands Ecological District (IGIED Fig 1), and the land on the periphery that would have influenced Tiritiri Matangi’s biological community before it was modified by human intervention. It therefore includes the adjacent mainland and elements of the outer islands.

Given the strategic objectives and implementation statements outlined in the CMS, further translocations of species to the island should focus on those present (or previously present) in the inner Gulf area. These transfers must follow the Department’s Transfer Guidelines for Indigenous Terrestrial Fauna and Flora, species recovery plans or an approved translocation programme.

4.1 FLORA

4.1.1 Development to date

To date the planting programme has been designed to achieve two linked but different objectives, namely forest establishment and enhancement of existing habitat. All plants were raised in the island’s nursery. Although most of the plants were germinated from local seed a few species were introduced, including *Alseuosmia macrophylla*, haekaro and *Rhabdothamnus solandri* from Hauturu (Mitchell, 1985). Plantings such as these are now considered inappropriate and in the future material will be acquired from areas as close as possible to Tiritiri Matangi.

Forest establishment

Planting has been undertaken over 40% of the island in areas of bracken fern and grassland (Plan 3). Certain areas were reserved from planting in accordance with an overall planting plan, including tracks, open space for views, archaeological sites, grazing paddocks in the vicinity of the lighthouse, and the northeast end of the island set aside for natural regeneration. The approach was to shortcut the process of natural regeneration by planting 'climax' and mid-successional species directly (Mitchell, 1985). Initially pohutukawa was the main species planted, together with smaller numbers of successional species including kowhai, *Coprosma* spp, five-finger, karo, flax, whau, mahoe and cabbage tree. Subsequently, when some shelter had been created, these were inter-planted with forest canopy species such as karaka, kohekohe, puriri, taraire, nikau and tawapou.

Habitat enhancement

"Habitat enhancement" has concentrated on improving food sources for birds, particularly during late winter to spring. Species such as puriri, kowhai and five-finger have been planted throughout the island and on the margins of existing bush remnants to augment nectar and fruit sources during this period. Catchments 3, 4, 13 and 14 are the main areas where enhancement planting has been undertaken (Plan 2). Catchments 8 and 9 which contain the largest and most significant bush remnants and which are actively regenerating around the margins, were specifically left to evolve naturally.

Very large differences in growth rates between various species have been recorded, the overall ordering of species resembling that found in the natural succession (Cashmore, 1995). The highest rates have been achieved by the early successional shrub species (ngaio, tauhinu, koromiko, karamu and broom); average rates by the early-mid successional species (five-finger, kanuka, karo and pohutakawa), while the future canopy species have grown only at a low rate (karaka, tawapou, and kohekohe). The faster growing species tend to be those with the highest survival rates.

4.1.2 Vegetation management

Overall there will be no further active management of the vegetation and natural processes will be left to occur without interference. Exceptions to this approach are:

Introduced indigenous species

Some of the species introduced from outside the IGIED are now considered inappropriate because they are not 'representative of the Inner Gulf'. *Hebe* cf. *pubescens* (Hauturu), a species which is still very local in distribution and has the potential to hybridise with the local *H. stricta*, will be removed. The specimens of *Elingamita johnsonii* and *Tecomantbe speciosa* (Three Kings Islands) and *Hibiscus diversifolius* (Aupouri) are considered unlikely to reproduce and these will be retained.

Maori archaeological and European historic site management

Most archaeological sites will be kept free of deep rooting vegetation. The lighthouse complex will be managed by mowing and or grazing to maintain an appropriate setting for the historic structures.

Ceremonial planting

Trees may be planted to celebrate particular events or for commemorative purposes.

Public areas

Areas of open space and some tracks will be managed by mowing to facilitate views and access. Elsewhere tracks will be maintained for access.

Catchment 15

The paddocks at the south eastern end of the island have been reserved from planting to date to provide grazing for sheep and as potential habitat for takahe. A few old remnants of vegetation have survived around the coast and in areas inaccessible to stock. Although seen as desirable, planting the edge was not attempted because of the high cost of fencing.

Sheep numbers will be progressively reduced over the next five years so that most of the area can be managed for takahe. The coastal edge will be planted with widely spaced pohutukawa interspersed with coastal shrubs. Pockets of planting will also be established within the grassland to provide cover for takahe. Sheep netting fencing augmented with electric fencing will protect planted areas until sheep are removed.

Catchment 10

The linear pattern of planted pohutukawa down the valley sides is very apparent when viewed from adjacent ridges and will remain so for many years. A variety of forest species will be inter-planted to reduce this effect.

Dam sites

Several dams were created as part of the takahe habitat enhancement programme and these will be planted with flax, cabbage trees, etc.

Absent or poorly represented species

Certain species are absent or poorly represented on the island, eg. mangeao. The introduction of such species will only occur to enhance existing depleted populations or to restore taxa which are now extirpated, or if they have been subjected to an Environmental Impact Assessment process and consensus has been reached as to suitability. Plants will be obtained from the closest and best island source within the IGIED or up to 12 km distant.

Pohutukawa management

Pohutukawa was the main species planted in approximately 80% of planted areas (60,000 trees). In some areas the trees are very closely spaced and are likely to form more or less pure stands which may persist for many years. 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 may be desirable, once the trees have successfully shaded out the grassland, to underplant and/or thin out the pohutukawa in particular areas to facilitate species diversity.

Ranunculus urvilleanus

Ranunculus urvilleanus is found in several damp streamside locations. Although no longer considered nationally threatened and ranked low priority for management (CMS, table 6), records indicate this buttercup was always scarce in the IGIED and Tiritiri Matangi is probably its stronghold. On the mainland it is uncommon. As it requires open conditions to flourish the known sites have not been planted and will continue to be monitored and kept clear.

Threatened species introductions

Many indigenous vascular plant species have become extinct or threatened in the Auckland Conservancy as a result of human activities. Their survival has been affected by vegetation clearance, wetland drainage and exotic animals and plants. Of the 319 threatened species nationally, 43 are thought to exist in the Auckland Conservancy (CMS, 1995). The CMS contains priorities for their conservation, organised by ecological district (Table 6: Threatened Vascular Plant Species Conservation Programmes).

Tiritiri Matangi with its protected status, absence of mammalian pests and broad range of habitats, is potentially an extremely valuable refuge for the translocation of threatened plants. The thirteen species listed in Appendix 3 have been selected on the basis of priorities for threatened plant conservation in the Conservancy and at a national level. Planning for their establishment will be carried out in the next two years.

Little is known about the growing requirements of certain species and the ability to re-establish them in new sites, eg. *Lepidium flexicaule* and *Lepidium oleraceum* are invariably associated with guano soils found near seabird nesting grounds. As Tiritiri Matangi is rodent free it is an ideal experimental location for trialing such species.

There is also an opportunity for the island to be used as holding area for certain species, and once the number of specimens is sufficient they could be included in replanting programmes elsewhere in the ecological district. Such an approach is suggested for sand tussock, pingao, *Lepidium flexicaule*, and Cook's scurvy grass.

The location and provenance of all species planted will be recorded on file and the outcome reported ie. Technical Report, Science and Research series.

4.1.3 Work summary

- Allow natural regeneration to occur except in specified locations.
- Remove indigenous species identified in 4.1.2.
- Plant the coastal edge of catchment 15, in catchment 10 and around dams.
- Introduce absent or poorly represented species and threatened plants according to the priorities listed in Appendix 3.
- Manage planted pohutukawa in particular areas as required.
- Continue to manage known sites of *Ranunculus urvilleanus*.
- Record all plantings.

4.2 FAUNA

4.2.1 Developments to date

To date the emphasis of fauna translocations have been on birds. Species have been liberated for which habitat was available and as habitat has been enhanced by planting.

They include:

Kakariki

The release of kakariki from captive reared stock in 1973/74 and again in 1975, predated the 1982 Working Plan. The population has flourished.

Saddleback

Saddleback from Cuvier were released in 1984 and quickly established themselves with the help of artificial roosting sites and nesting boxes. The regeneration of shrubland has greatly assisted their expansion. Birds have been relocated from Tiritiri Matangi to Otorohanga Zoo, The National Wildlife Centre and Mokoia.

Brown teal

Three pairs were released in 1987 from captive reared stock and a further three pairs in 1990. The birds have bred successfully but may be limited by the availability of brood rearing sites.

Whitehead

Whitehead were transferred from Hauturu in 1989 and 1990 and are now successfully established.

Takahe

In 1991 two takahe were transferred from Maud Island, to be followed by five more from Maud, Kapiti and Burwood in 1994, and a further bird in 1995. They have become free ranging, occupying loose territories in family groups. They like to frequent open grass/shrub areas but stay close to dense cover such as bracken fern and also use the forest. Breeding has been successful.

North Island robin

Forty four birds were transferred from the Mamaku Plateau in 1992 into the island's four largest forest remnants. A supplementary group of females was transferred in 1993. The island's capacity to support this species will increase as planted areas mature.

Little spotted kiwi

Five pairs from Kapiti were released in 1993 into prepared burrow sites in each of five separate bush remnants. A further release of six birds was made in 1995. The majority have moved out of the bush areas to frequent secondary growth bracken and coastal shrublands.

Stitchbird

Stitchbird from Hauturu were released in 1995 and 1996. It is too early to determine the success or otherwise of the translocations. The Recovery Plan identifies competition with bellbird and tui as an important factor influencing stitchbird establishment.

4.2.2 Fauna management

There are many possibilities for restoration including a range of invertebrates and reptiles that reflect the previous rich diversity of islands like Tiritiri Matangi. However, success will require an integrated and strategic approach to overcome potential conflicts between species.

In planning for the relocation of threatened species the Department will facilitate the appropriate exercise of tribal tikanga, consult with iwi authorities at an early stage and keep them informed of progress.

4.2.2 (1) Birds

The objectives and policies for the management of bird species in the Conservancy are set out in the CMS - 'Bird Conservation Programmes'. Priority work is focused on threatened species and their habitats and this means emphasis on island-based programmes. Work with threatened species is guided by the Species Priority Ranking System and is carried out in accordance with species recovery plans. Tiritiri Matangi is listed in relation to several species (CMS, Table 4):

- high priority - takahe, brown teal, North Island kaka (future), little spotted kiwi;

- medium priority - red-crowned parakeet, North Island robin, whitehead, bellbird, tui; and
- low priority - North Island saddleback, fernbird (future), and spotless crane.

Bird introductions

There are several bird species that would enhance the ecosystem development of Tiritiri Matangi and these have been divided into the following categories.

(a) Species that are likely to be self-introductions:

Kaka, spotted shag, pied shag, and those petrels and shearwaters not already breeding on the island.

No active introductions of these species will be undertaken but the establishment of breeding colonies will be encouraged through appropriate management of habitat.

(b) Species that have a good chance of establishing:

Fernbird

Suitable habitat is already available. However, as fernbird are terrestrial insectivores with a potential to impact on insect populations this factor will influence the timing of introduction. The ideal source is threatened mainland habitats but limited harvesting of the Aotea population will also be considered.

(c) Species that may be considered to be experimental, ie. there is no guarantee of success, but data may be gained to assist with their management elsewhere:

Kokako

Tiritiri Matangi is currently being evaluated by the Kokako Recovery Group as a site which could be suitable for relict populations and rehabilitation of captive reared kokako to the wild. The forest currently lacks the maturity and species diversity with which kokako are generally associated.

Rifleman

The present vegetation may lack the maturity and species diversity to suit this species.

Shore plover

Although the island has a large area of suitable rock platform habitat, the introduction of shore plover will depend on the development of translocation techniques currently being tried out on Motuora.

Tomtit

Tomtit are not known to co-exist with North Island robin on small islands and any proposal to introduce them would need to be thoroughly researched. It is desirable to allow the robins adequate time to establish and this factor may influence the timing of any tomtit introductions.

Opportunities should also remain for research and management initiatives which may improve understanding of ecosystem/species interactions, eg. grey-faced petrels as an analog to taiko conservation.

- (d) **Species that would survive well but may conflict with possible invertebrate and reptile introductions and should therefore be left until later in the sequence.**

Banded rail

Aviary

The aviary is used for holding birds captured for translocations. Its present location is considered to be too accessible to the public and a quieter site at the southwestern edge of the lighthouse complex is preferred.

4.2.2(2) Reptiles

Tuatara and sixteen species of lizards have been recorded from the greater Auckland region; tuatara and up to twelve species of lizards may once have inhabited Tiritiri Matangi (Appendix 4). Some of the species listed are at present covered by recovery plans. None identify Tiritiri Matangi as an option for recovery due to the presence of kiore when the plans were written. This indicates that management objectives elsewhere will have priority over the proposed use of Tiritiri Matangi for these species.

The presence of very 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 threatened species are transferred.

Against the background of these factors and other activities on the island, species in Appendix 4 have been divided into the following groups:

- (a) **Species that could be released at an early stage as indicators of the effects of ground feeding birds:**

Duvaucel's gecko, ornate skink

The possibility that both species persist on Tiritiri Matangi needs to be established first by survey. Duvaucel's gecko has some advantages as an indicator species because of its large size.

- (b) **Species that could be released at an early stage into shoreline areas as part of public participation in the “new wave” of reintroductions of species other than birds:**

Suter's skink, shore skink, common gecko, Pacific gecko

The possibility that some of these species persist on the island needs to be checked. The two skink species respond quickly to new habitats, so should soon be recorded in surveys if still present.

- (c) **Rare species that were probably part of the original fauna but whose release depends on habitat, availability of material for release and adequate security:**

Marbled skink, robust skink, Whitaker's skink, tuatara

- (d) **Other species that could be considered in the long term:**

Forest gecko, Auckland green gecko

There are unconfirmed reports of Auckland green geckos on the island which first need to be confirmed by survey.

- (e) **Species not recommended, although listed on the table:**

McGregor's skink (likely to detrimentally affect other related species such as Whitaker's skink); chevron skink, striped skink (habitat profiles unclear, management elsewhere may help determine feasibility, but at present unlikely candidates).

Planning for releases of species in groups (a) and (b) will be undertaken within the next two years and, depending on results obtained, for species in group (c) within five years.

