

# **Motuora Vegetation Management Plan 2010 – 2014**

## **1. Introduction**

### **1.1 Purpose**

The purpose of this plan is to provide guidance to Motuora Island managers for the management of vegetation on Motuora when the initial pioneer planting programme is completed. It includes plans for the planting of secondary succession and understory species in order to implement the vegetation section of the Motuora Native Species Restoration Plan, and outlines priorities for the management of invasive weeds in conjunction with the enhancement planting.

### **1.2 Background**

The Motuora Restoration Society has been carrying out planting of pioneer species on Motuora since 1994. These plantings have been the first stage in the conversion of kikuyu grassland to native forest cover in order to restore indigenous vegetation and ecological processes to the island. The initial planting of pioneer species is almost complete and many areas have now reached canopy closure and are starting to build up the leaf litter environment which provides suitable habitat for the next stage of vegetation succession. There are currently large areas of low shrubland which are vulnerable to weed invasion and which require management to ensure that invasive weeds do not suppress the natural succession process. Most of the planted blocks are free of invasive weeds other than kikuyu grass and gorse which will eventually be shaded out. However boneseed is still widespread on the cliffs and the naturally regenerating bush remnants. Blocks which were planted prior to the major weed control effort which commenced in 1998 still contain seed banks of several other invasive weeds in the soil.

## **2. Management Strategies**

### **2.1 Planting strategy**

The strategy being employed in the management of vegetation on Motuora is to allow natural processes to develop as much as possible and to keep management to a minimum. Pioneer shrub species have been introduced to previously grassed areas to provide shelter and cover to suppress the exotic grasses and allow natural succession of indigenous species to take place. The approach taken to later succession planting is to introduce seed sources and to allow nature to choose the sites of trees as much as possible. The species which are expected to dominate the coastal forest canopy (eg puriri, kohekohe, taraire) will be planted throughout the shrubland. Most other species will be planted in groups and allowed to spread naturally.

Planting is only carried out in designated planting blocks. It is not proposed to plant into naturally regenerating areas (ie all the areas originally outside the perimeter fence except for Still Bay) except where it is beneficial for the control of invasive weeds or where habitat is specifically identified for rare species. It has been decided by the

Motuora Restoration Society that these blocks should be left to regenerate naturally so that comparisons can be made with these and the planted blocks in the future.

In keeping with the island's designation as a recreation reserve several areas will be artificially maintained as open space to preserve views of the surrounding islands and mainland.

## **2.2 Weed control strategy**

The strategy being implemented for weed control on Motuora is to maintain zero density (no mature plants) of all invasive weeds except boneseed, gorse and kikuyu grass and to maintain containment of the latter to ensure that they do not invade new areas. The general approach is to encourage the native flora and discourage the invasive exotic flora with as little disturbance and with as little herbicide use as possible.

A programme of annual searching of the island to control invasive weeds is in place. This programme targets all the invasive weed species which were already present on the island and prevents new species from becoming established. However boneseed, gorse and kikuyu grass are in such large numbers and have such extensive seed banks that controlling all plants would be a massive task and detrimental to the natural environment through unacceptably high use of herbicide. In some areas wholesale clearance of these weeds would also cause erosion and result only in the weeds rapidly replacing themselves.

These three species do not survive in shade so shading brought about by natural succession is being used to eliminate these species in the long term. This will be difficult to achieve on the open cliffs as maintaining dense shade in these areas is hampered by wind and erosion. However on some coastal banks the natural succession process taking place is kikuyu grass being replaced by gorse which in turn is being replaced by *Muehlenbeckia complexa*. As *muehlenbeckia* provides food and habitat for a variety of species that are planned for introduction to Motuora, this process is being left to occur naturally and will be assisted if necessary. As the planted forest at the top of open cliffs matures, boneseed and gorse will be controlled gradually along the cliff margins to encourage the shading effect. Management strategies are in place to prevent the existing infestations of these species from spreading further into the regenerating forest.

### 3. Vegetation enhancement

#### 3.1 First succession planting

Over the past 15 years pioneer plants have been established in former grassed paddocks to provide the initial shrub cover to start the natural succession process and these are currently at various stages of growth ranging from 1m to 5m in height. Species that have been used in these plantings in large numbers are as follows:

<i>Carmichaelia australis</i> Broom	<i>Melicytus ramiflorus</i> Mahoe
<i>Coprosma macrocarpa</i> and <i>Coprosma robusta</i> Karamu	<i>Metrosideros excelsa</i> Pohutukawa
<i>Coprosma repens</i> Taupata	<i>Myoporum laetum</i> Ngaio
<i>Cordyline australis</i> Cabbage tree	<i>Myrsine australis</i> Mapou
<i>Dodonea viscosa</i> Ake ake	<i>Pseudopanax arboreus</i> Five finger
<i>Entelia arborescens</i> Whau	<i>Pseudopanax lessonii</i> Houpara
<i>Hebe stricta</i> and <i>Hebe macrocarpa</i> Koromiko	<i>Pittosporum crassifolium</i> Karo
<i>Kunzea ericoides</i> Kanuka	<i>Phormium tenax</i> Flax
<i>Leptospermum scoparium</i> Manuka	<i>Sophora chathamica</i> and <i>Sophora microphylla</i> Kowhai
<i>Melicope ternata</i> Wharangi	<i>Vitex lucens</i> Puriri

#### 3.2 Second succession planting

As the pioneer planting is almost complete, work has started on planting secondary succession species. This must only be carried out in planted areas where canopy closure of the pioneer species is close to established and there is little exotic grass present. The main species to establish long term canopy (approximate numbers 50 per block) are listed below. These species are those that have been listed for medium numbers in the Motuora Native Species Introduction Plan. They are the priority species for planting as soon as possible because they are the species which will provide most of the coastal forest canopy.

Species to establish general forest canopy:

Species	Habitat requirements	Where to plant	Seeding time
<i>Alectryon excelsus</i> Titoki	Prefers sun and shelter tolerates dry soil	Track margins in sheltered sites, light wells in forest, under shrub canopy	Oct-Dec
<i>Beilschmiedia tarairi</i> Taraire	Dappled shade and shelter, well drained rich soil, tolerates dry soil	Under shrub canopy	Apr-May
<i>Beilschmiedia tawaroa</i> Tawaroa	Dappled shade and shelter, well drained rich soil tolerates dry soil	Under shrub canopy	Apr-Jun
<i>Coprosma arborea</i> Mamangi	Dapples shade and shelter	Under shrub canopy	Jun-Jul
<i>Fuchsia excortica</i> NZ Fuchsia	Sheltered moist sites does not tolerate drought	Forest, scrub, sheltered gullies	Jan-Feb
<i>Corynocarpus laevigatus</i> Karaka	Well drained rich soil, tolerates dry soil	Under light canopy or in light wells	Jan-Feb
<i>Dysoxylum spectabile</i> Kohekohe	Shady sites, rich well drained soil	Under shrub canopy	May-Aug
<i>Hedycarya arborea</i> Pigeonwood	Shady sites, rich moist soil	Under shrub canopy	Nov-Mar
<i>Knightia excelsa</i> Rewarewa	Tolerates full sun, well drained soil will tolerate dry soil.	In light wells in forest and on track margins	Feb-Mar
<i>Podocarpus totara</i> Totara	Tolerates most conditions	In forest or open sites	Mar-Apr
<i>Pouteria costata</i> Tawapo	Prefers sun, tolerates wind and dry soil	Coastal fringe, open sites.	Mar-Apr
<i>Vitex lucens</i> Puriri	Rich soil, tolerates most conditions	In forest or sheltered open sites.	Jan-Dec

Other species that have been listed in the Motuora Native Species Introduction Plan to be introduced in low numbers will be propagated and planted as seed becomes available. It is important that plants that provide food are established as soon as possible to enhance the habitat for the animal species introductions that are planned. Mid tier and understory species will be established by planting low numbers in groups in their preferred habitat and assisted by manual seed distribution rather than actively planting everywhere eg. kowhai, nikau. Manual seed distribution will also be used to assist the spread of grass, sedge and rush species. Ferns will not be planted as it has been observed that these are establishing naturally in areas where habitat has become suitable.

