

CEF 0089 Restoration of Indigenous Biodiversity on Coastal Backdunes



**Restoration Plan, Rarawa Beach,
Far North, Northland**

Initial priorities for restoration

Contributors

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Laura Shaft, Northland Regional Council
Friends of Rawara Beach (FOR)
David Bergin, Dune Restoration Trust of New Zealand
Michael Bergin, Environmental Restoration Ltd**

July 2012

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INTRODUCTION

A collaborative backdune demonstration area is being set up involving the removal of the exotics, primarily coastal wattle, and planting and encouraging naturally regeneration of appropriate native coastal species. The project contributes to one of the aims of the local Friends of Rarawa Beach's long term goals for replacing weed cover with natives in the backdune area.

Several meetings over the last few weeks and a field trip in mid-June 2012 have been held to discuss initial restoration priorities. Those involved in the project include:

1. Vicky Rawnsley, Wayne Petera, Betsy Young, Ada Weeding, and others – Friends of Rarawa (FOR)
2. Graeme La Cock, Wendy Holland, local staff at Kaitaia office including Programme Manager Community Relations, Kylie McDowell, biodiversity staff – Department of Conservation
3. Laura Shaft – Northland Regional Council
4. David Bergin, Michael Bergin – Dune Restoration Trust of NZ

SITE DESCRIPTION

Rarawa Beach is located on the eastern coast of Aupouri Peninsula near the southern end of Great Exhibition Bay approximately 50 km north of Kaitaia (Figure 1). The focus of the restoration plan is along southern part of Rarawa Beach starting at the beach access walk that leads from the campground.

An aerial photograph taken in 1944 shows a substantial area of bare frontal dunes particular along this southern part of Rarawa Beach but nearly 50 years later in 1994 the landward dunes are dominated by dense vegetation, likely to be coastal wattle (Figure 2).

Wendy Holland has provided a species list for native and exotic plants found at Rarawa Beach during a field visit in June 2012 (Appendix 1).



Figure 1: Location of Rarawa Beach, Far North, Northland (Source: www.doc.govt.nz/parks-and-recreation/).



Figure 2: Aerial photographs of Rarawa Beach – 1944 above and 1993 below. The 800 m section which is the focus of the Restoration Plan immediately north the beach access walk at the campground is indicated on each aerial (Photographs supplied by Wendy Holland, DOC, Whangarei).

CONTROLLING WATTLE

Options

From the initial field inspections and discussions, priorities for an effective long term restoration programme for Rarawa Beach are based on the following principles:

Low priority areas for clearing wattle:

- It is considered that the dense infestations of coastal wattle within forested areas of the backdune are unlikely to spread within the existing forest. Crowns of many coastal wattle in dense stands appear to be dying back whereas a range of native coastal shrub and tree species are regenerating vigorously amongst the wattle. The implication is that the wattle may be outcompeted by the natives, but this needs to be monitored. Weeds researchers from DOC's National Office are interested in sites where natives are showing potential to outcompete weeds, so may get involved or advise on monitoring at Rarawa Beach.
- Spread of wattle into the landward grazed farmland areas behind the dunes was not observed and is therefore unlikely to be an invasion threat either vegetatively or through seed beyond the boundaries of that current infestation in the backdune areas.
- Setting up of vegetation plots and transects is recommended to determine the vegetation succession within the densely forested backdune sites and along the seaward zone to determine the status of coastal wattle.

High priority areas for clearing wattle:

- Coastal wattle is most vigorous along the seaward edge of the current infestation where it is invading vegetatively into the spinifex zone forming a low ground cover on elevated exposed sites and developing into taller plants on sheltered sites in lee of foredunes. Wattle also occurs as outliers either as single plants or clusters of several plants along the southern end of Rarawa Beach. The species appears to be actively colonising available foredune and backdune habitat including the margins of the estuary.
- It is suggested that the focus for wattle clearing and planting should continue on the southern end of the Rarawa Beach i.e. the area near the day parking area and the camp ground. Removing the outliers of wattle along the main access path and making a start on halting the seaward invasion on the frontal dune are considered a high priority.

Priorities

From a weed spread point of view, containment of the existing wattle is required. Listed are suggested priorities for the team to work on at their next working bees as follows:

- A. Complete removal of the large isolated wattle site to the east of the path that FOR have already started (refer Figure 3 – A). Options for control are discussed in the next section.
- B. Cut any isolated populations and individual plants of wattle invading along the edge of the estuary such as those to east of the path (refer Figure 3 – B). Isolated trees to the right of the path. Working on the steep slope south of the path is dangerous and may require help from DOC staff.