4.2.2(3) Fish

Although the island has a moderate rainfall (110mm), summer droughts are not uncommon and consequently few of the streams flow throughout the year. Banded kokopu are known from the stream in Catchment 8 and can be viewed from the Kawerau track.

The potential to enhance stream habitat, for fish generally and in Catchment 8 in particular, will be evaluated.

4.2.2(4) Invertebrates

The eradication of kiore has removed a major predator of larger species of invertebrates, providing not only an alternative refuge for some threatened species but also an opportunity to enrich the invertebrate fauna in line with other fauna introductions. Species of invertebrates which could be targeted for transfer within the life of this plan are as follows:

(a) 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, is the first priority. The draft recovery plan provides for the establishment of a captive breeding programme for introductions to other Hauraki Gulf islands.

Management of the translocated wetapunga may be necessary because of predators such as saddleback, eg. bird-proof artificial roost boxes. Post-introduction monitoring will be required to determine the success of the programme.

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

Darkling beetles, (smaller species quite possibly still present, larger species very unlikely to be present), giant centipede, common ground beetle.

Natural regeneration of species is favoured ahead of translocations of the same species. A baseline survey to determine what is already present will be carried out at about five years post-kioere (1998). Such information will provide the basis for introductions of the species listed. Some research may be required to determine appropriate source populations for the other species listed and this will influence the timing of possible transfers.

4.2.2(5) Bats

Bats are reported to have inhabited the Navy watchtower prior to its destruction in 1966 (Ray Walter pers. comm). Bats were sighted at Fishermans Bay in 1976 (John Craig pers. comm).

More recently (1993) a bat was sighted at the wharf (Graham Ussher pers. comm) although surveys have failed to locate them again.

The long-tailed bat is a medium priority for introduction (CMS, Table 5), but additional research will be needed before any action is taken.

On present knowledge of short-tailed bat habitat requirements, the island is probably not capable of supporting a resident population, but it will be assessed for suitability along with other islands.

4.2.3 Species security

While the open sanctuary creates opportunities for collectors to freely visit the island, the presence of resident Conservation Officers and an involved community provides a higher level of protection than at other sites. Electronic surveillance techniques such as permanently implanted transponders may be useful to help monitor some of the rarer and larger reptiles when released.

4.2.4 Work summary

- Manage threatened bird species as prescribed by recovery programmes.
- Evaluate the potential to enhance stream habitat for fish.

Provided the necessary approvals are gained further transfers will occur including:

- The bird and reptile species listed in the text.
- Threatened species of invertebrates listed in the text, and non-threatened species after survey.
- Long-tailed and short-tailed bats.

4.3 HABITAT PROTECTION

4.3.1 Weed control and eradication

4.3.1(1) Weed distribution

The island is host to a relatively restricted range of environmental weeds that require control (Clunie, 1995). They can be grouped into three broad categories:

(a) Species in heavy infestations mainly in the vicinity of the lighthouse complex and at the northern end of the island:

boxthorn, brush wattle, Cape ivy, gorse, Japanese honeysuckle, periwinkle, Australian ngaio and pine.

(b) Species with small infestations but having an island-wide distribution:

apple of Sodom, arum lily, Chinese privet, moth plant, pampas grass, and tree privet.

(c) Species with very limited distribution

climbing dock, elaeagnus, Mexican devil, mile-a-minute, mistflower, boneseed, olive, primrose willow, and sweet brier.

4.3.1(2) Weed management to date

Prior to 1995 the primary effort had been to contain Japanese honeysuckle, which poses a very serious threat to the revegetation programme because of its ability to scramble up and over vegetation. It was first found growing in catchments 13 and 14, but was later discovered to be more widespread. Initial spray trials proved unsuccessful, but control has since been effected with Escort sprayed from a tractor-mounted unit. Honeysuckle is now confined to isolated patches growing from residual seed banks and requires only spot control. Isolated gorse clumps have also been sprayed.

Brush wattle in catchment 13 is an important winter food source for the nectar feeding birds and the policy has been to retain the older trees and to hand pull seedlings outside the main concentration of plants.

A range of other weed species has been controlled by hand digging and pulling, rather than with herbicides. These include Mexican devil, pampas grass, boneseed and apple of Sodom. Individual specimens of mistflower, banana passionfruit and olive have been removed.

A survey of the status of weeds was carried out in 1994 for the Conservancy weed control programme. Work began in 1995 to control tree privet, mile a minute and elaeagnus from the hedges in and around the lighthouse complex. Periwinkle, Cape ivy, moth plant and boxthorn have also been targeted.

4.3.1 (3) Weed management

A Weed Management Strategy (draft) has been prepared and when approved will guide weed management using techniques contained in the Conservancy Weed Control Manual (Veitch 1995). Physical control will be used in preference to herbicides where it can achieve effective results.

Boxthorn still presents a serious challenge. It is widespread along the northeast coast which is difficult terrain to work. It is plentiful on Little Wooded Island, 250m offshore and control on Tiritiri Matangi is unlikely to be achieved without eradication of this seed source. It will be necessary to consult with iwi and Department of Survey and Land Information on any weed control work there as the island is uninvestigated Maori customary land. Petrels nest on the top of the island and to avoid damaging the burrows seed will be hand-broadcast here. Boxthorn on the lower slopes will be progressively cut and treated and replaced with coastal shrub species.

The policy of restricting the distribution of brush wattle will continue. It is anticipated that the native species planted to enrich this area will progressively contribute and brush wattle will be phased out within the next ten years.

The proximity of Tiritiri Matangi to the mainland means that there is always the prospect of weeds being introduced or reintroduced by birds, eg. starlings, or from wind blown seed, and weed control will be carried out as and when required. There are many aggressive weed species that have not yet reached the island. An overall increase in weed species can be expected as a result of kiore removal and this is an important period to monitor regularly and undertake control as required. An understanding of weed behaviour on an island from which kiore have been eradicated may provide useful information for eradication programmes on other islands, such as Hauturu and Raoul.

Australian ngaio which forms the hedge along the western boundary of the lighthouse complex has the potential to hybridise with the native species and will therefore be replaced.

4.3.2 Animal pest control and eradication

4.3.2(1) Pest management to date

Kiore were eradicated in 1993 with an aerial poison drop. Considerable efforts were made to protect vulnerable bird species. The impact on non-target species was closely monitored and deaths were recorded for several bird species, eg. brown teal, saddleback and pukeko. However, since the drop some species have noticeably increased their population and all species will ultimately benefit.

An increase in the number of seedlings post-kiore is very apparent and trees are recovering from leaf chewing and bark stripping. There is anecdotal evidence of an increase in lizard and insect numbers.

4.3.2 (2) Pest exclusion

Protection from animal pests is vital. The control of rodents is covered by the Conservancy Rodent Contingency Plan. The most important considerations are the provision of rodent-proof rooms; the checking of incoming goods; the maintenance of rodent bait stations to monitor the possible presence of rodents and to exterminate any that land; and managing and educating visitors in good practice with regard to their boats and baggage. Conservancy guidelines for managing rodent exclusion are found in Appendix 5. A list of permanent bait stations is included in Appendix 6.

The Department will continue to emphasise the importance of pest exclusion at access points, through its staff, interpretation displays and brochures, and via off-site Departmental advocacy programmes.

4.3.2(3) Wasps

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

The island's wasp population will be monitored and control programmes implemented if required. Where individual nests are located and are a problem, treat with an approved method.

4.3.2(4) Undesirable avian self-introductions

Certain bird species are considered to be undesirable visitors because of their adverse effects on indigenous species. They include eastern rosella, magpie, and myna.

Rosella may compete with kakariki for food and nesting sites, but to date only small numbers have established on the island and no impact can be proven. They are considered to prefer open forest so may not persist when the forest becomes dense. Magpies are extremely territorial and prey on other birds. Mynas have been known to compete with saddlebacks for use of nesting boxes. Neither of these species is particularly attracted to closed forest so their numbers may be expected to diminish as the forest structure changes.

The situation will be monitored and research initiated. Control measures will be adopted if required.

4.3.2(5) Avian disease

In the past injured native birds have been brought to the island for rehabilitation and/or release. This practice carries with it the potential for introducing avian disease to Tiritiri Matangi and such translocations will not be permitted in the future.

4.3.2(6) Domestic pets

Domestic pets are prohibited and signs to this effect are maintained at the wharf and the principal bays to which the public have access by boat. To assist with compliance dogs and cats will be identified on future signs.

4.3.3 Fire prevention and management

The island is covered by the Conservancy Fire Action Plan. While the vegetation is in a transitional phase to forest cover, ie. has a high component of grass, bracken and shrubs, the island is very vulnerable to fire. This risk is compounded in summer when vegetation is dry, the water supply may be limited and visitor numbers are high. The open mown tracks along the main ridgelines are important in that they function as fire breaks and provide egress for people and access for fire control.

Fires will be prohibited down to MLWS, and 'No fire' signs will be maintained at the most popular beaches.

The resident Conservation Officers will continue to request visitors to take every care and to refrain from smoking except on the foreshore and within the lighthouse complex. A similar message will be added to new signs at the main visitor entry points. As an additional precaution, spark arrestors will be fitted to house flues and to the diesel tractor exhaust.

4.3.4 Work summary

- Carry out weed control and eradication according to the Weed Management Plan (when approved), using control techniques suggested in the Conservancy Weed Control Manual.
- Maintain pest exclusion measures for the island as detailed in Appendices 5 and 6.
- Monitor wasp populations and take action to control as necessary.
- Monitor the impacts of rosella, magpie and myna and take action to control as necessary.
- Maintain 'no domestic pets' signs at the main access points.
- Maintain a vigilant fire prevention and restricted smoking policy.

4.4 RESEARCH

Tiritiri Matangi, reclassified from Recreation to Scientific Reserve status in 1980, has provided excellent opportunities for study and research. Research by the University of Auckland began in 1974 and has continued ever since (Saunders, 1995). Publication of this research has put Tiritiri Matangi into the international conservation arena. The majority of research and monitoring projects result from approaches to the Department by tertiary institutes seeking research topics, or students selecting topics and approaching the Department for permission to carry them out. While much of the early work was academic in nature, the trend has been progressively toward applied and management oriented research. Currently there are a number of projects covering aspects of forest regeneration and threatened species introductions.

The Department will encourage the continuing involvement of tertiary institutions and other parties in conducting research where this supports management objectives. Of particular interest for management are the following topics:

- Monitor the introduction of new species.
- Measure any visitor impacts on species and habitat.
- Compare the growth and recruitment of plant species under kiore (past research) with post-kiore conditions.
- Track the progress of areas planted with areas left unplanted. The revegetation programme was promoted on the basis of slow natural regeneration through bracken fern and it would be valuable to trace what actually occurs.

5. CULTURAL LANDSCAPE MANAGEMENT

5.1 THE LANDSCAPE RESOURCE

The existing landscape is a result of physical and biological processes and human activity.

The low, smooth profile of Tiritiri Matangi, together with the Whangaparaoa Peninsula, defines the northern edge of the inner harbour as experienced by urban Auckland. Viewed from a distance the lighthouse, standing with its group of mature trees on the highest point, is an instantly recognisable feature. At close quarters the young plants still appear as individuals.

Tiritiri Matangi is rated as an outstanding landscape (CMS, 1995). Its small size, narrow form with central ridgeline, and pattern of tracks which follow the topography, all contribute to the legibility of the island for visitors. Broad ridges on either side of the island offer many vantage points from which to appreciate the surrounding Gulf. The coastal edge has plenty of variety, the southwest shoreline being more sheltered and offering an attractive sandy beach, while the northeast coast facing the outer Gulf is exposed and more rugged. Pohutukawa are prominent along the coast and there are many offshore rocks and islets to enrich the coastal scenery.

The visual character of the island will change over time as the plantings mature and a continuous forest landscape evolves. Some areas of open space and tracks will be maintained to facilitate views and access. The areas to be managed by tractor-mounted slasher are identified on Plan 5.

5.2 MAORI ARCHAEOLOGICAL SITES

In Maori tradition, Tiritiri Matangi is one of the floats of an ancestral fishing net and it has a long history of ancestral associations. The island was occupied by the Kawerau people from very early times to the 1820's and again briefly in the 1830's - 1850's. Land Court records, traditional history and the evidence of archaeological sites all confirm that occupation of the island was once permanent, with the construction of the pa that gave the island its name, cultivation and the establishment of urupa. Later the island was used mainly for fishing, with the cultivations on the mainland.

Ngati Paoa had also occupied the island and constructed a pa at the northern end known as Papakura. Ngai Tai and the Marutuahu tribes also have associations with the island.

Thirty two sites have been recorded, most of them as a result of an extensive survey (Spring-Rice, 1981). The principal focus of settlement was on the western side of the island. The sites comprise two pa, two extensive terrace complexes (one with accompanying pits), seven small terrace sites, four pit/terrace complexes (two with known midden), nine beach midden, a working floor, two findspots, two urupa, and three patches of *Allium vineale* associated with contact period gardening (Plan 4).

5.2.1 Site management

5.2.1(1) Management to date

The management programme for sites was prepared and supervised during the initial phase of the planting programme by an archaeologist. All sites were reserved from planting because of the damage caused by initial digging and eventual root growth.

It was recommended that the sites receive different management treatment depending on their nature and particular surrounding physical conditions. Ten major sites (R10/262, 265, 266, 267, 271, 272, 275, 276, 280, 281) were to be kept

clear of heavy, woody vegetation so as to secure their long-term survival in the best possible condition.

The majority of sites have been left unmanaged under the cover of vegetation which prevailed at the start of the programme, ie. grass, bracken fern, or manuka/kanuka shrublands. There is a tendency for the grassland to revert to a cover of shrubs. Where accessible to tractor, some sites have been maintained under a cover of grass with a tractor-mounted rotary slasher. Sites R10/275 and 276 are managed in this way. Site R10/265 is mown with a hand mower.

5.2.1(2) Management of sites

The Historic Places Act 1993 affords protection to all archaeological sites and no site can be damaged or destroyed without authority from the Historic Places Trust. This process also involves consultation with tangata whenua.