The following are species which do not have seed sources on Motuora and which will be introduced in low numbers when seed is available:

Species	Species type	Habitat requirements	Seeding time (colour of ripe fruit)
<i>Agathis australis</i> Kauri	Canopy tree	Tolerates poor soil, establish under canopy in sheltered areas	Mar-Apr collect cones before they open
<i>Alsueosmia macrophylla</i>	Shrub	Forest, prefers shelter	Feb-Mar (red)
<i>Aristotelia serrata</i> Wineberry	Mid tier tree	Forest margins, wet tolerant Dioecious – plant in groups	Jan-Mar (dark purple)
<i>Astelia solandri</i> Perching lily	Epiphyte	In forks of trees	
<i>Carpodetus serrata</i> Putaputaweta	Mid tier tree	Forest, prefers shelter	Mar-May (black 1 yr to ripen)
<i>Carex flagellifera</i>	Sedge	Forest margins, swampy areas	
<i>Carex lambertiana</i>	Sedge	Swamps	
<i>Clematis paniculata</i>	Climber	Forest	Oct-Nov (White fluffy pappus)
<i>Coprosma propinqua</i>	Shrub	Scrub and regenerating forest	Jan-Mar (blue or white)
<i>Coprosma spathulata</i>	Shrub	Regenerating forest	Jan-Mar (black)
<i>Cordyline pumilio</i> Dwarf cabbage tree	Understory tree	Forest	Mar-May (blue)
<i>Cortaderia splendens</i> Toetoe	Tall grass	Rocky sites, cliffs and sand dunes	Dec-Jan
<i>Cyathodes juniperina</i> Mingimingi	Shrub	Scrub and forest	Dec-Jan (white, pink, red or purple)
<i>Dacrycarpus dacrydioides</i> Kahikatea	Emergent tree	Forest, swampy areas	Mar-Apr (purple-black)
<i>Dacrydium cupressinum</i> Rimu	Emergent tree	Forest	Apr-Jun (dark brown/black)
<i>Einadia triandra</i> Pigweed	Coastal herb	Coastal cliffs and beach margins	? (red)
<i>Elymus multiflorus</i>	Grass	Rocky sites, grassland	
<i>Freycinetia banksii</i>	Climber	Forest	Jan-May

<i>Gahnia setifolia</i>	Sedge	Forest and scrub	AYR (Brown/orange)
<i>Griselinia lucida</i> Puka	Epiphyte	Forest, tolerates wind	Feb-Mar (black)
<i>Laurelia novae-zelandiae</i> Pukatea	Emergent tree	Forest, swampy ground	Oct-Jan
<i>Leucopogon fasciculatus</i> Mingimingi	Shrub	Forest and scrub	Jan-Feb (red)
<i>Linum monogynum</i> NZ linen flax	Coastal herb	Coastal cliffs	Jan-Feb
<i>Litsea calicaris</i> Mangeao	Canopy tree	Sheltered gullies Dioecious - plant in groups	Oct- Nov?(black)
<i>Melicytus novae-zelandiae</i> Coastal mahoe	Mid tier tree	Forest and coastal cliffs	Feb-Mar (black)
<i>Metrosideros diffusa</i> White climbing rata	Climber	Forest and scrub	Feb-Mar (tiny seeds in capsule)
<i>Metrosideros fulgens</i> Orange rata vine	Climber	Forest and scrub	Feb-Mar (tiny seeds in capsule)
<i>Metrosideros perforata</i> Small-leaved rata	Climber	Forest and scrub	Feb-Apr (Tiny seeds in capsule)
<i>Muehlenbeckia australis</i>	Climber	Forest and coastal margins	Mar-Apr (white)
<i>Nestegis apetala</i> Coastal maire	Canopy tree	Forest	Dec (red)
<i>Nestegis lanceolata</i> White maire	Mid tier tree	Forest	Mar-Jun (red/brown)
<i>Olearia rani</i> Heketara	Shrub	Coastal cliffs, forest margins	Jan-Feb
<i>Ozothamnus leptophyllus</i> Tauhinu	Shrub	Scrub, full sun sites well drained soil	Jan-Feb
<i>Parsonsia heterophylla</i> NZ jasmine	Climber	Tolerates most conditions, likes sun.	Jan-Feb (dark brown pod with papery seeds)
<i>Passiflora tetrandra</i> Native passionvine	Climber	Forest Dioecious	Nov-Dec (orange)
<i>Peperomia urvilleana</i>	Coastal herb		
<i>Phyllocladus trichomanoides</i> Tanekaha	Emergent tree		Jan-Feb (black)

<i>Pittosporum cornifolium</i> Perching pittosporum	Mid tier tree or epiphyte	Forest	Mar-Apr
<i>Pittosporum tenuifolium</i> Kohuhu	Mid tier tree	Forest	Mar-Apr
<i>Pomaderris kumerahou</i> Kumerahou	Shrub	Clay banks scrub and forest margins. Tolerates drought and wind.	Dec-Jan
<i>Prumnopitys ferruginia</i> Miro	Emergent tree	Forest	Mar-Jun (red)
<i>Prumnopitys taxifolia</i> Matai	Emergent tree	Forest	Mar-May (black)
<i>Pseudopanax crassifolius</i> Lancewood	Mid tier tree	Forest and scrub, dry conditions	Dec? (1 year to ripen)
<i>Rhabdothamnus solandri</i> NZ gloxinia	Shrub	Forest	Mar
<i>Rubus cissoides</i> Bush lawyer	Climber	Tolerates most conditions	Dec-Jan (orange)
<i>Schefflera digitata</i> Pate	Mid tier tree	Forest	Apr-May (dark violet)
<i>Selliera radicans</i>	Coastal herb	Coastal margins, cliff seepages	
<i>Solanum aviculare</i> Poroporo	Shrub	Forest margins, scrub, prefers sun	Mar-Apr (orange)
<i>Streblus heterophyllus</i> Small leaved milk tree	Mid tier tree	Forest	Jan-Feb (red)
<i>Tetragonia trigyna</i> Beach spinach	Coastal herb	Splash zone, gravelly soil	Summer (red)
<i>Uncinia uncinata</i> Hook grass	Sedge	Swamp margins, scrub	
<i>Rhopalostylis sapida</i> Nikau	Palm	Forest, rocky areas	Jan-Dec (red)
<i>Ripogonum scandens</i> Supplejack	Climber	Forest	Mar-Apr (orange/red)

### 3.3 Planting guidelines for secondary succession species

1. Plants should not be larger than PB3 so that they can easily be planted among existing shrub roots but ensure a strong root structure has developed.
2. Plants must be planted as soon as possible after the summer drought (eg preferably before the end of June) to give maximum time for roots to develop before the following dry season.
3. Some seeds (eg Karaka and Tawapou) can be direct sown on the ground after initial sprouting as long as the ground is moist enough.
4. Select sheltered sites that are at least partially shady and that have no grass cover.
5. Plant in groups ensuring each species is placed in it's preferred soil, light and drainage habitat.
6. Place canopy plants at least 10 metres from other canopy species.
7. Place plants in a manner to ensure they will not be smothered by other faster growing species before they have time to establish.

### 3.4 Threatened plants

Sites for threatened plants listed in the Motuora Native Species Introduction Plan will be selected on a case by case basis depending on habitat requirements and the levels of plant and/or animal pests (eg snails). Some experiments will be carried out to see if some species can be established by seed distribution in suitable habitat.