In subsequent working bees the next priority could be:

- C. Initiate cutting of the vigorous wattle invading the frontal dunes immediately to the west of the access track (refer Figure 3 – C). It is recommended to initiate clearing of wattle along a narrow transect extending from the foredune landwards. A large pohutukawa tree located approximately 50 m west of the track may be a reasonable target for clearing of wattle over the next 2-3 years.

- D. Cut occasional wattle trees established within backdune forest along landward parts of the main access tracks from the day parking area and the camp ground to the beach. Initially this could involve removing wattle and other invasive exotics within dense forest up to 10 m either side of the main access tracks (refer Figure 3 – D).
- E. Clear wattle and weeds in the vicinity of the junction of access tracks from the day carpark and the camping ground for planting and eventual erection of a proposed information panel on the FOR/DOC/NRC dune restoration initiatives at Rarawa Beach (refer Figure 3 – E).

Methods to control wattle

Given that there are substantial areas of wattle that will require control at Rarawa Beach, it may be prudent to compare various options of control to determine the most practical and effective method for largescale control. Experience with wattle along the Whanganui coast cleared by local Coast Care groups have found that large wattle plants will die by cutting stems below any leaves.

For well-established stands of wattle control options include:

1. **Cut and clear** – cutting and clearing branch material as carried out for the current operation underway by FOR for the wattle site A (Figure 3). This labour intensive method requires intensive cutting and stacking of branches which may not be practical on a large scale.
2. **Cut and leave** – An alternative is to cut the trunks near the base of each wattle and leave the vegetation in place. While locating and accessing trunks of sprawling scrubby wattle will be challenging, the dying canopy of wattle and leaf loss will allow gradual increase of light and understorey natives to regenerate through the shelter of dead brushwood.
3. **Larger trees** – options include drilling and poisoning, basal bark spraying (chemical ring barking), or physical ring barking.

Potentially dry brushwood from cut wattle can pose a fire threat. Removal of this material would be impractical and costly on a largescale, Removal of brushwood over limited areas or chipping could be carried out in the vicinity of access tracks.