Sites will continue to be reserved from planting and track formation. It is preferable that all sites, other than those with a mature vegetation cover, be kept clear of deep rooting, woody vegetation to preserve them, and that sites R10/265, 275 and 276 continue to be mown. The physical condition of sites will be monitored by an archaeologist annually to assess the effects of vegetation management, visitors, etc and a report will be forwarded to tangata whenua. The management of sites will be modified as necessary after consultation.

5.3 EUROPEAN HISTORIC SITES

European settlers grazed livestock on the island from the early 1850's. Farming operations were centred around Hobbs Beach where there was a woolshed, cottage, boatshed, sheepyards and cattle run. The only surface evidence of this settlement is a few pile foundations, fenceposts, a stone wall and sheep dip.

The lighthouse, one of New Zealand's first, was erected in 1864. The complex of buildings and structures associated with it has evolved over time as technology has changed and buildings have been replaced or adapted to new uses. Today the historic elements comprise the lighthouse, a gun cotton store and Slaughters Gun, Cotton Fog signal (1898), a signal station (1912), two keepers' houses (1918) and outhouse, a diaphonic fog horn and building (1936), and the base of the signal mast (Plan 6). The approximate locations of many earlier structures are known, many of which constitute archaeological sites under the provisions of the Historic Places Act. The lighthouse has been assigned a Category 1 registration by the NZHPT for its historical and architectural significance. The other structures including a workshop/engine house (1950's) and electronic foghorn have not yet been assessed by the Trust, but are also significant and collectively offer a unique opportunity to conserve a lighthouse complex for future generations.

The island was occupied by the Ministry of Defence between 1940 and 1945 as part of the extensive network of defences for Auckland. Initially based near the lighthouse, the Port War Signal Station was shifted to the centre of the island in 1942. Little remains except for an open site now reverting.

5.3.1 Historic site management

5.3.1(1) Management to date

The core functions of the lighthouse complex have continued to the present. Management of the complex is shared between the Department and MSA. While the majority of the buildings were transferred by the then MoT in 1986, they retained ownership of the lighthouse, foghorn equipment, workshop/engine house and meteorological square. Weather information is gathered by the Department for the Meteorological Service.

The lighthouse is of considerable public interest and there has been an informal arrangement whereby the public have access providing it is supervised by the resident Conservation Officer. Access has now been withdrawn.

A conservation plan has been prepared for the complex (Treadwell, 1995). It includes a description and condition report for the main historic structures. The significance assessment emphasises the value of the lighthouse complex as a whole, its potential to demonstrate how lighthouses were operated, how technology advanced, and the social history of the people who operated them. The conservation plan sets out broad conservation objectives for the complex in accordance with the principles of the ICOMOS New Zealand Charter (ICOMOS, 1993). It also contains detailed policy for the maintenance of the keepers' houses (including the outhouse) and signal station, and makes recommendations for the conservation of the lighthouse and other structures. The conservation plan considers that the present location of the nursery buildings and garage confuse the interpretation of the complex as a 19th - early 20th century site and it suggests policies which would assist in its interpretation. The most important are:

- (i) Consider relocating structures built in recent times, and any proposed buildings to another site. This would allow the lighthouse complex to become a separate entity expressing more clearly its historical and conservation values.
- (ii) Maintain the lighthouse complex in an open pastoral condition, and protect long views to/from the sea by restricting the location of plants and buildings.

While stock were withdrawn from the rest of the island in 1972, most of the lighthouse reserve has continued to be grazed by sheep in recognition of its historic use by lighthouse staff since 1865. In recent years sheep have been excluded from the area immediately around the lighthouse because of management conflicts with visitors and this area is now mowed.

5.3.1(2) Management of the lighthouse area

Structures

The Department will prepare a schedule for implementation of maintenance work to the keepers' houses and signal station, and other historic structures under the Department's control. Alterations will be guided by the specific policies recommended by the conservation plan.

It is acknowledged that non-historic structures, including tanalised post retaining walls and associated signs, compromise the presentation of the historic buildings. The aviary will be relocated and the toilets and garage will be phased out. Landscape elements appropriate to the historic character of the complex will be used.

Oral history study of the complex and additional research on the location of historic archaeological sites will be conducted for interpretation purposes. Investigations will also be undertaken to establish the locations of earlier picket fences with a view to reinstating them.

Vegetation

Historic photographs show the various structures located within picket fences and sited in an open pastoral landscape. During its 130 years of operation successive generations of keepers have sought to improve the living conditions on a very windy site by planting shelter. These trees have become an important component of the character of the place and their maturity is a strong physical expression of the age of the complex. However, not all the exotic trees contribute equally and some native trees planted during the revegetation programme need to be removed in the interests of presenting the historical relationships of buildings.

The area within the enclosing shelter will be retained largely in an open pastoral condition. The following actions are required:

- Research historic vegetation survivals in the house gardens ie. fruit trees, to determine options for their management/reinstatement.
- Remove some of the massed plantings on the bank between the lighthouse and the earlier house sites to allow for improved spacial connections between them. Retain significant individual trees such as flame tree, kowhai, etc.
- Remove privet hedges and replace with karo planted and maintained as a hedge; phase out the existing Australian ngaio hedge and replace with mixed indigenous shrub spp.
- Phase out some of the pine and *Eucalyptus* spp. shelter belt on the periphery of the lighthouse complex as adjacent plantings mature. Progressively replace the pines, where appropriate, with pohutukawa planted as a shelter belt (Plan 6).
- Relocate some of the plants to the northeast of the workshop/engine house to maintain an open aspect for the lighthouse to the sea.
- Manage the paddock to the southeast of the lighthouse up to and including the diaphonic foghorn with sheep or by mowing. This will allow the traditional management of the lighthouse complex by sheep and cattle to be interpreted. Allow the remainder of the former lighthouse reserve to revert.

Management agreement with MSA

The Department will negotiate with MSA for rationalisation of the ownership and management of structures currently owned by them as follows:

The lighthouse - The Department will liaise with MSA in the preparation of a maintenance plan which includes the recommendations of the conservation plan. The lighthouse is a major sightseeing attraction and the Department favours formalising the agreement for public access to the building. The lighthouse will need safety modifications.

Foghorn - The diaphonic equipment is non-operational but has potential for public presentation. Either transfer to the Department or seek a maintenance and access agreement similar to that proposed for the lighthouse.

Workshop/engine house - This building is currently used as a workshop by the Department. Its future will be reviewed when the new operations centre is built.

The meteorological square - MSA are no longer responsible for meteorological services and it would be practicable for the meteorological square to be transferred to the Department.

Power cable - Although the power cable is no longer functional, the sign marking the alignment remains and in the interests of clarity this should be removed.

5.3.1(3) Management of other sites

Information about the former farm complex in Hobb's Bay is limited and research on the location of historic archaeological sites and other historic features will be carried out.

The site of the former naval camp at the trig has been cleared of former structures and will be allowed to revert. A track will be maintained to give access to the elevated views obtained from this point. While the opportunity exists, an oral history study of the military and farming history of the island will be conducted.

5.3.2 Work summary

- Maintain managed grassland areas shown on Plan 5 by mowing to allow for visitor assembly, access and appreciation of the island.
- Maintain Maori archaeological sites according to the results of an annual inspection, report and consultation with iwi.
- Prepare a schedule for maintenance of the keepers' houses, signal station and other historic structures.
- Relocate or phase out non-historic structures which compromise interpretation of the historic lighthouse complex in accordance with 5.3.1(2) Structures.

- Manage the vegetation in the lighthouse complex in accordance with section 5.3.1(2) Vegetation.
- Negotiate a management agreement with MSA for structures owned by them.
- Prepare a Conservation Plan for historic structures not yet covered.
- Undertake oral history and archaeological research of the lighthouse, military and farming history of the island.
- Allow the site of the former naval camp to revert but retain track access to the general area.

6. PROVISION OF VISITOR FACILITIES AND SERVICES

Tiritiri Matangi has become the focus of one of the largest and most successful habitat restoration projects in New Zealand (John Craig pers. comm). This has been carried out with an unprecedented level of public participation in a wide range of conservation activities. The creation of habitat and release of threatened bird species means that visitors can now see birds which previously could only be experienced on some of the restricted access Nature Reserves. The success of the first 'open sanctuary' is evident from the growing number of visitors and increasing interest from overseas tourists.

The island is well placed as a tourist destination and has enormous potential to make a significant contribution to conservation education both nationally and internationally. In order to realise this potential it will be necessary for more resources to be allocated to the provision of information and interpretation.

Part of the attraction of Tiritiri Matangi lies in its low key, unpretentious nature. The facilities are basic and the contact with conservation staff is direct and personal. It is important, while catering for an increasing number of visitors, to retain these distinctive elements of the quality experience currently offered, and to expand the information and interpretation facilities where lacking. These facilities should be appropriately scaled to ensure the island's heritage values are adequately safeguarded.

6.1 VISITOR FACILITIES

The Department inherited an infrastructure of a wharf, road and buildings from the former lighthouse settlement. Over time these have been adapted to meet the needs of the revegetation programme, while new structures and tracks have been built as required. Any additional visitor facilities will generally be provided in support of the established network of facilities and in line with the strategic objectives.

6.1.1 Wharf complex

6.1.1(1) The wharf

The wharf is the main point of arrival and departure and an operational service point. It is in poor condition and arrangements are currently being made to replace it with an improved facility. The new wharf will be a precast concrete structure on concrete piles, erected just south of the present one. It will provide short-term berthing for a variety of passenger and freight vessels between 10-38m in length.

6.1.1(2) On-shore facilities

The design of on-shore facilities will reflect the cultural values and the physical constraints of the site, and respond to the opportunities created by the removal of the old shed to better provide for visitor reception and information. A new wharf shed will provide for the storage of freight pending transportation to the service centre. Materials used will be in keeping with those on the existing toilets located 70m along the foreshore. The on-shore area will be levelled to facilitate visitor access and freight handling, and the steep track lowered to achieve a safer grade for vehicle manoeuvring. The boat ramp will be retained in its present location but will require some lateral rock support once the present wharf is removed.

6.1.1(3) Visitor information shelter

It is proposed to construct a facility to provide information for visitors arriving at the wharf and to serve as a shelter for those waiting to catch a ferry. The building will be designed and sited so as to have a low visual impact when viewed from offshore. It will be located in the small stream valley at the base of the hillside and use the old cabbage tree as a focus. The timber structure will combine open decks with covered areas and cater for about 80 people. The design will, if considered appropriate, incorporate elements of Te Kawerau heritage. It could also make use of old timbers from the wharf and allow for volunteer assistance in its construction.

6.1.2 Visitor service centre at the lighthouse complex

6.1.2(1) Functional requirements

The lighthouse complex is the centre for management operations and has been the focus of visitor/volunteer effort. The propagation shed has been multi-functional, serving the needs of plant production, visitor reception and refreshment, information display, sale of goods and storage. Although the space is very limited and the facilities makeshift, none the less it has served the revegetation programme well, helping to engender a strong sense of hands-on active participation.

In anticipation of more visitors concerned to have better information about the island's ecology (Cessford, 1995), there is a need for a new purpose-built visitor centre. The functional requirements are:

- (i) A general purpose space for 50-80 people, with interpretative displays, stack seating and shop counter.

- (ii) A kitchen (to prepare hot drinks), good storage and office and toilet for staff.
- (iii) Toilet facilities.
- (iv) Sheltered outdoor assembly area which acts as an extension of the visitor centre.

6.1.2.(2) Siting and design

The lighthouse complex today has a very different function to that for which it was established and the requirement to conserve and interpret the historic values of the complex must be considered in the context of the operational requirements of the field base. It is not practicable to relocate the operations centre to another site, but it is possible to locate new buildings within the complex so as to minimise their impact on the presentation of historic features. This is generally on the periphery of the open space where structures can be integrated with surrounding vegetation. A range of sites has been evaluated using the criteria listed in Appendix 7.

Plan 6 illustrates the proposed location for a visitor service centre. In this position a building would be near the entrance to the complex; sited partly amongst existing vegetation; create a relatively sheltered north facing outside space; and screen the operations centre from the entrance to the lighthouse complex.

Additional planting will be required to screen the site from the approach road. Removal of the ngaio hedge will be phased so as to maintain visual screening to the site.

The criteria listed in Appendix 7 will guide the design of the building.

6.1.3 Visitor accommodation

An overnight stay is a special experience, providing an opportunity to hear the evening and morning bird chorus, the call of the little spotted kiwi, and to witness the return of petrels to their burrows.

One of the former keeper's houses is used as a bunkroom for volunteers, research workers and the public. It accommodates 19 people. Preference is given to the University of Auckland Research personnel (4 beds) and the Department's management needs over private bookings. The bach, which accommodates five people, is used primarily by Department staff but is also available to the public.

Both buildings will be maintained to the standards required and the conservation plan will guide any necessary alterations to the bunkroom. Provision for visitor overnight stays in the bunkroom and bach will be continued, but no camping will be permitted.

6.1.4 Walking tracks

The island has an extensive track system (11km) giving access to virtually all parts of the island. The primary track follows the island's central ridge from the lighthouse to the northern end and is maintained as a double-width grass track. Linked to the

ridge track are a series of mown grass tracks which follow spurs down to the coast, offering the visitor a multitude of choices for variable length, looped walks. A coastal track which connects the wharf with Hobbs Beach and the eastern coast route (under construction), completes the island circuit.

Tracks are of a variable standard and offer a range of experiences. They traverse mature bush (Kawerau track on boardwalk), younger bush (Wattle track, metal and boardwalk) and the more open areas of recent planting. Visitors are asked to keep to the tracks and thereby avoid disturbing sensitive habitats.

Once the eastern coastal track has been completed no additional tracks will be necessary. The walking track system shown on Plan 5 will be retained for visitor access. It is proposed that the future of Cable track be reviewed when takahe management considerations permit, because it duplicates the main ridge track and can be confusing to visitors.

In order to cater for twice the present number of visitors it will be necessary to upgrade some tracks to encourage a wide dispersal of visitors. A job prescription will be required detailing what is to be achieved, the material and labour required, and to what standard.