The threatened plants for introduction to Motuora are as follows:

Species	Habitat requirement	Amount of current habitat on Motuora
<i>Austrofestuca littoralis</i> Sand tussock	Stable sand dunes	Adequate, Home Bay, Still Bay, Pohutukawa Bay, Macrocarpa Bay
<i>Calystegia marginata</i> Small flowered white bindweed	Open shrubland, coastal headland, track margins	Limited due to presence of kikuyu grass, establish on Kiwi Track after control of kikuyu
<i>Clianthus puniceus</i> Kakabeak	Bluffs, coastal cliffs (not where boneseed or thick grass is present)	Adequate eroding cliffs but sites need to be poor habitat for snails.
<i>Dactylanthus taylorii</i>	Hosts: mahoe, five finger,	Adequate mahoe, five

Wood rose	kapuka, karamu, mapou, putaputweta	finger and mapou trees.
<i>Desmoschoenus spiralis</i> Pingao	Coastal shifting sand dunes	Limited, only two possible sites, Home Bay, Still Bay
<i>Euphorbia glauca</i> Shore spurge	Coastal cliffs, rocky bluffs mudstone slopes, sand dunes	Adequate Still Bay, Home Bay, north western coast
<i>Geranium solanderi</i> "large petals"	Dry open lowland	Limited due to presence of kikuyu grass
<i>Ileostylus micranthus</i> Green mistletoe	Hosts: totara kanuka coprosma propinqua, manuka mapou	Adequate, large amounts kanuka and manuka some small totara and mapou
<i>Lepidium flexicaule</i>	Coastal turfs, rock stacks outcrops, headlands, cliff faces.	Limited to rock stacks and open bluffs due to presence of kikuyu grass and snails
<i>Lepidium oleraceum</i> Cook's scurvy grass	Seabird roosts, fertile soils on coastal slopes rocky shorelines and gravel beaches	Limited to rock stacks and open bluffs due to presence of kikuyu grass and snails, some suitable seabird sites
<i>Pimelia tomentosa</i>	Coastal and semi coastal forest, open grassy clifftops, in scrub and seral habitats	Limited to open bluffs due to presence of kikuyu grass in other habitats
<i>Pisonia brunoniana</i>	Sheltered understory of mixed-broadleaf forest	Adequate, plenty of sheltered forest habitat
<i>Rorippa divaricata</i>	Disturbed ground, petrel burrows, recent slips, track margins	Adequate but confined to areas without kikuyu grass.
<i>Senecio scaberulus</i>	Cliffs, coastal scrub, forest margins and clearings, shaded sites among short grasses, banks near sea.	Adequate but confined to areas without kikuyu grass
<i>Sicyos aff. Australis</i> Mawhai	Coastal and lowland forest, scrub	Adequate around coastal margin
<i>Streblus banksii</i> Large leaved milk tree	Coastal forest	Adequate
<i>Tetragonia tetragonioides</i> NZ spinach	Open coastal sites, and dunes, stony beaches	Adequate, around coastal margin
<i>Tupeia antarctica</i>	High light, regenerating shrubland forest edges, hosts Pittosporum species, Coprosma species Putaputa weta, Five finger, white maire, Coastal maire	Adequate, plenty of pittosporum and coprosma species, and five finger.

### **3.5 View points**

Several of the high points of the island have been designated as public viewing points which are to be managed so as to preserve views of the surrounding landscape (see fig 2). These areas will be maintained primarily in grass and only low growing shrubs will be planted in the direction of the views. The native grass *Microlaeana stipoides* will be planted on the mown sections of these sites and *Muehlenbeckia complexa* or low growing shrubs on those areas too steep to mow. No species which grow to a height of more than ten metres will be planted above the designated lines shown in fig 2. and species of this height which self seed into these areas will be removed.

## 4. Planting Plan by Block

For the purposes of this plan the island has been divided into twenty seven vegetation management blocks (see fig 1). These blocks are based on the plots created in 2003 for weed control. The boundaries of these blocks have been created using existing tracks, gullies, bluffs and the coastline. Some of these boundaries coincide with those of the original blocks created for the shrub planting plan in 1997. However some of these original blocks have been amalgamated to reflect the existing natural boundaries created by tracks. The timing of planting second succession trees in each block will vary depending on the existing vegetation present, i.e. the age of the planting or the extent of invasive weeds.

It must be noted that the numbers of canopy species specified for each block are guidelines only and do not have to be exact. For those species that will be introduced in low numbers, five plants is considered the minimum per block to ensure some survival.

### **Block 1 (3.8 hectares)**

#### **Description**

Block 1 incorporates all of planting Areas A (Block 1a) and D (Block 1d) and part of Area B (Block 1b) as far as the bottom of Snake Gully which forms the northern boundary. It is bounded on the south west by the track which leads along the cliff to a group of fallen pines and the eastern boundary follows the line of the fence that used to separate these planting blocks from the paddock. It also incorporates all of the area between these areas and the coast which was originally outside the perimeter fence (Block 1c).

Area A was the site of the first major plantings on Motuora between 1994 and 1996. The planted trees there are now over thirteen years old and are dominated by pohutukawa and karo. In the gully are some other canopy trees eg puriri and karaka and this is the only place on the island where totara have been planted. Area B was planted around the same time as area A and contains several mature puriri and numerous pohutukawa. Most of Area D was planted in 1997 with a strip on the eastern side completed in 1998. It contains large amounts of pohutukawa, karo and coprosma as well as other mixed shrubs, a large area of flax in the middle and a strip of manuka dominated shrubs on the eastern side. Some kohekohe have been planted close to the eastern boundary.

These planted areas have a closed canopy without the presence of gorse or kikuyu grass except on the edges of tracks but still contain a small seed bank of climbing asparagus and several currently non active Madeira vine sites particularly in Block 1a. The sites which were originally outside the perimeter fence consist of a narrow strip dominated by gorse and muehlenbeckia which separates Block 1d from the pohutukawa dominated cliffs, and a strip of kikuyu grass and boneseed mixed with regenerating coprosma which lies between Block 1a and the cliff. These naturally regenerating areas also contain active climbing asparagus seed banks but they are in low numbers. The lower half of Snake Gully contains a large amount of gorse and kikuyu grass which is gradually being taken over by native trees and muehlenbeckia. It is likely that as the

kikuyu grass gets shaded out in this area some climbing asparagus will be activated from the seed bank.

All of this block except that which was originally outside the perimeter fence is currently suitable for secondary planting. As there are already many canopy trees in Block 1a, planting will be restricted to those species not already present.

Species for planting:

Block 1a (1 ha) planted 1995-97 (planting block A)

Canopy Species	No.	Notes	Mid tier and understorey		Notes
Karaka	20	Already planted	Wineberry	5	Prefers sun. Dioecious plant close together
Kohekohe	20		Putaputaweta	5	
Pigeonwood	20		Tree coprosma	5	
Puriri	25	Already planted	Thin leaved coprosma	5	
Rewarewa	20		Large leaved coprosma	5	
Tawapou	10		Shining karamu	5	
			Mingimingi (3 species)	5	
			Puka	5	
			Rata (3 species)	5	
			NZ Jasmine	5	

Cliff area below block 1a

Pioneer species	No.	Notes
Akepiro		All 1.5m spacing  On the bush edge  On clay bank
Coastal mahoe		
Hangehange		
Kanuka		
Kumarahou		

		20m spacing
Manuka		
Pohutukawa	20	
Taupata		

Block 1b (1.4 ha) planted 1995 (Planting block B)

No Planting required. Allow natural regeneration under gorse.

Block 1d (1.2 hectares) planted 1997/98 (Planting block D)

Canopy Species	No	Notes	Mid tier and understorey	No.	Notes
Karaka	25		Wineberry	5	Prefers sun Dioecious plant close together
Kohekohe	25	Already planted	Putaputaweta	5	
Pigeonwood	25		Tree coprosma	5	
Puriri	25		Thin leaved coprosma	5	
Rewarewa	25		Large leaved coprosma	5	
Tawapou	10		Shining karamu	5	
			Mingimingi (3 species)	5	
			Puka	5	
			Rata (3 species)	5	
			NZ Jasmine	5	

**Block 1c (.2ha).**

No planting required. Allow natural regeneration

## Block 2 (2.8 ha)

### Description

This block extends from the Kiwi track north to southern boundary of planting area A. The eastern boundary is the track between the Kiwi track and the end of Block 1, the western boundary is the edge of the campground and the coast to the north of Home Bay. It consists mostly of naturally regenerating bush on steep bluffs where no restoration planting has been carried out. At the north and south are areas of kikuyu grass and gorse and the cliffs to the north of the block contain large infestations of boneseed. This block was the site of major infestations of climbing asparagus, periwinkle and lantana and still has seed of these species in the soil. There are also three Madeira vine sites present and the only site on the island of Queen of the Night.