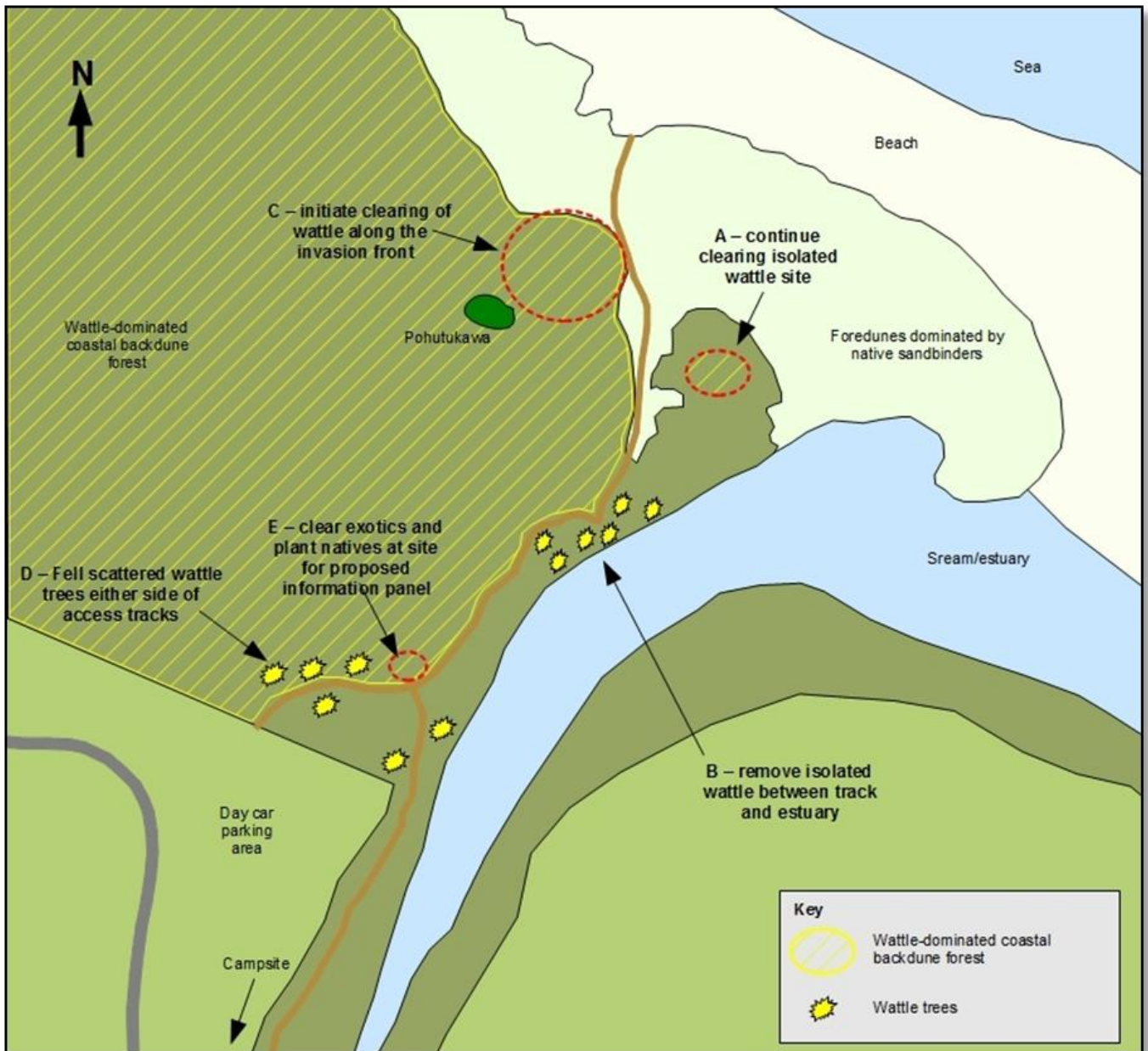


Figure 3: Proposed priority areas (A – E) for clearing wattle and other invasive weed species as part of initial restoration work at Rarawa Beach, Northland.

RESTORATION OPTIONS

Planting of nursery-raised seedlings is the most common method for restoration of natives on coastal sites. However, there is a range of other options to encourage establishment of a native vegetation cover.

Natives regenerating under wattle

Some wattle sites already have naturally regenerating natives established or occur as an understorey and are likely to quickly occupy sites once wattle is cut. When felling trees be careful not to destroy established natives in the process.

Controlling exotic grass

Some open sites are dominated by a mixture of pohuehue and exotic grasses. Knapsack spray the grass-selective haloxyfop (Gallant) over these sites to eliminate the grass and allow the pohuehue to flourish. Other non-grass natives such as wiwi, sand coprosma and sand daphne will not be affected by overspraying with haloxyfop.

Transplanting wildings

FOR are keen to transplant wildling natives regenerating on other areas in the region which could be transplanted from appropriate sites. Transfer of seedlings 30-50 cm high directly to the planting site is an option but expect some failure particular if only a small proportion of the root system is recovered. Drought-prone planting sites such as sand dunes will also contribute to loss of transplanted wildings.

Tall wilding plants (over 50 cm) should be topped to reduced transpiration loss from a high proportion of leaves. Planting wildings in sheltered conditions and use of where practical mulches (e.g. any leaf litter beneath wattle stands) is also likely to improve survival.

Smaller wildings (<20 cm tall) may be best to pot-on into containers and raised for up to a year until at least 50 cm tall in nursery conditions before transplanting to the planting site.

PLANTING

Planting nursery-raised seedlings is the most common method for restoration of a range of appropriate native plant species on sand dunes. Use of high quality of stock that is a minimum of 40 cm high for shrubs and trees and which has been hardened off before transfer to the planting site will improve survival and early growth.

Planting allows placement of species to appropriate sites. However, it is often difficult to determine optimum sites for each species so some degree of testing species over different sites will provide valuable information on species tolerances.

Most of the cleared sites that are recommended as priority areas for wattle clearing above may not need immediate replanting. Monitoring of regrowth is recommended to determine if there will be sufficient regeneration of natives or whether weed control and/or planting of natives will be required.

Planting sites

Priority sites for establishing natives are those in the vicinity of the beach access track targeting natural gaps or gaps created by the removal of coastal wattle. Planting sites within shelter of surrounding vegetation is likely to result in higher survival of planted natives.

Planting should focus on the north side of the main access track along the estuary especially for local schools and community workers, leaving the steep banks for contractors (DOC?) to clear and plant.

Other planting sites are in the vicinity of the proposed information panel (Figure 1 – D) and either side of the track where gaps in the forest cover have been created by the ring barking or removal of scattered coastal wattle (Figure 1 – E).

Avoid rigid planting pattern so that suitable microsites are selected avoiding other vegetation, debris, stumps, etc....

Species for planting

Wendy Holland has indicated a comprehensive list of native species appropriate for restoration of foredunes and backdunes at Rarawa Beach (Appendix 2). Of these species, some such as pohuehue and spinach are likely to regenerate naturally within many sites cleared of exotics and will not require planting.