At present there is little evidence of crowding (Barraclough 1995) but as visitor numbers continue to increase there is the prospect of loss of satisfaction, eg. interruption while watching birds if visitors are concentrated on only a few tracks. Visitors will be encouraged to disperse throughout the existing track system by the promotion of loop walks, ranging from short circuits to long walks taking up to three hours. Loop walks will be identified on a pamphlet and by a simple sign identifier. Interpretation themes can be developed for certain loops, eg. archaeological, bird species. Provision could also be made for short side tracks to allow for uninterrupted bird watching experiences.

6.1.5 Directional/information signs

There is a comprehensive directional sign system throughout the island. This has been upgraded to comply with the Department's national design guidelines. At some of the more remote beaches there are still some old Hauraki Gulf Maritime Park signs.

Hauraki Gulf Maritime Park signs will be replaced with more explicit messages about the open sanctuary.

6.1.6 Toilet facilities

Toilets are currently located at the wharf and the lighthouse complex. Moderate visitor use of the Kawerau combined with the high recreational use of Hobbs Beach in the summer, justifies the provision of a toilet to serve this area. This will be a sealed vault type similar to that at the wharf and will incorporate a small changing area serving the beach.

If visitor numbers increase as expected it may be necessary to install a toilet towards

the western end of the island. In this situation a fully composting type would be desirable. The temporary toilets in the lighthouse complex will be removed when the visitor centre is built.

6.1.7 Work summary

- Develop a new wharf, shed and on-shore facilities to cater for freight and visitor reception.
- Provide a visitor information shelter at the wharf.
- Site and design a visitor service centre at the lighthouse complex using the criteria defined in Appendix 7.
- Continue to provide for visitor overnight stays.
- Maintain the walking track network shown on Plan 5.
- Prepare a job prescription for all track upgrading.
- Promote loop walks to encourage visitor dispersal.
- Replace HGMP signs.
- Construct toilet facilities at Hobbs Beach.

6.2 VISITOR SERVICES

6.2.1 Visitor profile

Visitors to Tiritiri are comprised of the following groups; overseas visitors, schools and tertiary groups, volunteers, and other visitors (Sutton 1994). The relative number of each is illustrated in Figure 2.

The number of overseas visitors (10%), while trending up, is quite small compared with total visitors. However, a greater increase in line with national visitor figures is expected in the future. Trips to the island for educational purposes have increased significantly with a higher proportional increase in tertiary students compared with primary and secondary. The number of volunteers has declined as a proportion of total visitors because the number of other categories of visitors has continued to increase. The number of other visitors not involved in island restoration who arrive by private boat or ferry, has increased significantly and now represents the largest group. Those arriving by ferry comprise the largest category and numbers can be expected to grow and become the dominant casual visitor type as ferry services become more regular.

6.2.2 Interpretation

The most effective form of interpretation is personal. Present visitor management involves resident staff meeting each commercial boat arriving at the wharf. Visitors are welcomed, given a brief introduction to the island, are advised of appropriate behaviour, can have their baggage transported to the lighthouse service area and may be given a guided walk along the Wattle Track. Visitors derive considerable satisfaction from this personal contact (Cessford, 1995). As visitor numbers increase it may not be possible to make staff available on all occasions. However, it is the preferred approach and it may be necessary to draw on more support from volunteers as guides in order to maintain this contact.

The main opportunities for delivering interpretation are at the wharf, the lighthouse complex, and on the developed tracks.

6.2.2(1) The wharf

The information at the wharf shelter would introduce people to the island, its special values and recreational opportunities and set out some basic rules and appropriate behaviour. The displays proposed are a pictorial map of the island with reference points to help orientate and direct visitors; and some information about birds, eg. which ones to look for and where.

6.2.2(2) The lighthouse complex

The main interpretation effort will be at the visitor centre in the lighthouse complex. There are three main themes on which to base the displays:

The Revegetation Story:

Covering the degraded habitats and rehabilitation programme; the introduction of threatened species; the invaluable work and support of volunteers without whom it would not have been possible; how visitors can continue to contribute.

The Open Sanctuary Concept:

Explaining biodiversity and how Tiritiri Matangi fits within the New Zealand context; the value of islands as refuges; the habitat restored for threatened birds and other species to follow; the success of bird management related to predator control; the risks of an open sanctuary versus the benefits; scientific research done here - an 'open classroom'; future directions.

Historical/cultural:

First, the history of Maori settlement; distribution of sites; an explanation of sites that remain visible particularly Tiritiri Matangi pa; ongoing connections of tangata whenua.

Secondly, the lighthouse complex; an insight into New Zealand as a maritime nation dependent on the safety of ships; tracing the changes in structures and technology, and describing the people employed (including a listening post with recorded oral history).

To enable visitors to explore the lighthouse complex and understand the significance of its various elements a heritage trail brochure will be available from the visitor centre.

6.2.2(3) On-site interpretation

To visit Tiritiri Matangi is to experience at first hand threatened fauna in their habitats. Surveys of visitors and SoTM indicate a priority for interpretation of birds. On-site displays will seek to interpret what lives there and why. Information about bird species will be provided at sites where they are most likely to be present, eg. North Island robin in catchment 8. Signs will be designed in a consistent style and will rely largely on visual images for clarity of understanding, especially by overseas visitors. Laminated returnable information sheets or purchasable pamphlets from the visitor centre will supplement signs.

To avoid proliferation signs will generally be limited to the two developed tracks, ie. Kawerau and Wattle.

Interpretation material at Tiritiri Matangi Pa will provide visitors with an insight into the extent and form of the earthworks and the significance of the site.

Any interpretation material prepared by support groups, sponsors, and concessionaires will be discussed with and approved by Conservancy staff prior to production.

6.2.3 Programme promotion

The restoration programme is now well established and has generated a momentum of its own based on dedicated staff, committed support, successful liberations, pest eradication and the continuing development of the island's ecosystem. A sense of achievement pervades the project and everyone associated feels positive about it.

The Department will continue to work with support groups in helping to heighten public awareness of the value and role of Tiritiri Matangi as an open sanctuary. Future promotion will continue to focus on the liberation of threatened species and special events associated with them. Where possible, and subject to an integrated approach, at least one translocation will be planned every year, in order to maintain the island's high public profile. A high quality publication about the island is an essential part of promoting the restoration programme.

6.2.4 Education

The potential contribution the island could make to conservation education programmes was a guiding objective behind the revegetation programme. To date there has been only limited research to substantiate the benefits. The results of research on the island tends to support a positive view of the current management approach (Smith, 1994). A 1993 study concluded that a visit instills an appreciation for conservation projects and encourages visitors to take more interest in conservation organisations and volunteer work (Cessford, 1995). The most distinctive features attributed to Tiritiri Matangi by those who completed the questionnaire were the restoration programme, the unique role played by Departmental staff and the presence of numerous and rare birds.

While there may be increased risks associated with allowing public open access to the island, they appear to be offset by positive educational benefits. These manifest themselves in an increased understanding, knowledge, and commitment to caring for the wider environment and the building of greater support for the management of the island.

The island also offers potential to educate visitors about Maori heritage.

Education on the island has been focused on learning through 'direct involvement' in the planting programme (Galbraith, 1991). The shift to a more passive involvement centred around the evolving ecosystem requires a different approach and improved information sources. The level of information available and the interpretation provided have been limited (Barraclough, 1995). To realise the island's potential for education the Department will encourage the following:

- The provision of a visitor service centre.
- The preparation of educational programmes and supporting resource material pitched at all age groups.
- The provision of information about the island and its management on the ferries.
- Working relationships with schools, tertiary institutions and community groups.
- Visitor inter-action with staff, scientists and volunteers where this is appropriate.
- Tangata whenua to initiate Maori heritage education in relation to their taonga.

Any educational material such as pamphlets prepared by support groups, sponsors or concessionaires for use on the island will be discussed with and approved by Conservancy staff prior to production.

6.2.5 Concessions and commercial transport operations

The basis for the CMS objective limiting facilities and interpretation provision is to cater for what is considered to be the maximum number of visitors the island can handle without detriment to either the flora or fauna or the quality of the visitor experience. The daily limit (150) is already reached on many summer days. The annual figure (32,000) is a best guess estimate which recognises that some limit needs to be set to provide a context for impact management. Since 1988 visitor numbers have increased steadily by about 15% a year, to 18,800 in 1995. Given this trend it is expected that the CMS maximum will be reached within 10 years (Sutton, 1994)

While the number of visitors who arrive in their own boats cannot be controlled, it is possible to limit commercial transport operators both in the frequency of visits and the number of passengers they bring, in line with the figures set in CMS.

The Department will manage daily visitor numbers as necessary according to the goals outlined in the Visitor Strategy (DOC, 1996). It will also monitor social impacts, such as visitor satisfaction and crowding, and physical impacts such as water consumption, to provide data throughout the life of the plan. This will provide a basis on which to review the limit up or down.

Several companies have sought concessions to offer guided tours on the island. These include specialist trips with professional guides and small-scale trips focusing on the international market. Commercial ferry operators are now interested in providing tours as a value-added part of their service. The Department will formalise arrangements for any commercial activity under the Conservation Amendment Act 1996.

The quality of interpretation offered by concession guides will be monitored to ensure standards are maintained.

Information about the island will be available and presented to visitors in a variety of ways, including the meeting of visitors by staff when available.

6.2.6 Work summary

- Where possible have departmental staff available to provide a personal greeting to visitor groups.
- Provide introductory information at the wharf information shelter.
- Provide visitor displays at the lighthouse complex.
- Provide on-site displays on the Kawerau and Wattle tracks.
- Provide a high quality publication as part of the education/promotion programme.
- Continue to develop the island as a focus for conservation education.
- Monitor the standard of interpretation offered by concession guides.
- Monitor social impacts as a basis for reviewing visitor numbers to be catered for.

7. WORK PROGRAMME SUPPORT

The Tiritiri Matangi field base is managed by two resident staff responsible to the Island Sanctuaries Field Centre Manager. The base is equipped with telephone, radio and fax and is serviced fortnightly by the Department's vessel. Funds are allocated in the Annual Business Plan. Expenditure incurred in operating the field base and maintaining facilities is partially offset by revenue from guiding, accommodation fees for overnight stays and the sale of publications, clothes, plants, etc.

7.1 VOLUNTEER SUPPORT AND SPONSORSHIP

Volunteers have played a special role in the development and management of the island. The success of the planting programme is due largely to the involvement of thousands of volunteers. Since its formation in 1988, the involvement of volunteers has been channelled through the SoTM (Galbraith, 1990). This group has broadened support for the programme beyond planting, to include weed control, upgrading tracks, equipment purchase, education, funding kiore eradication, and takahe introduction through sponsorship by Du Pont (NZ). The society is the official channel for donations and sponsorship and has raised many thousands of dollars.

Additional sponsorship has been arranged as part of national campaigns, for example, World Wide Fund for Nature-NZ whose initial sponsorship developed the nursery; the Kiwi Recovery Programme which sponsored the little spotted kiwi transfer; and Ducks Unlimited with brown teal. A full list of major contributors is provided in Appendix 8.

Although there will be an ongoing need for hands-on island management, particularly weed control and track maintenance, the future focus will be on tasks associated with the evolving ecosystem, further introductions, and on visitor management and education. There will be a need for specialist volunteers for surveillance of endangered species, as advocates for the project, as educators and interpreters, and as trainers for other volunteers. The enthusiastic support and involvement of SoTM is seen as essential to the continuing success of the restoration programme, and the Department will continue to work in partnership with the society. The possible transfer of merchandising to SoTM will be considered.

7.2 ACCOMMODATION

The resident Conservation Officers live in one of the former keeper's houses. The building was soundly constructed and is generally in a good state of repair.

If additional staff accommodation is required a single staff member would be housed in the existing bach. For a couple a new staff house would be required. The preferred solution would be to relocate the bach to a site south of the bunkhouse and build a new house on the vacated site, (thereby concentrating all the bookable accommodation in one area) Plan 6. The site is sheltered from south westerly winds and enjoys a spectacular view of the ocean to the north and east. In this location the house would not intrude on the historic complex and the southern boundary could be planted to achieve additional privacy. Design criteria would include low profile, contemporary style, materials and colour so as to distinguish the new building from the historic houses.

All dwellings will be maintained in a rodent-proof condition so that incoming stores can be unpacked inside these buildings.

7.3 FIELD BASE OPERATIONS CENTRE

There is a shortage of covered storage space for machinery, equipment and timber. This is currently stored in the open near the entrance to the complex and presents an untidy and inappropriate image. Storage capacity is scattered amongst several buildings and providing this in one location would enable the overall number of buildings to be reduced.

The functional requirements are for a covered shed, accessed from an operations yard, with provision for heavy and light machinery, general and dangerous goods storage, a workshop and a rodent proof room where incoming stores can be unpacked.

The facility shares with the visitor services centre similar siting criteria in respect of its relationship to the historic complex and would also share some of the design criteria (Appendix 7).

The proposed site for the facility is illustrated on Plan 6. In this location the building would be set into the existing Australian ngaio hedge (or its replacement), with minimal intrusion on the open space; protected from prevailing winds; with good overview from the house; near existing services; and capable of vehicle access separate from the entrance to the lighthouse complex.

7.4 THE NURSERY

The nursery has been the 'engine house' of the revegetation programme since its establishment in 1983. At the peak of production 35,000 plants per annum were propagated and planted, but this has been progressively scaled down as the planting programme has tapered off. In 1994/95 4500 plants were produced for island use, 2500 being for planting and 2000 for sale to visitors. However, production has again been increased to meet the demand from revegetation projects on Motutapu and Motuora. It is anticipated that the Motutapu nursery will ultimately produce all the Conservancy's needs.

The present nursery will be retained while there is a requirement for significant numbers of plants, such as for catchment 15, and while it continues to be used as a visitor service/operations centre. Its future will be reviewed should it no longer be required for these purposes.

7.5 THE FARM

The farm is no longer required to sustain life on the island and in its present form involves a commitment by island staff. However, the presence of farm animals is consistent with, and contributes to, the historic atmosphere.

A few sheep (wethers) may be retained for interpretation purposes and to help manage the lighthouse paddock in conjunction with mowing. The cowshed will be

maintained if required as a shelter. The remainder of the farm will be retired from grazing and the redundant sheds removed. No supplementary feed will be imported to the island because of the potential to introduce rodents.