### Species for planting

Most of this block does not require planting. However there are some open spaces as to be filled with plants as outlined below.

Top of the Kiwi Track

Pioneer species	No.	Notes
Flax	10	Mix of plants at 1m spacing
Hangehange	10	
Koromiko	10	
Tauhinu	10	
Taupata	10	
Toetoe	10	

Where gorse has been controlled north of the Kiwi Track:

Canopy Species	No.	Notes	Mid tier and understorey		Notes
Coastal maire	2		Large leaved coprosma	3	
Karaka	5		Shining karamu	3	
Puriri	2		Mingimingi (3 species)	3	
Tawapou	1		Puka	1	

			Rata species) (3	1	
			Hoheria	5	
			Houpara	5	
			Kowhai	5	Already planted
			Ngaio	5	
			Pigeonwood	5	

### Block 3 (2.2 ha)

#### Description

This block extends from the gully to the south of Home Bay to the gully to the north of the row of Macrocarpa trees at Macrocarpa Bay. The eastern boundary is the first service track and the western boundary is the coast. Most of this block is naturally regenerating bush with the exception of the face just below the track in planting area G which has been planted but has been heavily invaded by kikuyu grass. There are also large areas of gorse and muehlenbeckia.

#### Species for planting

It is MRS policy not to plant in naturally regenerating areas so most of this block will not be planted. However manuka will be planted at the edge of the bush at the Home Bay end to contain the spread of gorse.

In the planted part of the block (planting area G .5 ha) kikuyu grass that has invaded the planting must be controlled, manuka and kanuka filled in and canopy closure achieved before secondary planting can take place. The following can then be planted:

Canopy Species	No	Notes	Mid tier and understorey	No.	Notes
Karaka	10		Wineberry	5	Prefers sun Dioecious plant close together
Kohekohe	10		Putaputaweta	5	
Pigeonwood	10		Tree coprosma	5	
Puriri	10		Thin leaved coprosma	5	
Rewarewa	5		Large leaved	5	

			coprosma		
Tawapou	5		Shining karamu	5	
Titoki	10		Mingimingi (3 species)	5	
Totara	5	Dry areas	Kohuhu	5	
Taraire	10		Fuchsia	5	In gully
			Nikau	5	In gully
			Lancewood	5	
			Alseuosmia	5	

#### **Block 4 (4 ha) planted 1998/99/2000**

This block extends from the north of the Macrocarpa trees to the Macrocarpa Bay track and all the area above that between tracks. The entire area is planted, with a predominance of karo and pohutukawa at the lower slopes near the beach and manuka and kanuka on the upper slopes. The trees are now about 10 years old and secondary species such as ferns and kawakawa have been establishing unaided.

All of this block is currently suitable for secondary planting.

Species for planting

<b>Canopy Species</b>	<b>No</b>	<b>Notes</b>	<b>Mid tier and understorey</b>	<b>No.</b>	<b>Notes</b>
Kahikatea	10	By lower dam	White Maire	10	
Karaka	80		Wineberry	10	Dioecious, plant close together
Kohekohe	80	50 Already planted	Putaputaweta	10	
Mangeao	10	Dioecious plant close together	Tree coprosma	10	
Nikau	50	25 in each gully Already planted	Thin leaved coprosma	10	
Pigeonwood	50		Large leaved coprosma	10	
Puriri	80		Shining karamu	10	
Rewarewa	20		Mingimingi (3 species)	10	
Tawapou	10		Puka	10	

Titoki	20		Rata (3 species)	5	
Totara	20	Dry areas	NZ Jasmine	10	
Puketea	2	By lower dam	NZ Gloxinia	10	
Taraire	50		Supplejack	5	
Kauri	5	On terrace	Bush lawyer	5	
Tanekaha	5		Alseuosmia	5	
Rimu	5		Clematis	5	Dioecious plant close together
Coastal maire	5				

## Block 5 (2.6 ha) planted 2000

### Description

This block extends from the Macrocarpa Bay track to the pa site incorporating all the area to the west of the ridge track. This is mostly a planted block with the exception of a small coastal strip of steep eroding cliff faces. Some parts of the cliff have gorse and kikuyu grass and a small amount of regenerating forest cover. There is a small amount of boneseed and lantana seed in the soil on these cliffs so control of these is ongoing.

### Planting

Most of this block is currently suitable for secondary planting with the exception of a few areas where kikuyu grass will need to be controlled first. The grass will be sprayed out and manuka, kanuka and karamu planted in these areas to provide shade.

Second succession species for planting throughout the block

Canopy Species	No	Notes	Mid tier and understorey	No.	Notes
Kauri	5		White Maire	5	
Karaka	40		Wineberry	5	Dioecious plant close together
Kohekohe	40	20 Already planted	Putaputaweta	5	
Mangeao	50	Dioecious plant close together	Tree coprosma	5	
Rimu	5		Thin leaved	5	

			coprosma		
Pigeonwood	20		Large leaved coprosma	5	
Puriri	20		Shining karamu	5	
Rewarewa	5		Mingimingi (3 species)	5	
Tawapou	5		Puka	5	
Titoki	20		Rata (3 species)	5	
Totara	5		NZ Jasmine	5	
Coastal maire	2		Supplejack	3	
			Bush lawyer	3	
			Alseuosmia	5	
			Clematis	5	Dioecious plant close together

Species for planting on cliff edge

Pioneer species	Notes
Flax	Mix of these plants at 1m spacing
Hangehange	
Koromiko	
Tauhinu	
Taupata	
Toetoe	
Pohutukawa	
Akepiro	
Coastal mahoe	

## Block 6 (2 ha)

### Description

This block extends from the Kiwi track to the gully south of Home Bay. It covers all of the house, sheds and nursery area as well as the gullies behind the house. These gullies were formally the site of large infestations of lantana, periwinkle and climbing asparagus under mature pines all of which have been removed and are now dominated by naturally regenerating mahoe and *Coprosma* species. There are still seed banks of the weed species in the soil so control of these is ongoing.

### Planting

Natural regeneration is being allowed to occur in the gullies behind the base. Low growing scrambling species will be encouraged on the lower slopes of the Kiwi track to preserve views of the campground from the top of the hill. Similarly on the upper slope above the road low growing species will be planted to preserve views from the top of the hill.

Species for planting at kiwi release site

Pioneer species	No.	Notes
Manuka		Already planted
Koromiko		
Small flowered white bindweed		
Toetoe		
Whau		Already planted

Species for planting below the Kiwi Track

Canopy Species	No.	Notes	Mid tier and understorey		Notes
Pohutukawa		Already planted	Small flowered white bindweed		Track edges
			Muehlenbeckia complexa		Encourage growth of plants already present, scatter extra seed
			Small leaved rata	5	

Species for planting between the nursery and the road

Pioneer species	Notes
Flax	Mix of plants at 1m spacing
Hangehange	
Koromiko	
Tauhinu	
Taupata	
Toetoe	
Akepiro	
Coastal mahoe	
Manuka	

Muehlenbeckia will be encouraged to colonise the slope between the road and the top of the hill by planting and distribution of seed.

Species for planting on the banks above the beach near the aviary

Shore species	Notes

Coastal needle tussock	Plant each species in groups
Spinifex	
NZ Spinach	
Toe toe	
Native ice plant	
NZ linen flax	

**Block 7 (1.3 ha) Part planted 1995**

**Description**

This block extends from the bluff to the south of Pohutukawa Bay to the point north of Still Bay and covers all the naturally regenerating cliff areas plus the planted block C around the Twin Dams. The western boundary follows the original perimeter fence line. Outside the original perimeter fence the vegetation is mostly gorse and boneseed with some regenerating coastal shrubs and tall pohutukawa. The planted area around the Twin Dams is mostly dense pohutukawa, manuka and flax. The edges of the dams are dominated by kikuyu and other exotic grass species.

**Planting**

Most of this block is naturally regenerating and so will not be planted. However there are two areas where vegetation enhancement needs to be carried out.

**Planted area C Twin Dams (1.3 ha) planted 1995**

Control of invasive grasses and gorse around the dams needs to be carried out before any planting can take place. Any native wetland species already present will be identified and encouraged.