The main native species recommended initially for planting within the main zones are listed in Table 1. These are the more hardy species for which most can be easily raised from seed in a nursery and most have high survival on appropriate sites.

Table 1: Recommended native species for planting on dune sites at Rarawa Beach.

Zone	Comments	Species for planting
Seaward foredunes	Sand binding zone	spinifex, pingao
Semi-stable frontal dunes	Zone immediately landward of the seaward foredunes with mix of woody ground cover species and sedges	sand coprosma, wiwi, harakeke, toetoe...
Stable transition zone	Hardy shrubs landward of woody ground cover zone	taupata, harakeke, toetoe, houpara, karo, ngaio, tauhinu...
Back dunes	Tree and shrub zone where native trees and shrubs can be planted in sheltered natural gaps or within gaps created by removal of wattle	akeake, ti kouka, karamu, kanuka, manuka, coastal mahoe, pohutukawa, puriri

Group planting

Preferred planting pattern is to plant natives in small groups or clusters especially if there is minimum local experience of local site and climatic conditions for new plant species.

Advantages of group planting include:

- small microsites can be selected to match species to appropriate sites than a rigid planting pattern over a wide area.
- easy to locate a group of several planted natives compared to scattered individuals for maintenance and monitoring
- for intensive monitoring, groups can be mapped and numbered.
- cluster planting affords mutual protection for planted seedlings.

Group planting pattern is more likely to mimic natural regeneration patterns.

It is recommended that groups vary in size from 3-10 plants each depending on the size of the gaps available along the track. Group size can vary from 2 m in diameter where 3-5 seedlings can be planted to 5-10 m diameter where 10-30 seedlings can be planted.

Plant spacing within groups will vary according to plant size and type:

- For ground cover, recommend plant spacing within groups of 50 cm to 1 m apart;
- For shrubs, plant spacing within groups at 1-1.5 m apart
- For trees, plant spacing 2-4 m apart although shrubs should be planted in mixture with trees to fill in sites.

Groups can be either single or mixed species depending on range of species available and site conditions, e.g. ti kouka (cabbage tree) look great planted in groups of 3, 5 or more;

similarly harakeke (flax). Larger groups can comprise a mixture of species, and on landward sites can include both native shrub and tree species.

Site preparation

As discussed above, any exotic woody vegetation will require removal to create canopy gaps for planting groups of natives. Dense exotic grass on open sites will require knapsack spraying and/or hand clearing before planting of native seedlings seedling. Most natives planted under a canopy of existing vegetation will not grow. Creating 'light well' with clear sky above and side shelter are the preferred planting conditions for many native shrub and tree species.

Rabbit control

There are some issues with rabbit browse of new plantings at the recently cleared site (Figure 1-A).

Options for restoration where rabbits are present and where control to low numbers may be difficult include:

1. Plastic netting tree guards to protect newly planted seedlings from rabbit browse and ring barking; cost of guards and vandalism are disadvantages.
2. Use of cut branches from coastal wattle to protect planted seedlings. Surrounding planted seedlings or small planted groups with cut wattle branches is likely to deter rabbits. Test plots with and without surrounding cut wattle branches.
3. Plant less palatable natives such as tauhinu, manuka and kanuka.

MONITORING

Recording work completed

A one-page site history template is attached for recording a history of when, where and what activities are undertaken at each working bee or by contractors (Appendix 3). Space is provided for mapping where clearing and planting has been carried out as well as recording any other relevant information. This is designed not to be too onerous for completion by the Coast Care group leader and will be useful in determining success of operations carried out in previous years.

Monitoring and weed control

Removal of vegetation needs to be coupled with monitoring of regrowth within areas cleared of wattle and where necessary planting of native species appropriate to the site. Regrowth of any wattle and other potentially invasive exotics such as pampas will require control. Exotic plants present at Rarawa compiled by Wendy Holland are listed in Appendix 1.

Weed control activities can be recorded on site history sheet including marking location of work undertaken on a map (Appendix 3).

Identifying groups and plants

For monitoring, groups and plants need to be identified. Level of identification will depend on data required and objectives of monitoring.

As a minimum, groups can be identified by one or more of the following:

- For each cluster, centrally locate a wooden peg, bamboo stake or similar
- GPS centre of each cluster;
- Map planting site indicating location of groups and number of planted seedlings in each group;

For intensive monitoring of each plant within planted groups:

- Allocate a unique number to each plant within a cluster and locate each plant on a plot diagram;
- For large plots, divide area in quadrats with vertical axis aligned perpendicular to the sea so that plants placed randomly within a plot can be identified. Plot peg is placed in the centre.
- Refer to Figure 3 as an example of a large planted group with 16 seedlings of a range of native tree and shrub species where each seedling has been assigned a unique plant number.