7.6 UTILITIES

The mains power cable link to the island was damaged in 1989 and has not been repaired. The field base now utilises a hybrid power system comprising a diesel generator, inverter and battery storage, roof mounted solar water heating, and bottled gas to fuel heating and cooking appliances. The use of energy efficient appliances also reduces the energy load on the system.

The powerhouse is located close to the visitor services centre site. Consideration could be given to relocating it to another site if proximity results in unacceptable effects.

The lighthouse itself is powered by a bank of photovoltaic cells mounted on a solid frame sited within a few metres of the structure. This is considered to be visually intrusive and the Department will negotiate with MSA for its removal and for the lighthouse to draw power from the powerhouse.

There are limited supplies of water on the island and summer droughts are not uncommon. There is a dual reticulation system, with all potable supplies collected from roofs, stored in tanks and treated with UV light to kill micro organisms before use. Nursery and toilet supplies are drawn from dams. In times of water shortage visitors are requested to conserve water and may even be required to bring potable water for the period of their stay. This approach will be continued.

Waste minimisation, re use and recycling is practiced and wherever possible waste generated by island staff is brought back to the mainland for disposal. Visitors are encouraged to support the 'pack in-pack out' policy.

The lighthouse complex utilises a conventional septic tank and field disposal sewerage treatment system. This has built-in capacity for additional facilities should these be required.

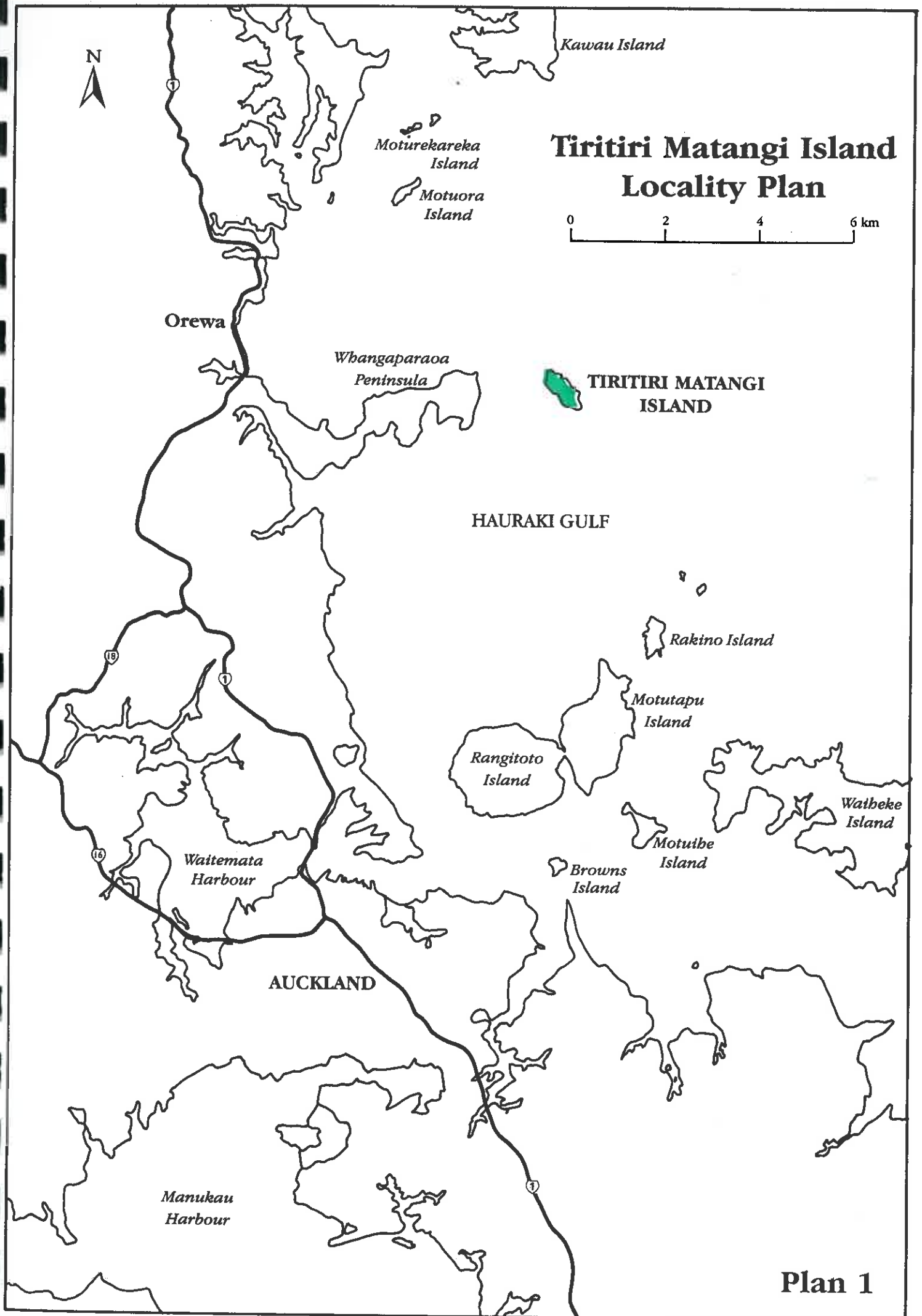
7.7 PLAN MONITORING AND REVIEW

Monitoring will be carried out annually by the Department to ensure that the Working Plan is being implemented effectively and that the provisions of the plan are still current and in the best interests of conservation management. An annual report documenting activities will be prepared by the Conservation Officers and copies forwarded to iwi and SoTM.

The plan is intended to cover the period of CMS and should be reviewed in association with that document in 2005.

7.8 WORK SUMMARY

- Continue to work in partnership with SoTM.
- Maintain the keepers' houses to the standard required and carry out remedial works and any essential alterations in accordance with the conservation plan policies.
- Provide additional staff accommodation as required.
- Develop a field base operation centre using the criteria defined in Appendix 7.
- Retain the present nursery and review if circumstances change.
- Reduce the area of the farm within five years and manage the lighthouse paddock with sheep or by mowing.
- Negotiate with MSA to relocate the lighthouse power source to a less conspicuous position.
- Monitor the Plan periodically and review in 2005.

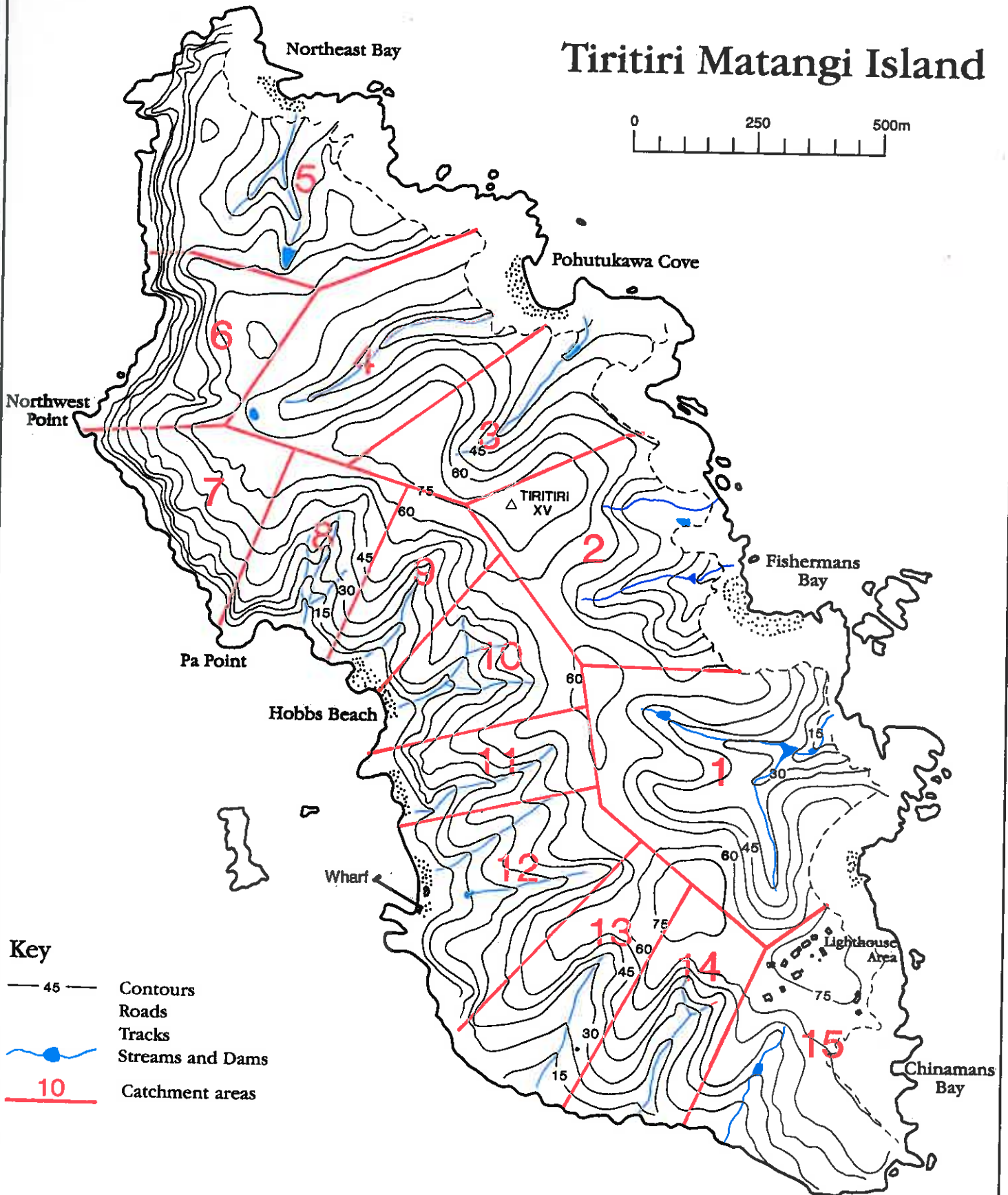




Little Wooded Island

Tiritiri Matangi Island

0 250 500m



Key

- 45 — Contours
- - - Roads
- x - Tracks
- • — Streams and Dams
- 10 Catchment areas