Species for planting around the edge of the Twin Dams

Wetland species	No.	Notes
Carex lambertiana		Plant 1m spacing in groups of same species around edge of dams - scatter seeds

Carex flageliffera		
Juncus australis		
Cyperus ustulatus		

Planting at top of open cliffs

Plant pohutukawa and taupata near cliff edge.

Scatter seeds of flax, hangehange, manuka, pohutukawa, astelia, on the eroding cliffs while carrying out abseiling work.

No other planting will take place in this block except for more unusual species if suitable habitat is identified here.

### **Block 8 (3.3 ha)**

#### **Description**

This block extends from the bluff south of Pohutukawa Bay and includes all of the regenerating bush which was outside the perimeter fence around to the top of Coromandel Gully. The area has mixed coastal species including mature specimens of ngaio, mahoe and hoheria and the only naturally growing kohekohe on the island. No planting has been carried out in this block.

#### **Planting**

No planting will take place in this block, except if suitable habitat for a rare species is identified.

### **Block 9 (2.5 ha)**

#### **Description**

This block extends from the old fenceline down the cliff at the top of Coromandel Gully to the north western point of the island and includes all the area of cliff which was originally outside the perimeter fence. An extensive pine tree shelter belt originally present along the cliff top was felled in 2002. The cliffs on the east coast to the south of Coromandel Gully contain mixed native coastal forest but north of this gully most of the cliff area is dominated by boneseed and gorse.

#### **Planting**

Hardy species that will help to suppress the growth of boneseed will be planted at the bush edge at the top of the cliff. The maturing bush will prevent boneseed spreading into the planted area, and the establishment of a seed source for cliff hardy species will help to compete with the boneseed and gorse to assist with the long term control of these species.

The only place where planting is required is on the cliff top on the north western edge of the block.

Species for planting at top of north western cliff

Pioneer species	No.	Notes
Flax		Mixed plants at 1m spacing
Hangehange		
Koromiko		
Tauhinu		
Taupata		
Pohutukawa		
Akepiro		
Coastal mahoe		
Manuka		
Kanuka		

**Block 10** (3 ha)

### Description

This block extends from the north western point of the island to the bottom of Snake Gully and includes all of the area on the cliffs which was originally outside the perimeter fence. Much of this steep area is dominated by boneseed and gorse which will not be controlled (except to prevent it spreading into open areas) until canopy closure has been achieved at the top of the cliff. Weed control is carried out in this block to control low numbers of climbing asparagus.

### Planting

No planting will be carried out in this block except if specific sites for rare plants are identified.

**Block 11** (2.5 ha) planted 1997 and 2004

## Description

This block extends from the gully north of Still Bay to the track that leads around the high point to the south of Still Bay. The western boundary follows the track which leads south from the top of the Still Bay Track.

Pohutukawa trees have been planted at wide spacings below the Still Bay track and the rest of the vegetation there consists of thick kikuyu grass which in some places is being invaded by gorse. Some of the planted area above the track has also been invaded by kikuyu grass. To the north of the track there is a large patch of gorse among planted trees. To the west there is a thick planting of pohutukawa and karo which is about 11 years old. The southern end of the block is an area of planted mixed pioneer species.

## Planting

Species for planting at Still Bay – mid section of track

Species	No	Notes
Pohutukawa	20	20 m spacing (most already planted)
Manuka	100	Plant where boneseed is present on southern section of block near large macrocarpa tree.

Species for planting at Still Bay - lower section of track

Pioneer species	No.	Notes
Muehlenbeckia		Plant 1m spacing or scatter seed and encourage plants already present
White bindweed		On edge of bush

Species for planting at Still Bay - Shoreline

Coastal plants	Notes
Pigweed (2 species)	Splashzone
NZ linen flax	Coastal cliffs
Koromiko	Coastal cliffs
White bindweed	At bush edge
Coastal needle	On edge of beach

tussock	
Selliera	At seepages
NZ spinach	Splashzone
Peperomia	At seepages

Second succession species to be planted among the shrub plantings to the north and south of Still Bay: Some canopy species can be planted under the patch of gorse.

Canopy Species	No	Notes	Mid tier and understorey	No.	Notes
Karaka	20		Wineberry	10	Prefers sun
Kohekohe	20		Putaputaweta	10	
Pigeonwood	10		Tree coprosma	10	
Puriri	20		Lancewood	10	
Rewarewa			Thin leaved coprosma	10	
Tawapou	10		Large leaved coprosma	10	
Titoki	20		Shining karamu	10	
Totara	5	Dry areas	Mingimingi (3 species)	10	
			Puka	10	
			Rata (3 species)	5	
			NZ Jasmine	10	
			NZ Gloxinia	10	
			Supplejack	5	
			Bush lawyer	5	
			Alseuosmia	5	

**Block 12 (2ha) planted 2001**

**Description**

This block includes all the planted area to the east of the ridge track from the track around the high point south of Still Bay to the northern edge of the gorse patch above the dam. Most of this area has been planted except for the two high points which are to be maintained as viewing points.

## Planting

No planting will take place in the naturally regenerating areas which were originally outside the perimeter fence.

Species for planting throughout the planted areas

Canopy Species	No	Notes	Mid tier and understorey	No.	Notes
Karaka	20		Wineberry	5	Prefers sun Dioecious plant close together
Kohekohe	20		Putaputaweta	5	
Lancewood	10		Tree coprosma	5	
Pigeonwood	10		Thin leaved coprosma	5	
Puriri	20		Large leaved coprosma	5	
Rewarewa	5		Shining karamu	5	
Tawapou	10		Mingimingi (3 species)	5	
Titoki	20		Puka	5	
Totara	5	Dry areas	Heketara	5	At cliff edge
			Akepiro	5	At cliff edge
			NZ Gloxinia	5	
			Rangiora	5	At cliff edge
			Hangehange	10	At cliff edge
			Alseuosmia	5	

View points (see fig 2 for location and extent)

Prevent trees from naturally invading the viewpoints by mowing as much of the area as possible. Where this is not possible, allow the thick kikuyu grass to remain but spray the edges of it regularly to prevent it from continuing to invade the surrounding plantings and remove any tree seedlings which appear. When shade is established around the edge

of the view point spray out kikuyu grass sprayed out and sow *Microlaena stipiodes* grass. Spot spray kikuyu until *Microlaena* is established. Plant low growing species around the perimeter of the viewpoint to preserve views.

Species to be planted around high points to preserve views

Shrub species	Notes
Heketara	Plant at 1m spacing to ensure dense shrub cover to keep kikuyu grass from invading
Hangehange	
Koromiko	
Tauhinu	
Taupata	
Rangiora	
Akepiro	
Coastal mahoe	
Toe toe	
Mingimingi	

### Block 13 (3ha) planted 2001

#### Description

This block includes all the planted area on the eastern side of the ridge track from the dam to the start of the pa site as well as all the steep area that was originally outside the perimeter fence. The planted area has been invaded by gorse and kikuyu grass and there are large patches of thick kikuyu grass and gorse on the cliff slopes as well as small areas of naturally regenerating natives dominated by karo, flax and *Coprosma* species.

#### Planting

Plant canopy species among the thick gorse. Control kikuyu grass where it has become dominant and plant kanuka and manuka to provide shade. Second succession species will only be planted in these areas when the kikuyu grass has been shaded out but there

are some areas of the block where there is already sufficient shade to plant these species.

Second succession species for planting throughout the block

Canopy Species	No	Notes	Mid tier and understorey	No.	Notes
Karaka	30		Wineberry	5	Dioecious plant close together
Kohekohe	30		Putaputaweta	5	
Pigeonwood	10		Tree coprosma	5	
Puriri	10		Thin leaved coprosma	5	
Rewarewa	10		Large leaved coprosma	5	
Tawapou	30		Shining karamu	5	
Titoki	5		Mingimingi (3 species)	5	
Totara	10	Dry areas	Alseuosmia	5	
			Heketara	5	At cliff edge
			Akepiro	5	At cliff edge
			NZ Gloxinia	5	
			Lancewood	10	
			Rangiora	5	At cliff edge
			Hangehange	10	At cliff edge

## Block 14 (3ha)

### Description

This block includes all of the pa site and surrounding cliffs.

### Planting

No planting has been carried out in this block and natural regeneration has been allowed to occur. A separate plan will be developed for management of this area as an archaeological site.

## Blocks 15 to 27

The above are all blocks containing recently planted shrubs to which secondary species will be introduced when the pioneer plants have reached the stage where they are shading out the kikuyu grass. This is usually when they are about 3 to 5 years old and a timeline for secondary succession planting is outlined in Chapter 6. However judgement will be required for each block to ascertain when it has reached the appropriate stage. The blocks are all bounded by existing tracks and/or the lines of the original perimeter fence (see fig ? for details).

### **Block 15 (1.2 ha) planted 2002**

Kikuyu grass has invaded the western side of this planting and will need to be controlled before any more planting can take place there. The terrace below the eastern track which currently has a large amount of flax present will be enhanced with the following low growing species:

<b>Shrub species</b>	<b>No.</b>	<b>Notes</b>
Heketara	20	Mixed plants at 1m spacing
Hangehange	20	
Koromiko	20	
Tauhinu	20	
Taupata	20	
Rangiora	20	
Akepiro	20	
Coastal mahoe	20	
Toe toe	10	
Mingimingi	20	

Second succession species for planting throughout the remainder of the block

<b>Canopy Species</b>	<b>No.</b>	<b>Notes</b>	<b>Mid tier and understory</b>	<b>No.</b>	<b>Notes</b>
Karaka	12		Wineberry	5	Dioecious, plant close together
Kohekohe	12		Putaputaweta	5	
Tawapou	12		White maire	5	

Tree coprosma	5		Thin leaved coprosma	5	
Pigeonwood	20		Large leaved coprosma	5	
Puriri	20		Shining karamu	5	
Rewarewa	5		Lancewood	5	
Titoki	20		Mingimingi (2 species)	5	
Totara	5	Dry areas			
Coastal maire	2				

### Block 16 (1.3 ha) planted 2002

There are some areas in this block that have been invaded by kikuyu grass as the pioneer species are not in sufficient numbers or species mix to provide shade. The kikuyu must be controlled and these areas will be filled in with manuka and kanuka to address this before any second succession plants can be established in those parts of the block.

Second succession species for planting throughout the block

Canopy Species	No	Notes	Mid tier and understorey	No.	Notes
Karaka	30		Wineberry	5	Dioecious, plant close together
Kohekohe	30		Putaputaweta	5	
Tree coprosma	10		Lancewood	10	
			Thin leaved coprosma	5	
Pigeonwood	30		Large leaved coprosma	5	
Puriri	30		Shining karamu	5	
Rewarewa	5		Mingimingi (3 species)	5	
Tawapou	10		Alseuosmia	5	
Titoki	20				

Totara	5	Dry areas			
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### Block 17 (1.7 ha) planted 2003

This block includes the large dam near the water tanks. On the eastern side of the dam is an open area between the dam and the ridge track which will be maintained in grass.

Species for planting around the dam

Wetland species	No	Notes	Mid tier and understorey	No.	Notes
Carex virgata	50		Kowhai	5	At the edge of open space near the track
Carex flagellifera	50		Manuka	20	On bush edge
Cyperus ustulatus	50		Toe toe	20	At edge of open space by track
Carex lambertiana	50				

Second succession species for planting throughout the remainder of the block

Canopy Species	No	Notes	Mid tier and understorey	No.	Notes
Karaka	30		Wineberry	5	Dioecious, plant close together
Kohekohe	30		Putaputaweta	5	
Tree coprosma	10		Lancewood	10	
Pigeonwood			Thin leaved coprosma	5	
Puriri	30		Large leaved coprosma	5	
Rewarewa	30		Shining karamu	5	
Tawapou	5		Mingimingi (3 species)	5	
Titoki	10		Alseuosmia	5	
Totara	20	Dry areas			

**Block 18** (1 ha) planted 2004

Second succession species for planting throughout the block

<b>Canopy Species</b>	<b>No</b>	<b>Notes</b>	<b>Mid tier and understorey</b>	<b>No.</b>	<b>Notes</b>
Karaka	20		Wineberry	5	Dioecious, plant close together
Kohekohe	20		Putaputaweta	5	
Tree coprosma	10		Lancewood	10	
			Thin leaved coprosma	5	
Pigeonwood	20		Large leaved coprosma	5	
Puriri	20		Shining karamu	5	
Rewarewa	5		Mingimingi (3 species)	5	
Tawapou	5		Alseuosmia	5	
Titoki	20		NZ jasmine		
Totara	5		NZ passionvine		

### Block 19 (2.3 ha) Planted 2005

This block has large areas of mature gorse which will not be controlled but will be prevented from spreading further. Some canopy species will be planted under the mature gorse.

Second succession species for planting throughout the block

Canopy Species	No	Notes	Mid tier and understorey	No.	Notes
Karaka	40		Wineberry	5	Dioecious, plant close together
Kohekohe	40		Putaputaweta	5	
Tree coprosma	10		Lancewood	10	
Pigeonwood	40		Thin leaved coprosma	5	
Puriri	40		Large leaved coprosma	5	
Rewarewa	10		Shining karamu	5	
Tawapou	10		Mingimingi (3 species)	5	
Titoki	40		Alseuosmia	5	
Totara	10		Rata (3 species)	5	
Taraire	40	Dry areas	Supplejack	5	
Nikau	20		Bush lawyer	5	
Kahikatea	10	In gully	Puka	5	
Coastal maire	10	In gully			

**Block 20** (2.7 ha) planted 2005/06

Second succession species for planting throughout the block

<b>Canopy Species</b>	<b>No</b>	<b>Notes</b>	<b>Mid tier and understory</b>	<b>No.</b>	<b>Notes</b>
Karaka	30		Wineberry	5	Dioecious, plant close together
Kohekohe	30		Putaputaweta	5	
Tree coprosma	10		Lancewood	10	
Pigeonwood	30		Thin leaved coprosma	5	
Puriri	30		Large leaved coprosma	5	
Rewarewa	5		Shining karamu	5	
Tawapou	10		Mingimingi (3 species)	5	
Titoki	20		Alseuosmia	5	
Totara	5		Supplejack	5	
Taraire	20		Bush lawyer	5	
Nikau	20		Puka	5	

**Block 21** (3.7 ha) planted 2006

Second succession species for planting throughout the block

<b>Canopy Species</b>	<b>No</b>	<b>Notes</b>	<b>Mid tier and understory</b>	<b>No.</b>	<b>Notes</b>
Karaka	70		Wineberry	5	Dioecious, plant close together
Kohekohe	70		Putaputaweta	5	
Tree coprosma	10		Lancewood	10	

Pigeonwood	50		Thin leaved coprosma	5	
Puriri	70		Large leaved coprosma	5	
Rewarewa	10		Shining karamu	5	
Tawapou	10		Mingimingi (3 species)	5	
Titoki	50		Alseuosmia	5	
Totara	10		Kohuhu	10	

### Block 22 (2.7 ha) planted 2006

**View point** (see fig 2 for location)

Prevent trees from naturally invading the viewpoint by mowing the open space. When shade is established around the edge of the view point spray out kikuyu grass and sow *Microlaena stipiodes* grass. Spot spray kikuyu grass until *Microlaena* is established.

Second succession species for planting throughout the block

Canopy Species	No	Notes	Mid tier and understorey	No.	Notes
Karaka	60		Wineberry	5	Dioecious, plant close together
Kohekohe	60		Putaputaweta	5	
Tree coprosma	10		Lancewood	10	
Pigeonwood	40		Thin leaved coprosma	5	
Puriri	60		Large leaved coprosma	5	
Rewarewa	5		Shining karamu	5	
Tawapou	10		Mingimingi (3 species)	5	
Titoki	30		Alseuosmia	5	
Totara	10	Dry areas			

### Block 23 (3.6 ha) planted 2006

View point (see fig. 2 for location)

Prevent trees from naturally invading the viewpoint by mowing as much of the area as possible. Where this is not possible, allow the thick kikuyu grass to remain but spray the edges of it regularly to prevent it from continuing to invade the surrounding plantings and remove any tree seedlings which appear. When shade is established around the edge of the view point spray out kikuyu grass sprayed out and sow *Microlaena stipiodes* grass. Spot spray kikuyu until *Microlaena* is established. Plant low growing shrubs around the perimeter of the view point.