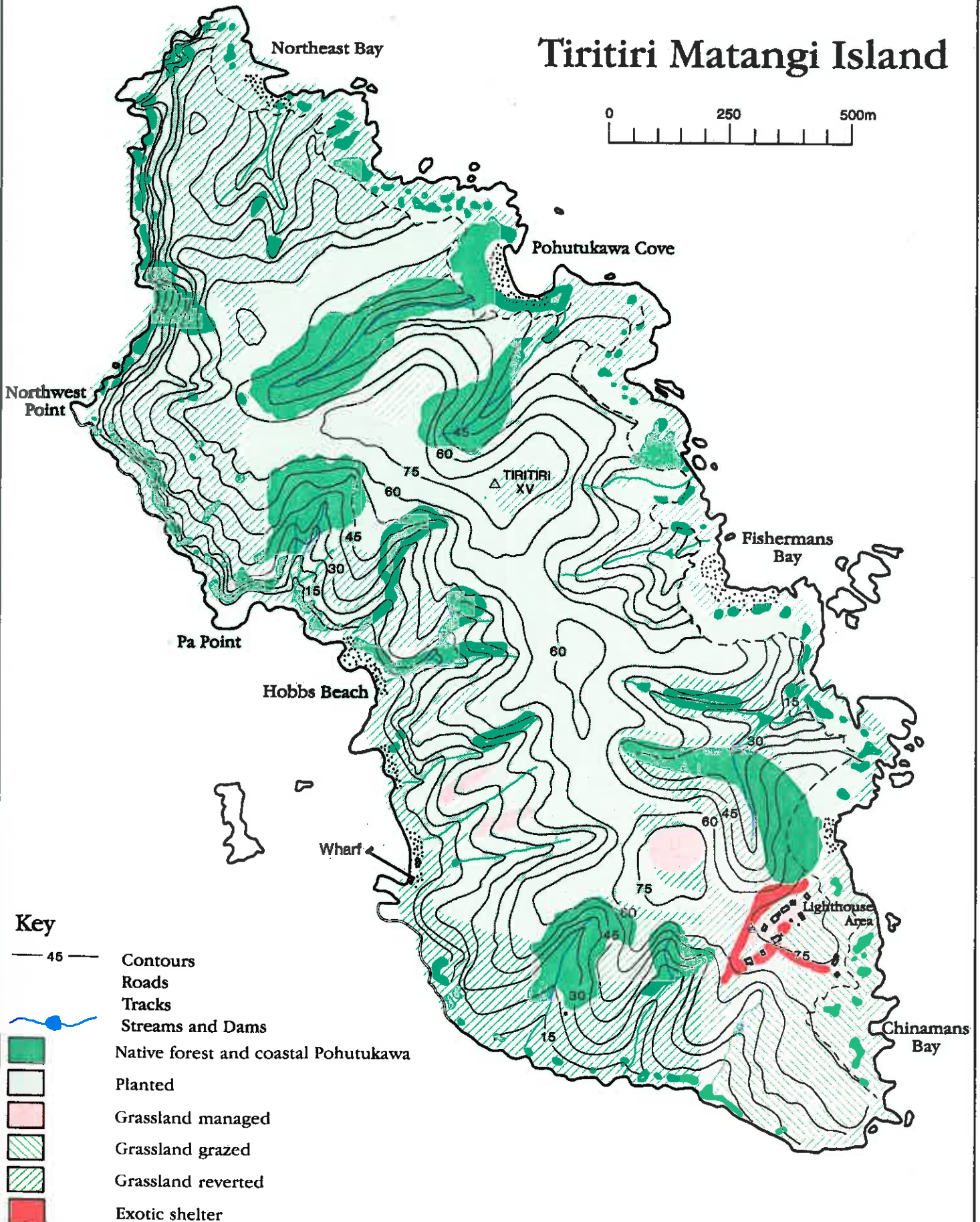
Plan 2: Topography and Catchments



Little Wooded Island

Tiritiri Matangi Island

0 250 500m

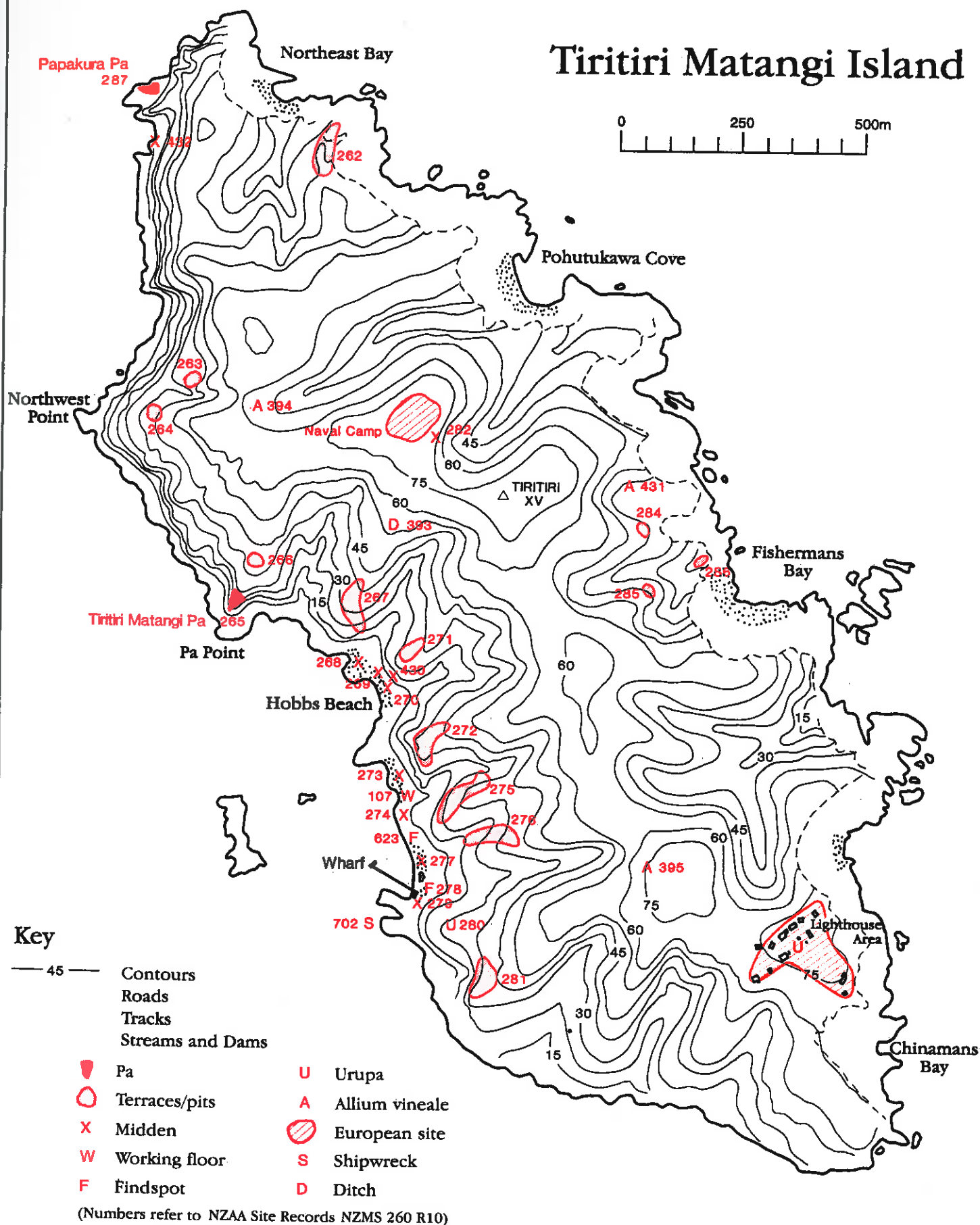


Plan 3: Vegetation



Little Wooded Island

Tiritiri Matangi Island

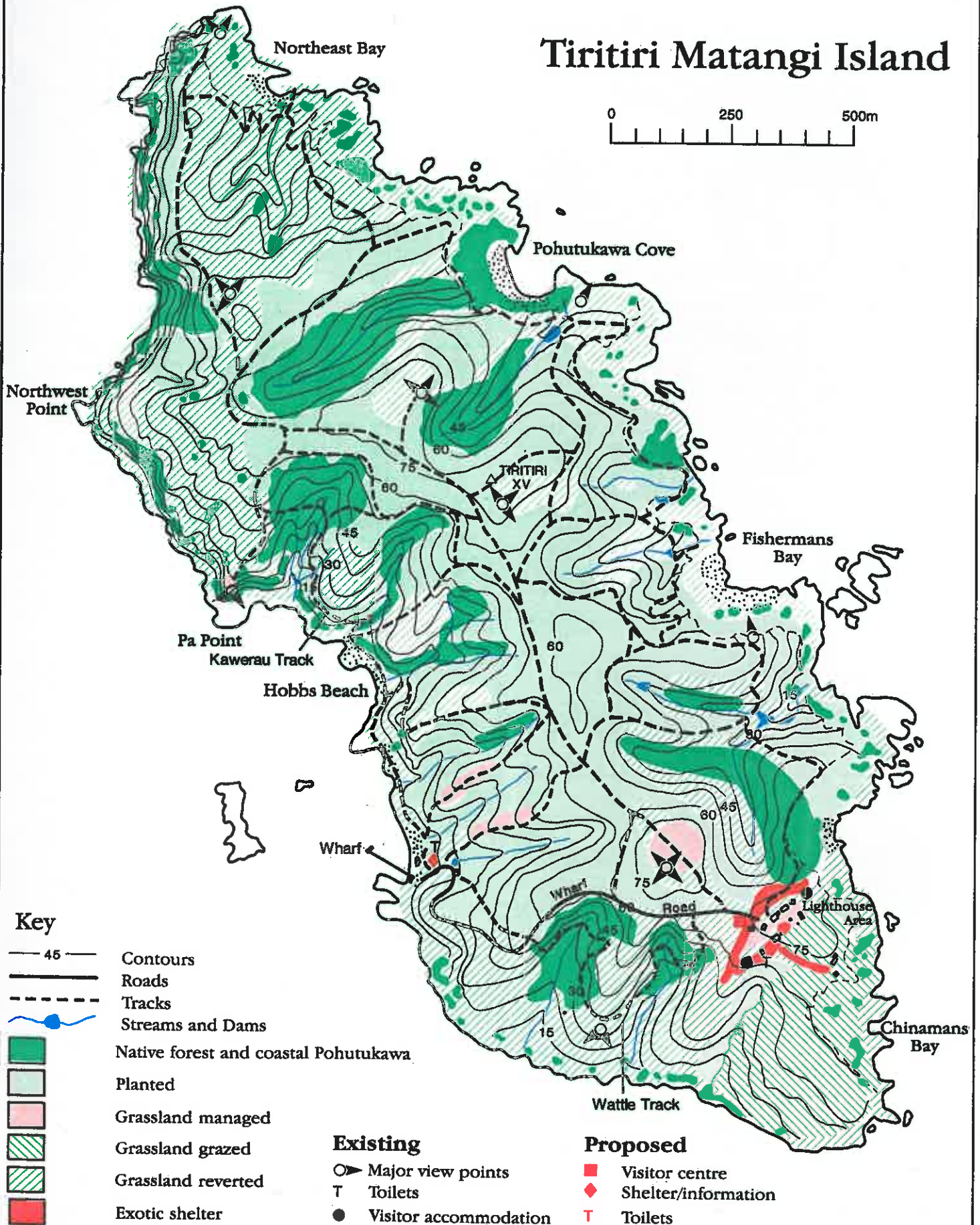
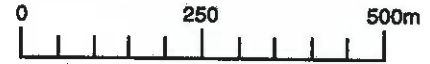


Plan 4: Recorded Archaeological and Historic Sites



Little Wooded Island

Tiritiri Matangi Island



Plan 5: Recreational Facilities

ECOLOGICAL DISTRICTS IN THE AUCKLAND CONSERVANCY

FIGURE 1

Scale: 1:800,000

Key: — — Auckland Conservancy Boundary
 — E.R. Ecological Region Boundary
 - - - E.D. Ecological District Boundary

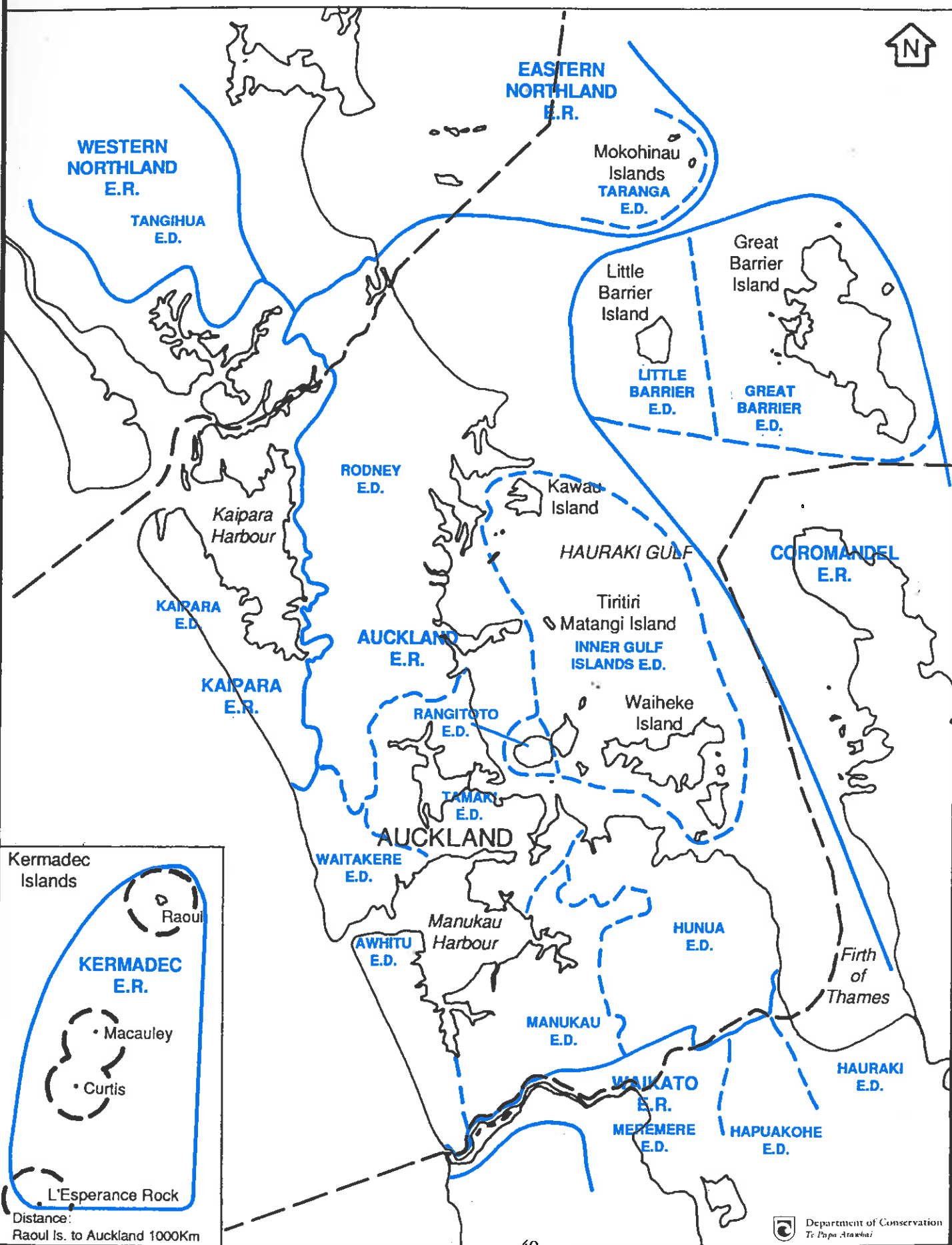
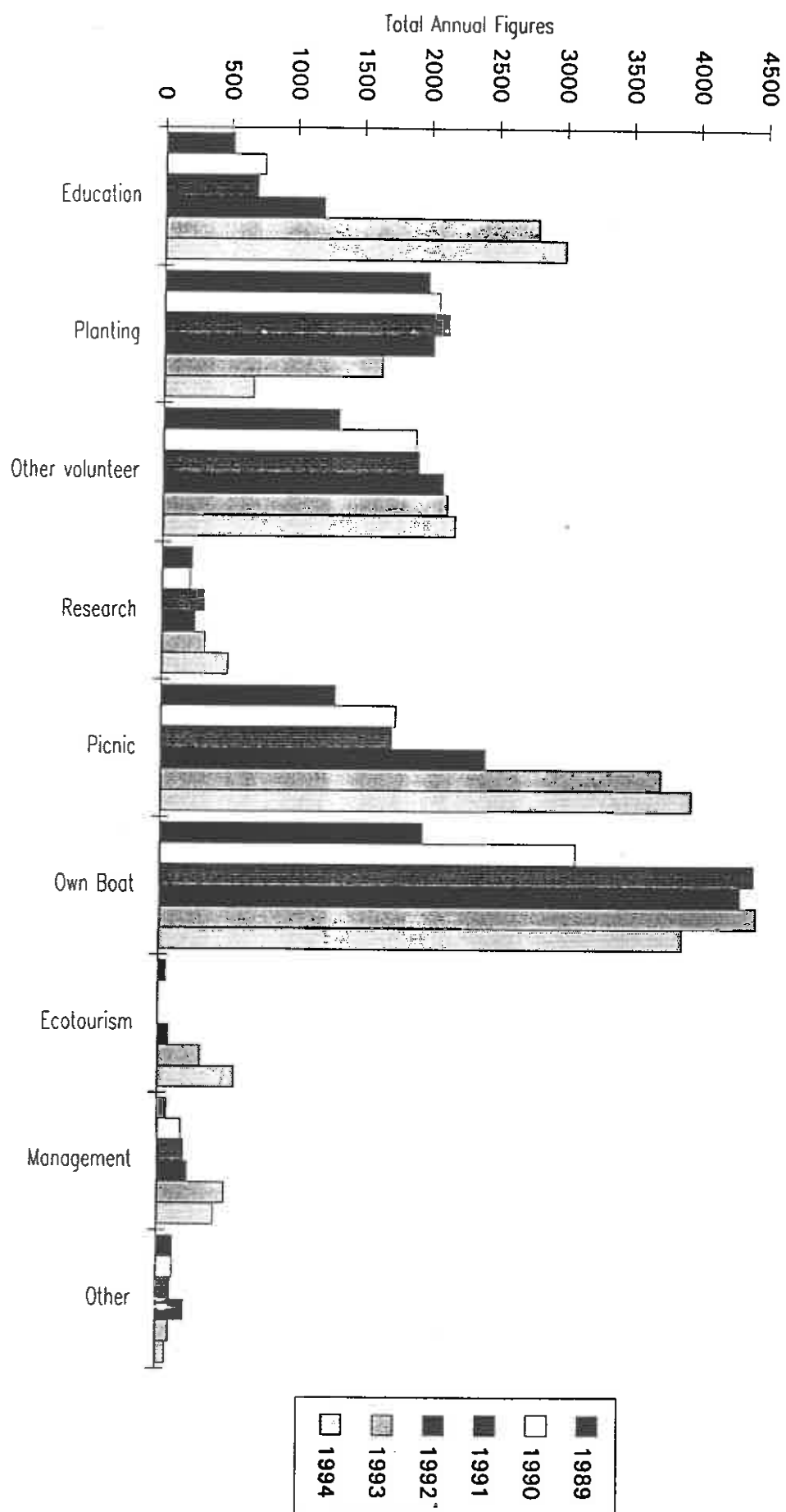


FIGURE 2



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APPENDIX 1

PLANNING AND POLICY DOCUMENTS RELATING TO TIRITIRI MATANGI

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 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 Tiritiri Matangi as a key area and priority place for conservation investment. It contains detailed references to the island under the following sections:

- Bird conservation programmes
- Conservation programmes for other animal species
- Conservation of indigenous vascular plant species
- Historic management
- Island restoration
- Public awareness, information, and community involvement
- Visitor services and opportunities

Hauraki Gulf Maritime Park Management Plan 1982

This plan was prepared for 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 Tiritiri Matangi and provides a broad framework of objectives and policies to guide management decisions.