Species for planting in direction of views

Shrub species	No.	Notes
Heketara	20	Plant at 1m spacing to ensure dense shrub cover to prevent invasion of kikuyu grass.
Hangehange	20	
Koromiko	20	
Tauhinu	20	
Taupata	20	
Rangiora	20	
Akepiro	20	
Coastal mahoe	20	
Toe toe	20	
Mingimingi	20	

Second succession species for planting throughout remainder of the block

Canopy Species	No.	Notes	Mid tier and understory	No.	Notes
Karaka	70		Wineberry	5	Dioecious, plant close together
Kohekohe	70		Putaputaweta	5	
Tree coprosma	10		Lancewood	10	

Pigeonwood	50		Thin leaved coprosma	5	
Puriri	70		Large leaved coprosma	5	
Rewarewa	10		Shining karamu	5	
Tawapou	10		Mingimingi (3 species)	5	
Titoki	50		Alseuosmia	5	
Totara	5	Dry areas			

### Block 24 (4 ha) planted 2006/07

View point (see fig. 2 for location)

Prevent trees from naturally invading the viewpoints by mowing as much of the area as possible. Where this is not possible, allow the thick kikuyu grass to remain but spray the edges of it regularly to prevent it from continuing to invade the surrounding plantings and remove any tree seedlings which appear. When shade is established around the edge of the view point spray out kikuyu grass sprayed out and sow *Microlaena stipiodes*. Spot spray kikuyu until *Microlaeana* is established. Plant low growing shrubs in the direction of the views.

Species for planting in direction of views

Shrub species	No.	Notes
Heketara	50	Plant at 1m spacing to ensure dense shrub cover to prevent invasion of kikuyu grass.
Hangehange	100	
Koromiko	100	
Tauhinu	100	
Taupata	50	
Rangiora	20	
Akepiro	20	
Coastal mahoe	10	

Toe toe	20	
Mingimingi	20	

Species for planting throughout remainder of the block

Canopy Species	No	Notes	Mid tier and understory	No.	Notes
Karaka	80		Wineberry	5	Dioecious, plant close together
Kohekohe	80		Putaputaweta	5	
Tree coprosma	10		Lancewood	10	
			Thin leaved coprosma	5	
Pigeonwood	30		Large leaved coprosma	5	
Puriri	80		Shining karamu	5	
Rewarewa	5		Mingimingi (3 species)	5	
Tawapou	10		Alseuosmia	5	
Titoki	20		Kohuhu	10	
Totara	5	Dry areas	Supplejack	5	
Taraire	50		Bush lawyer	5	
Nikau	20		NZ Jasmine	5	
Miro	5		NZ passionvine	2	

### Block 25 (2.8 ha) planted 2007

Species for planting throughout the block

Canopy Species	No	Notes	Mid tier and understory	No.	Notes
Karaka	70		Wineberry	5	Dioecious, plant close together
Kohekohe	70		Putaputaweta	5	
Tree coprosma	10		Lancewood	10	

Matai	5		Thin leaved coprosma	5	
Pigeonwood	30		Large leaved coprosma	5	
Puriri	70		Shining karamu	5	
Rewarewa	5		Mingimingi (3 species)	5	
Tawapou	10		Alseuosmia	5	
Titoki	20		Kohuhu	5	
Totara	5		Supplejack	3	
Taraire	20		Bush lawyer	2	
Nikau	20		NZ Jasmine	5	
			NZ passionvine	5	

**Block 26** (5.5 ha) planted 2008

Species for planting throughout the block

Canopy Species	No	Notes	Mid tier and understory	No.	Notes
Karaka	100		Wineberry	5	
Kohekohe	100		Putaputaweta	5	
Tree coprosma	10		Lancewood	10	
Pigeonwood	30		Thin leaved coprosma	5	
Puriri	100		Large leaved coprosma	5	
Rewarewa	5		Shining karamu	5	
Tawapou	10		Mingimingi (3 species)	5	
Titoki	20		Alseuosmia	5	
Totara	5	Dry areas			

View point (see fig. 2 for location and extent)

Prevent trees from naturally invading the viewpoints by mowing as much of the area as possible. Where this is not possible, allow the thick kikuyu grass to remain but spray the edges of it regularly to prevent it from continuing to invade the surrounding plantings and remove any tree seedlings which appear. When shade is established around the edge of the view point spray out kikuyu grass sprayed out and sow *Microlaena stipiodes*. Spot spray kikuyu until *Microlaeana* is established. Plant low growing shrubs in the direction of the views.

Species for planting in direction of views

Shrub species	No.	Notes
Heketara	20	Plant at 1m spacing to ensure dense shrub cover to prevent invasion of kikuyu grass.
Hangehange	50	
Koromiko	50	
Tauhinu	50	
Taupata	20	
Rangiora	10	
Akepiro	20	
Coastal mahoe	10	
Toe toe	10	
Mingimingi	10	

### Block 27 (3.3 ha)

Most of block 27 will be maintained as open space which will be managed in grassland as with other viewpoints. Mow whole open area to maintain grass sward until the shrubs provide shade around the perimeter of the open space. When shading is established at the edges, spray out the kikuyu grass and sow *Microleana stipoides* grass. Spot spray kikuyu grass until *Microlaena* is established.

Species for planting among existing shrub plantings

Canopy Species	No		Mid tier and understory		
Karaka	20		Shining karamu	5	
Kohekohe	20		Mingimingi (3 species)	5	
Pigeonwood	20				
Puriri	20				

## 5. Timelines

### 5.1 Second succession planting

The following table is a five year timetable for the completion of the planting programme. It outlines the tasks to be undertaken each season for the next five years in order to complete the basic planting in each block. Planting of second succession species apart from the common canopy species will be dependent on the availability of seed but will take place whenever seed can be obtained.

Year	Block	Tasks
2010	5	Spray kikuyu grass where it is dense and replant with manuka, kanuka and karamu. Plant second succession species as per plan.
	4	Control gorse on open site and plant manuka. Control any isolated gorse that is likely to spread. Spray any kikuyu grass that has become dense and plant manuka, kanuka and karamu. Plant second succession species as per plan.
	12/13	Spray kikuyu grass and gorse where it is dense in the plantings and replant with manuka and kanuka. Prevent gorse from spreading further. Plant second succession species as per plan. Manage the viewpoints as per plan.
	11	Control boneseed, kikuyu grass and gorse around the Still Bay track and begin encouraging muehlenbeckia to replace them. Prevent the spread of gorse.
	6	Spray kikuyu grass between the road and the beach in preparation for planting of shore species. Spray

		remainder of the slope above the road and plant muehlenbeckia. Spray out remaining kikuyu grass on the Kiwi Track and plant as per plan.
	1	Plant second succession species in blocks 1a and 1d as per plan. Plant canopy species among gorse in block 1b.
	All	Continue with search and surveillance and checking of known sites for all invasive weeds as per weed control schedule (see 5.3). Mow all viewpoints and remove canopy species below them.
2011	15	Spray kikuyu grass in planting area G and where the track has overgrown and replant with manuka, kanuka and karamu. Plant second succession species as per plan.
	16	Spray kikuyu grass where it is dense and replant with manuka, kanuka and karamu. Plant second succession species as per plan.
	17	Plant canopy species and wetland species as per plan.
	18	Spray kikuyu grass at the southern end of the block where it has become dense and replant with manuka, kanuka and karamu. Plant second succession species as per plan.
	7	Spray invasive grasses from around twin dams and replant with wetland species
	All	Continue with search and surveillance and checking of known sites for all invasive weeds as per annual weed control schedule (see 5.3). Mow all viewpoints and control canopy species below them.