The Inner Gulf Islands Ecological District and Rangitoto Action Plan (draft)

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

The Action Plan (draft) describes each island's resources, defines the threats, and outlines the management actions needed to protect or enhance their remnants of natural heritage. It places the management of Tiritiri Matangi in the context of other ecological protection and restoration work on islands in the Gulf, and ensures a strategic and compatible approach to, for example, the introduction of indigenous species.

Transfer Guidelines for Indigenous Terrestrial Fauna and Flora 1990

The guidelines apply to any transfer of indigenous terrestrial fauna and flora and are used in the preparation of Species Recovery Plans.

The Auckland Conservancy Historic Resources Strategy

This document provides a strategy for integrated management of historic resources on land administered by the Department. It identifies Tiritiri Matangi as a priority for active management as noted in Table 1: Historic Management Conservation Programmes (CMS, 1995).

Department of Conservation Auckland Conservancy Annual Business Plan.

The Business Plan specifies conservation work priorities and allocated staff time and finance for the year. The preparation of the Tiritiri Matangi Working Plan (draft) is required under key output 5.3 Island Restoration in the 1995-6 Business Plan.

Kawerau a Maki Trust Resource Management Statement 1995.

This document outlines the concerns and goals the Kawerau a Maki Trust have for the sustainable management of taonga within the Te Kawerau tribal area.

RMA Statutory Plans

The Resource Management Act 1991 establishes an hierarchy of plans which potentially affect the planning of Tiritiri Matangi. At the national level is the New Zealand Coastal Policy Statement. At the regional level are the Proposed Auckland Regional Policy Statement which aims to promote sustainable and integrated management across the region, and the Proposed Regional Plan: Coastal, which contains objectives, policies and rules for the coastal marine area and objectives and policies for some of the coastal environment.

There is also a Proposed Regional Plan: Sediment Control which is relevant. At the district level the Rodney District Plan, a transitional plan, contains rules relating to land uses. Recently Rodney District notified a change to its rural provisions which also pertain to Tiritiri Matangi. Each land use proposal needs to be individually assessed to determine what consents are required.

APPENDIX 2

SCIENTIFIC NAMES USED IN THE TEXT

Scientific name	Common/Maori name
Plants	
<i>Ageratina adenophora</i>	Mexican devil
<i>Ageratina riparia</i>	mistflower
<i>Allium vineale</i>	wild onion
<i>Alseuosmia macrophylla</i>	
<i>Araujia sericifera</i>	moth plant
<i>Austrofestuca littoralis</i>	sand tussock
<i>Beilschmiedia tarairi</i>	taraire
<i>Carmichaelia australis</i>	broom
<i>Cassinia leptophylla</i>	tauhinu
<i>Chrysanthemoides monilifera</i>	boneseed
<i>Coprosma repens</i>	taupata
<i>C. robusta</i>	karamu
<i>Cordyline australis</i>	cabbage tree
<i>Cortaderia jubata</i>	purple pampas grass
<i>C. selloana</i>	pampas grass
<i>Corynocarpus laevigatus</i>	karaka
<i>Desmoschoenus spiralis</i>	pingao
<i>Dipogon lignosus</i>	mile-a-minute
<i>Dysoxylum spectabile</i>	kohekohe
<i>Elaeagnus xreflexa</i>	elaegnus
<i>Elingamita johnsonii</i>	
<i>Entelea arborescens</i>	whau
<i>Erythrina xsykesii</i>	flame tree
<i>Eucalyptus spp.</i>	
<i>Hebe stricta</i>	koromiko
<i>H. pubescens</i>	
<i>Hibiscus diversifolius</i>	
<i>Kunzea ericoides</i>	kanuka
<i>Lepidium flexicaule</i>	
<i>Lepidium oleraceum</i>	Cook's scurvey grass
<i>Leptospermum scoparium</i>	manuka
<i>Ligustrum lucidum</i>	tree privet
<i>L. sinense</i>	Chinese privet
<i>Litsea calicaris</i>	mangeao
<i>Lonicera japonica</i>	Japanese honeysuckle
<i>Ludwigia peploides</i>	primrose willow
<i>Lycium ferocissimum</i>	boxthorn
<i>Melicytus ramiflorus</i>	mahoe
<i>Metrosideros excelsa</i>	pohutukawa

<i>Myoporum laetum</i>	ngaio
<i>Myoporum insulare</i>	Australian ngaio
<i>Olea europaea</i>	olive
<i>Paraserianthes lophanta</i>	brush wattle
<i>Passiflora mollissima</i>	banana passionfruit
<i>Phormium tenax</i>	flax
<i>Pseudopanax arboreus</i>	five-finger
<i>Pteridium esculentum</i>	bracken fern
<i>Pinus radiata</i>	pine
<i>Pittosporum umbellatum</i>	haekaro
<i>P. crassifolium</i>	karo
<i>Pouteria costata</i>	tawapou
<i>Ranunculus urvilleanus</i>	waiuatua
<i>Rhabdodhamnus solandri</i>	nikau
<i>Rhopalostylis sapida</i>	
<i>Rosa rubiginosa</i>	sweet brier
<i>Rumex sagittatus</i>	climbing dock
<i>Senecio angulatus</i>	Cape ivy
<i>Solanum linnaeanum</i>	apple of Sodom
<i>Sophora microphylla</i>	kowhai
<i>Streblus smithii</i>	
<i>Tecomanthe speciosa</i>	
<i>Ulex europaeus</i>	gorse
<i>Vinca major</i>	periwinkle
<i>Vitex lucens</i>	puriri
<i>Zantedeschia aethiopica</i>	arum lily

Birds

<i>Acridotheres tristis</i>	myna
<i>Acanthisitta chloris</i>	rifleman
<i>Anas aucklandia chlorotis</i>	brown teal
<i>Anthornis melanura melanura</i>	bellbird
<i>Apteryx owenii</i>	little spotted kiwi
<i>Bowdleria punctata</i>	fernbird
<i>Callaeas cinerea</i>	kokako
<i>Cyanoramphus novaeseelandiae</i>	kakariki
<i>Gymnorhina tibicen</i>	magpie
<i>Mohoua albigilla</i>	whitehead
<i>Nestor meridionalis septentrionalis</i>	North Island kaka
<i>Notiomystis cincta</i>	stitchbird
<i>Notornis mantelli</i>	takahe
<i>Petroica australis longipes</i>	North Island robin
<i>Petroica macrocephala</i>	tomtit
<i>Phalacrocorax varius</i>	pied shag
<i>Philesturnus carunculatus rufaster</i>	North Island saddleback
<i>Platycercus eximius</i>	eastern rosella
<i>Porphyrio melanotus</i>	pukeko
<i>Porzana tabuensis</i>	spotless crane
<i>Procellariidae</i>	petrel, shearwater

<i>Prosthemdera novaeseelandiae</i>	tui
<i>Pterodroma macroptera</i>	grey faced petrel
<i>Pterodroma magentae</i>	taiko
<i>Rallus philippensis</i>	banded rail
<i>Stictocarbo punctatus</i>	spotted shag
<i>Sturnus vulgaris</i>	starling
<i>Thinornis novaeseelandiae</i>	shore plover

Reptiles

<i>Cycodina whitakeri</i>	Whitaker's skink
<i>C. oliveri</i>	marbled skink
<i>C. alani</i>	robust skink
<i>C. macgregori</i>	McGregor's skink
<i>C. ornata</i>	ornate skink
<i>C. aenea</i>	copper skink
<i>Hoplodactylus pacificus</i>	Pacific gecko
<i>H. duvauceli</i>	Duvaucel's gecko
<i>H. granulatus</i>	forest gecko
<i>H. maculatus</i>	common gecko
<i>Leiolopisma suteri</i>	Suter's skink
<i>L. moco</i>	moko skink
<i>L. striatum</i>	striped skink
<i>L. smithi</i>	shore skink
<i>L. homalonotum</i>	chevron skink
<i>Naultinus elegans elegans</i>	Auckland green gecko
<i>Sphenodon punctatus</i>	tuatara

Fish

<i>Galaxias fasciatus</i>	banded kokopu
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Invertebrates

<i>Anagotis fairburni</i>	giant flax weevil
<i>Cormocephalus rubriceps</i>	giant centipede
<i>Ctenognathus novaezealandiae</i>	common ground beetle
<i>Deinacrida heteracantha</i>	wetapunga (giant weta)
<i>Mimopeus elongatus</i> , <i>M. opaculus</i>	darkling beetles
<i>Placostylus hongii</i>	flax snail
<i>Polistes chinensis</i>	Asian paper wasp
<i>Vespula germanica</i>	German wasp
<i>V. vulgaris</i>	common wasp

Mammals

<i>Chalinolobus tuberculata</i>	long-tailed bat
<i>Mystacina tuberculata</i>	short-tailed bat
<i>Rattus exulans</i>	kiore

APPENDIX 3

THREATENED SPECIES OF PLANTS CONSIDERED SUITABLE FOR REPLANTING ON TIRITIRI MATANGI

Priorities for plant selection are as follows:

1. Species threatened or now extinct in the IGIED
2. Species threatened or now extinct in the Ecological Region (especially those from the adjacent mainland)
3. Nationally threatened species from outside the Ecological Region where it can be shown that Tiritiri offers the best chance nationally of success.

Austrofestuca littoralis sand tussock

Very close to extinction within the conservancy. Historically present on Waiheke and at Omaha. It probably did occur on Tiritiri Matangi and the island has sufficient sandy beaches suitable to replant the species.

Priority for Conservancy: High
National priority: Low

Calystegia marginata bindweed

A vulnerable species which reaches its present mainland southern limit on the Takatu Peninsula near Leigh. A species under constant threat through spraying and land clearance of its weedy roadside habitat. The bracken fernland and shrubland of Tiritiri Matangi is ideal habitat for this species. It should be introduced from Takatu sourced material.

Priority for Conservancy: High
National Priority: Medium

Clianthus puniceus kakabeak

A recovery plan has been approved for this species but it does not allow for replanting into the former historical range of the species. Kakabeak is under threat of extinction in its only known site in the Conservancy - Moturemu. It was formerly present at Motukaraka (Flat Island) and at Great Barrier, and may have been on the Inner Gulf Islands as well. It is a useful food source for birds, and an attractive species whose conservation plight is understood by the public.

Priority for Conservancy: High
National Priority: High

***Dactylanthus taylorii* woodrose**

This is a Category A threatened species (Molloy and Davis 1994) severely impacted by rats and possums in other locations. It may have been present on Tiritiri Matangi and it could provide food for short-tailed bats if they are present or introduced.

Priority for Conservancy: High

National Priority: Medium

***Desmoschoenus spiralis* pingao**

While no longer considered nationally threatened this change in status reflects the improved condition of this species nationally through replanting and other active management. Within the IGIED pingao is confined to Waiheke. It also occurs on Motukorea (Tamaki Ecological District). Planting this species on Tiritiri Matangi would help ensure its survival until Motutapu and Motuihe are rabbit free, and it can be planted there.

Priority for Conservancy: High

National Priority: Low

***Euphorbia glauca* shore spurge**

Now presumed extinct within the IGIED, it is known from a site on Motukorea and this should be used as a seed source for restoring the species to the district.

Priority for Conservancy: High

National Priority: Medium

Lepidium flexicaule

Now presumed extinct in the North Island, this cress was formerly present within the area at North Head - its type locality, and on Rangitoto. It is doubtful that *L. flexicaule* ever occurred on Tiritiri Matangi but trials could be undertaken there to see how easily it could be returned to the wild. This species is strongly tied to healthy coastal ecosystems supporting large bird nesting grounds, and the island is an ideal experimental location.

Priority for Conservancy: High

National Priority: High

***Lepidium oleraceum* nau, Cook's scurvy grass**

Formerly reported from the Waitemata Harbour, Kawau and the Noises (circa 1860), this cress is now confined within the conservancy to the Mokohinau Islands, islands off Great Barrier and possibly Little Barrier. This species requires guano soils. Re-introduction to Tiritiri Matangi would help restore it to the district and provide an experimental indication of how this should best be achieved.

Priority for Conservancy: High

National Priority: High

Pimelea tomentosa

Known from Goat Island and Ponui Island, probably once present on the other larger Inner Gulf islands. Requiring dry shrubland, this easily grown, nationally vulnerable species could be planted on Tiritiri Matangi using Ponui or Goat Island Stock.

Priority for Conservancy: Low

National Priority: Low

Pomaderris polifolia

Probably now extinct in the Conservancy. This species is ideally suited to the dry ridges and shrubland communities of the island. Material could be obtained from Mangawhai Heads.

Priority for Conservancy: High

National Priority: High

Rorippa divaricata

Probably once present on the Inner Gulf islands, particularly as one of the first specimens was collected from the Waitemata Harbour (Peter Delange pers comm). This species has recently been recorded from the Conservancy at the Mokohinau Islands, Great Barrier and Rakitu. Closely associated with sea birds and by planting this species we are reproducing part of a complex coastal ecosystem all but eliminated by mammalian predators.

Priority for Conservancy: High

National Priority: High

Senecio scaberulus

Once an abundant plant on the lava fields of inner Auckland, now presently known in the Ecological District from two sites, one on Motuhoropapa (The Noises) and the other on Motuihe. This plant is under imminent threat of extinction within the Conservancy, and its few strongholds are now confined to the far North.

Priority for Conservancy: High

National Priority: High

Sicyos australis mawhai

Now extinct within the IGIED (last recorded from Waiheke in 1981, otherwise reported from Kawau in 1879, Noises in 1870's and Motuihe in 1860). Little Barrier is the next available source for the species. It is suspected that cucurbits ie. melons, cucumber, squash, zucchini, etc, transmit a virus which has all but eliminated this species from the mainland and inner shore island groups. Once propagated mawhai could be planted out at localities well away from the lighthouse complex as a precaution against Cucumber Mosaic virus.

Priority for Conservancy: Medium

National Priority: Low

APPENDIX 4

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 diurnal (D), crepuscular (C) and nocturnal (N); species marked RP have an existing recovery plan.

Species	Status	Habit	Nearest living population
<i>Sphenodon</i> : Tuatara	Rare (RP)	N	Little Barrier
<i>Hoplodactylus</i> : Common gecko	Common	N	Tiri ?
Duvaucel's gecko	Rare	N	Tiri?
Forest gecko ²	Common	D-N	Waiheke
Pacific gecko	Common	N	Great Barrier
<i>Naultinus</i> : Auckland green gecko	Common	D	Waiheke
<i>Cyclodina</i> : Copper skink	Common	C	Present
Marbled skink	Rare	C-N	Little Barrier
McGregor's skink	Rare	N	Sail Is
Ornate skink	Common	C	Tiri ?
Robust skink	Rare (RP)	N	Mercury Is
Whitaker's skink	Rare (RP)	N	Mercury Is
<i>Leiopisma</i> : Chevron skink ²	Endangered (RP)	D	Little Barrier
Moko skink	Common	D	Present
Shore skink	Common	D	Tiri ?
Striped skink ²	Rare	D	Great Barrier
Suter's skink	Common	N	Tiri ?

Total species in region: 17

Potential species for Tiri: 13

APPENDIX 5

RODENTS IN STORES AND EQUIPMENT

Definitions:

Rodent islands are: Motutapu, Rangitoto, Motuihe and Kawau. Low-rodent islands are: Little Barrier, Moturekareka, Fanal and Great Barrier. Rodent-free islands are: Motuora, Tiritiri Matangi and Burgess and all other islands in the Mokohinau Group except Fanal.

"Rodent-proof area" may be a designated room or an entire house. There should be an automatic door-closer or outer doors closed at night to ensure that the area remains rodent-free or that rodents which might escape from a package are contained.

Packaging standards:

All stores which are for delivery to rodent-free or low-rodent islands shall be packed in rodent-proof containers. These containers may be a fully sealed cardboard carton, a plastic bin with a lid, or one of the plywood boxes which is available at Boats Section.

Larger items:

Equipment items which are too large to be enclosed in a sealed package should, whenever possible, be left entirely unpackaged. Or prepared in such a manner that possible rodent hiding places are sealed or inspection for the presence of rodents is easy.

Overnight storage:

On rodent and low-rodent islands items packed in cartons, sacks, or other materials which might be prone to a successful overnight attack by rodents, will be stored in a rodent proof room. Items packed in more robust containers and larger items may stay out of the rodent-proof room.

Delivery to Boats Section:

Upon arrival at Boats Section all items which do not meet the packaging standards listed above shall be immediately packaged. It is preferable that this work be done by the deliverer as ongoing training for that person. Items packed in cartons, sacks, or other materials which might be prone to a successful overnight attack by rodents, will be stored in a rodent-proof room. Items packed in more robust containers and larger items may stay out of the rodent-proof room.

Delivery to Hauturu:

Upon arrival at Hauturu all items which are packed are to be stored in the hold. Accommodation areas and the workshop are not to be used for the transport of any stores apart from frozen goods in the freezer.

A "clean hold policy" will be maintained by the ships crew. This means that the hold will be cleared of all loose items at the end of each voyage or at the end of each working day.

Larger, unpacked items must be checked by ships crew for rodents before being stowed.

Transport on other vessels:

Goods being transported to islands, or arriving on islands on other (non-DOC) vessels will be packed and handled in the manner described above. The vessels transporting such goods will be expected to follow the rodent protection procedures used for DOC vessels.

Delivery to a rodent island:

Stores may be unpacked at any time after they are clear of the transporting vessel.

Delivery to a low-rodent or rodent-free island:

Packed stores must be taken directly to a rodent-free room for unpacking. Larger items must be carefully inspected for possible rodent presence and parts which are packed should be unpacked in a clear area where any escaping rodent can be detected.

PEOPLE TO ISLANDS

People and packs to Hauturu

All items other than day packs are to meet the sealed packaging requirements listed above. These items are to be inspected by ships crew for signs of rat damage before being stowed in the hold.

The people should be asked to inspect their day packs before boarding Hauturu.

Unpacking packs

The standards established for stores apply.

On rodent-free and low-rodent islands the Conservation Officer in charge must ensure that all visitors are inside the rodent-proof area before they begin unpacking.

ISLAND PROTECTION WITH RODENT BAIT

Rodent-free islands

Bait stations will be maintained at landing points and buildings on all rodent-free islands. These stations will be inspected by the Conservation Officer in charge of the island at three-monthly intervals and the condition of the baits and the stations recorded in the quarterly report.

If possible all stations should be checked at monthly intervals. Those in high use areas such as the main landing and houses should be checked by the Conservation Officer while those in other locations may be checked by some other person.

All bait station baits will be replaced at six-monthly intervals and the old bait returned to Conservancy Office for recycling.

Vessels:

All Department of Conservation vessels will, to the best of our ability, be rodent-proof. All doors and hatchways will be closed at night while the vessel is alongside a wharf.

Bait stations will be maintained on board all vessels and these will be checked weekly with the bait replaced as necessary. A record of these checks will be maintained and included with each quarterly report.

All bait station baits will be replaced at six-monthly intervals and the old bait returned to Conservancy Office for recycling.

Halsey Street:

Bait stations will be maintained and these will be checked weekly with the bait being replaced as necessary. A record of these checks will be maintained and included with each quarterly report.

Any bait station bait which is not eaten by rodents will be replaced at six-monthly intervals and the old bait recycled to a station which is visited more frequently by rodents.

APPENDIX 6

PLACEMENT OF PERMANENT BAIT STATIONS ON TIRITIRI

MATANGI

1. Northeast Bay - under the pohutukawa at the northern end of the bay.
2. Northeast Bay - beside the "TIRITIRI MATANGI" sign in the middle of the bay.
3. Northeast Bay - scrub to the right of the track down to the beach.
4. Northeast Bay - north cove under karo at the centre of the cove.
5. Northeast Bay - south cove under pohutukawa at the north end.
6. Pohutukawa Cove - under the first pohutukawa to the north of the "TIRI" sign.
7. Pohutukawa Cove - under pohutukawa in the middle of the bay.
8. Pohutukawa Cove - under the second pohutukawa north from the southern end.
9. The Arches - ampitheatre.
10. Fishermans Bay behind a ngaio at the northern end
11. Fishermans Bay under flax half way along the beach.
12. Fishermans Bay behind a pohutukawa at the southern end.
13. Emergency Landing - under pohutukawa in the gully
14. Point north of Chinamans Bay at the base of the point right on the coast.
15. Chinamans Bay - flax south side of "TIRITIRI MATANGI" sign
16. Chinamans Bay - behind karo at the north end.
17. Chinamans Bay - pohutukawa at the south end, bottom of grass cliff.
18. Cove below lighthouse - in flax at south end of north cove.
19. Cove below lighthouse - in flax by pohutukawa half way down cliff to south cove.
20. Under karo and pohutukawa closest to coast on south side of Bunkhouse Dam stream.
21. The bay south of the wharf around the point under a *Coprosma repens* at the north end.
22. The bay south of the wharf around the point behind gorse at the centre of the beach.
23. The bay south of the wharf around the point under flax at the south end.
24. By a flax bush behind the beach to the south of the wharf.
25. Wharf building - left side of rails.
26. Wharf building - right side of rails.
27. End of wharf
28. End of wharf
29. In the toilet block near the wharf.
30. In flax to the right of the wooden rails onto the beach before Hobb's beach.
31. In scrub to the right of where coastal track to Hobb's starts again.
32. Hobb's Beach (south end) under whau by creek.
33. Hobb's Beach under platform.
34. Hobb's Beach under large pohutukawa on the beach.
35. Hobb's Beach north end in scrub to the left of the Kawerau Track sign.
36. Under pohutukawa at south end of cove past Hobb's Beach.

37. Under first (southern) pohutukawa in second cove past Hobb's Beach.
38. Bunkhouse under the house by the access door.
39. Hobb's Beach under scrub 5m south of central "TIRITIRI MATANGI" sign.
40. Number one house under the house by the access door.
41. Garage to the left of the spades.
42. Office/potting shed in poisons/fertiliser room.
43. Under the bach by the gas bottle cage.
44. In the centre room of the workshop.
45. The downstairs porch of the signal station.
46. Cow shed.
47. Fowl house.
48. Bird aviary-under the viewing deck.
49. Foghorn.
50. Outside the toilet block at the houses.

APPENDIX 7

VISITOR SERVICE CENTRE SITING AND DESIGN CRITERIA

Siting Criteria

- Avoidance of archaeological sites
- Degree of visual intrusion into or competition with the historic area ie. consistency with Conservation Plan recommendations.
- Degree of disturbance to landform.
- Degree of disturbance to significant vegetation.
- Degree of visual impact on the wider landscape.
- Provision of good public access.
- Mitigation of exposure to prevailing winds.
- Opportunities for interpretation.
- Opportunities for outdoor spaces
- Views achieved
- Opportunities for future expansion.
- Constraints and opportunities for design.
- Degree of disruption to existing structures while building.
- Ease of connection to existing services.
- Allowance for supervision.
- Type of construction.

Design Criteria

- Be functional in design
- Reflect a conservation message through cost-effective, low-maintenance design, with low-energy use, water collection and the use of non-toxic materials where practical.

- Create suitable microclimate for outside assembly and provide good indoor/outdoor connection.
- Complement (ie. not challenge) the form and colour of historic structures, but be clearly interpretable as a modern building.
- Minimise the degree of visual intrusion into or competition with the historic area.

APPENDIX 8

LIST OF SPONSORS WHO HAVE DONATED SUMS IN EXCESS OF

\$1,000

Sir John Logan Campbell Residuary Estate
Maurice Paykell Charitable Trust
World Wide Fund for Nature Supporters Group (Auckland)
North Shore Branch, Royal Forest and Bird Protection Society of New Zealand (Inc)
Auckland Savings Bank
University of Auckland
New Zealand Lottery Grants Board
Moller Yamaha Ltd
Lanier New Zealand Ltd
Supporters of Tiritiri Matangi (Inc)
DuPont (New Zealand) Ltd
Bob Haldane Ltd
LJ Fisher Charitable Trust
ENZA New Zealand
Glenfield Lions
Central Auckland Branch RFBPS (Inc)
BP Solar (Aust Ltd)
Sierra Fertilisers
Lyndale Nurseries
Adhesive Print Ltd
Heli Tranz
NZ Wiremakers
Hibiscus Coast Service Clubs
Zonta Hibiscus Coast
Bank of New Zealand
Gulf Harbour Ferries
Adventure Cruising Co. Ltd
NZ Glass

APPENDIX 9

PLANTS, SEEDS OR CUTTINGS INTRODUCED TO TIRITIRI

MATANGI

SPECIES	ORIGIN	DATE	COMMENT
<i>Alectryon excelsus</i>	Motutapu	1990	2
<i>Alseuosmia macrophylla</i> (?) or <i>A. x quercifolia</i> (?)	Hauturu	1984, 87	2
<i>Carmichaelia cunninghamii</i>	Hauturu	1987	
<i>Clianthus puniceus</i>	Moturemu	1993	
<i>Dodonaea viscosa</i>	Rangitoto	1991	
<i>Elingamita johnsonii</i>	DSIR	1988	2
	(Three Kings Is)		
<i>Euphorbia glauca</i>	Hauturu	1987	Unsuccessful
<i>Fuchsia excorticata</i>	Hauturu	1984, 87	1
<i>Hebe cf. Pubescens</i>	Hauturu	1987	1
<i>Hibiscus diversifolius</i>	Ahipara	1987	1
<i>Melicope ternata</i>	Motutapu	1991	
<i>Pittosporum umbellatum</i>	Hauturu	1984	
<i>Rhabdodhamnus solandri</i>	Hauturu	1984, 85	
<i>Rhopalostylis sapida</i>	Hauturu	1987	
	Waiheke	1987	
<i>Schefflera digitata</i>	Hauturu	1986	
<i>Solanum aviculare</i>	Hauturu	1987	Unsuccessful
<i>Sophora microphylla</i>	Rangitoto	1985	
	Shakespear Bay	1983	
	Hen & Chickens	1983	Unsuccessful
<i>Streblus smithii</i>	DSIR	1987	Unsuccessful
	(Three Kings Is)		
<i>Tecomanthe speciosa</i>	Hauturu	1983	4
	(Three Kings Is)		
<i>Vitex lucens</i>	Motutapu	1987	
	Warkworth		
	Hauturu		
	Cornwall Park		

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