Year	Block	Tasks
2012	19/20/21	Control kikuyu grass where it has become dense and replant with manuka and kanuka. Prevent gorse from spreading onto tracks or other open areas. Plant second succession species as per plan.
	22	Control kikuyu grass where it has become dense and replant with manuka and kanuka. Prevent the spread of gorse. Plant second succession species as per plan. Manage the view point as per plan.
	All	Continue with search and surveillance and checking of known sites for all invasive weeds as per annual weed control schedule (see 5.3). Mow all viewpoints and control canopy species below them.
2013	23/24/25/26	Control kikuyu grass where it has become dense and replant with manuka and kanuka. Prevent the spread of gorse. Plant second succession species as per plan. Manage viewpoints as per plan.
	27	Control kikuyu grass where it has become dense and replant with manuka and kanuka. Plant second

		succession species as per plan. Manage open space as per plan.
	All	Continue with search and surveillance and checking of known sites for all invasive weeds as per annual weed control schedule (see 5.3). Mow all viewpoints and control canopy species below them.
2014 onwards	All	Complete any of the previous tasks if necessary. Plant second succession species as per plan as they become available.

## 5.2 Threatened plant introductions

The following table describes a programme for the introduction of threatened plants to Motuora. It should be noted that this is a guideline only and the timing will depend on the availability of a seed source and suitable habitat evolving on Motuora.

Year	Species	Habitat requirements	Where to plant
2010	<i>Austrofestuca littoralis</i> Sand tussock	Stable sand dunes	Home Bay by the aviary

	<i>Desmoschoenus spiralis</i> Pingao	Coastal shifting sand dunes	Home Bay by the aviary
	<i>Euphorbia glauca</i> Shore spurge	Coastal cliffs, rocky bluffs mudstone slopes, sand dunes	Home Bay by the aviary, Still Bay seepage and Coromandel Gully seepage
	<i>Tetragonia tetragonioides</i> NZ spinach	Open coastal sites, sand dunes, stony beaches	Suitable sites from Scallop Bay to Macrocarpa Bay, Still Bay, Pohutukawa Bay.
	<i>Calystegia marginata</i> Small flowered white bindweed	Open shrubland, coastal headland, track margins	Around the kiwi burrows on the Kiwi Track.
2011	<i>Clianthus puniceus</i> Kakabeak	Bluffs, coastal cliffs	Eastern cliffs, eroding sites
	<i>Ileostylus micranthus</i> Green mistletoe	Hosts: totara kanuka coprosma propinqua, manuka mapou	Block 1 on totara, block 1 and 4 on kanuka and manuka
	<i>Pimelia tomentosa</i>	Coastal and semi coastal forest, open grassy clifftops, in scrub and seral habitats	Eastern cliffs
	<i>Pisonia brunoniana</i>	Sheltered understory of mixed-broadleaf forest	Block 4 and 5
	<i>Sicyos aff. Australis</i> Mawhai	Coastal and lowland forest, scrub	Sites without kikuyu grass from Scallop Bay to Macrocarpa Bay. Still Bay track.
2012	<i>Streblus banksii</i> Large leaved milk tree	Coastal forest	Blocks 4, 5 and 24
2013	<i>Geranium solanderi</i> "large petals"	Dry open lowland	Sites without kikuyu grass Still Bay, Home Bay
	<i>Lepidium oleraceum</i> Cook's scurvy grass	Seabird roosts, fertile soils on coastal slopes rocky shorelines and gravel beaches	Sites near petrel burrows without kikuyu grass
	<i>Lepidium flexicaule</i>	Coastal turfs, rock stacks outcrops, headlands, cliff faces.	Still Bay headland.

	<i>Rorippa divaricata</i>	Disturbed ground, petrel burrows, recent slips, track margins	Track margins without kikuyu grass Still Bay and Home Bay.
	<i>Senecio scaberulus</i>	Cliffs, coastal scrub, forest margins and clearings, shaded sites among short grasses, banks near sea.	Still Bay headland and bluffs.
2014	<i>Dactylanthus taylorii</i> Wood rose	Hosts: mahoe, five finger, karamu, mapou, putaputweta	On suitable hosts block 1 and 8
	<i>Tupeia antarctica</i>	High light, regenerating shrubland forest edges, hosts Pittosporum species, Coprosma species Putaputaweta, Five finger, white maire, Coastal maire	Home Bay by Kiwi Track

### 5.3. Weed control

The following table identifies what is required for the management of invasive weeds in each block in the next five years to ensure suitable conditions for second succession planting become available or are maintained. Monitoring means checking any known weed sites within the block and checking high risk areas for new invasions. Grid searching means intensive searching in a line with people not more than five metres apart to ensure coverage of the whole area.

Block	Weed control
1	Grid search block 1a and 1c annually to find and eliminate invasive weeds germinating from the seed bank. Highest risk - climbing asparagus. Control kikuyu grass and gorse at top of open cliff. Monitor block 1b and 1d for invasive weeds.
2	Grid search whole block annually to find and eliminate invasive weeds germinating from the seed bank. Highest risk - climbing asparagus, periwinkle and lantana. Control kikuyu grass and gorse in open areas.
3	Grid search all of the naturally regenerating areas of the block annually to find and eliminate invasive weeds germinating from the seed bank. Highest risk are climbing asparagus and lantana. Control gorse and kikuyu grass at the edge of the gully at the northern end of the block and prevent them from spreading in the planted area at the southern end of the block. Leave gorse among trees and on coastal banks to be shaded out.
4	Monitor for invasive weeds.
5	Monitor annually for invasive weeds. Highest risk – lantana, boneseed,

	boxthorn
6	Grid search whole block annually to find and eliminate invasive weeds germinating from the seed bank. Highest risk – periwinkle, climbing asparagus, boneseed, lantana, Italian arum, pampas, Madeira vine,
7	Monitor annually for invasive weeds. Highest risk - climbing asparagus, pampas, periwinkle. Gorse and boneseed are not controlled in this block except where they occur on the open clifftop and anywhere in isolation. Control kikuyu and other invasive grasses around the Twin Dams. Control the periwinkle site on the eastern cliff twice annually.
8	Monitor annually for invasive weeds. Highest risk – climbing asparagus, pampas. Control the Mexican daisy site on the cliff quarterly.
9	Monitor annually for invasive weeds and control these. Highest risk – climbing asparagus, pampas. Control boneseed at the top of the cliffs.
10	Monitor annually for invasive weeds and control these. Highest risk – climbing asparagus. Control boneseed at the top of cliffs.
11	Prevent gorse from spreading. Monitor annually for invasive weeds and control these
12	Mark out the extent of the grassed areas for the view points. Mow these where possible. Control other large areas of kikuyu grass where there is insufficient shade. Prevent the spread of gorse. Monitor annually for invasive weeds and control these.
13	Control large areas of kikuyu grass. Prevent gorse from spreading further. Monitor annually for invasive weeds and control these. Highest risk – lantana, pine, climbing asparagus (on cliff slopes).
14	Check annually for climbing asparagus, lantana, boxthorn and boneseed and any other invasive weeds and control these.
15	Control large areas of kikuyu grass.
16	Control kikuyu grass where it has become dominant under cabbage trees. Monitor for invasive weeds and control these.
17	Control large areas of kikuyu grass. Monitor for invasive weeds and control these.
18	Control kikuyu grass where it has become dominant around flax. Monitor for invasive weeds and control these.
19	Contain the spread of gorse and kikuyu grass. Monitor for invasive weeds and control these. Control boneseed near the cliff edges.
20	Prevent gorse from spreading onto the cliffs and tracks. Control kikuyu grass where it has become dominant. Monitor for invasive weeds and control these. Control boneseed on the cliff edge.
21	Prevent the spread of gorse into this planting. Monitor for invasive weeds and control these. Control kikuyu grass in the northern part of the block.
22	Monitor for invasive weeds and control these. Control kikuyu grass in the eastern part of the block.
23	Monitor for invasive weeds and control these.
24	Monitor for invasive weeds and control these.
25	Monitor for invasive weeds and control these.
26	Monitor for invasive weeds and control these.
27	Monitor for invasive weeds and control these. Mow open space to maintain the grass and control pasture weeds.
All	Spot spray kikuyu grass where it is regrowing in small isolated patches.