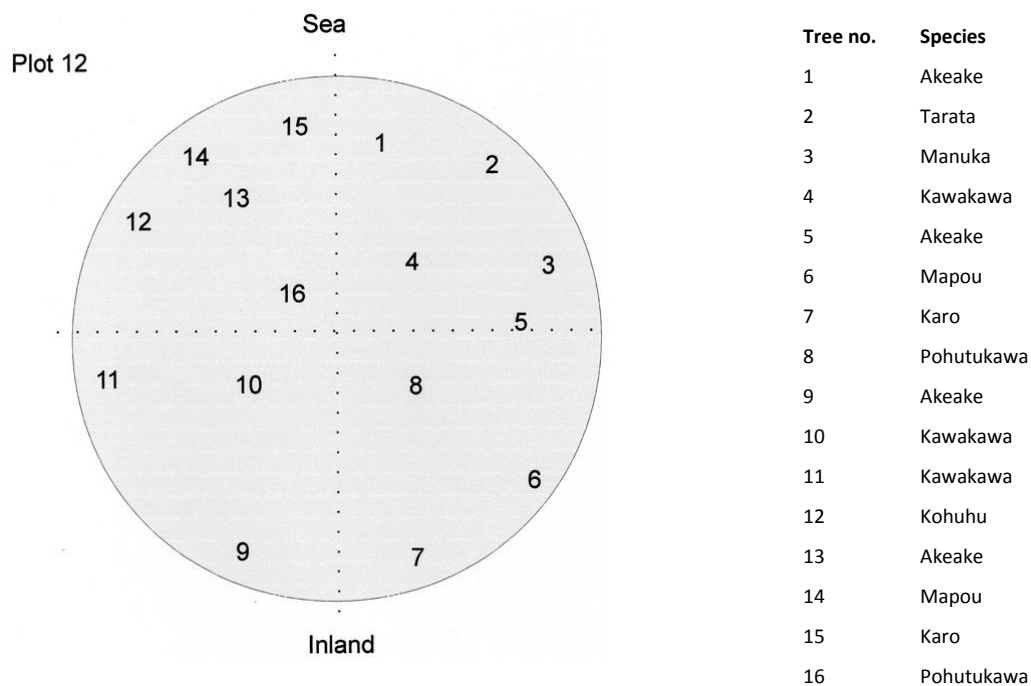


Figure 3: Example of a large group with a mixture planted native species where an identification peg is placed in the centre. Between 3-5 plants have been planted in a flexible pattern within each quadrant targeting suitable planting microsites. In this case the plant identification has been aligned with the vertical axis perpendicular to the sea for easy reconstruction of the site for remeasurement.

Assessment of plants

Minimum assessment for all planting is survival – a plant count by species for each site type or zone. It is useful to assess survival within 3 months of planting, then annually for up to 3 years.

For more intensive plant assessments, key measurements include:

- Height,
- crown spread
- plant vigour or health
- Record of any other factors affecting growth such as rabbit browse, dieback, etc...

Refer to the Appendix 4 – *Assessment Criteria for Planted Natives* for details on methods for each full measurement and to Appendix 5 for a sample of spreadsheets that can be customised to the number of plants established per group.

Measurement at planting

Measure a minimum of 30 plants for each species before planting to provide a baseline. Plant measurements to include plant height from top of potting mix of container-grown seedlings, crown spread, plant vigour (refer to Appendix for assessment criteria and sample field sheets).

Field measurements

For large scale planting programme, it is not necessary to monitor all planted seedlings. Select a representative number of groups and plants per species as a sample. As a guide, a minimum of 30 plants per species within each stratified planting site will be required within a sample.

Carry out a full field measurement of height, crown spread and plant vigour (as above) approximately 12 months after planting (refer to Appendices 4 and 5 for assessment criteria and sample field sheets). Repeat full field assessment for 2-3 years after planting depending on performance.

SCHOOL MONITORING

There is scope for five local schools (Ngataki, Waiharara, Pukenui, Te Kao, Te Hapua) to assist with restoration at Rarawa Beach.

Options for school involvement include planting natives in groups along the access track to establish well prepared and managed 'gardens'. Perhaps each school could adopt a group or section of the restoration area to establish as their own. School activities to cover a range of curriculum activities could include:

- design and plan a planting programme
- plant the range of native shrub and tree species within one or more groups,
- design and construct a school sign with information on the native planting for their planting,
- design and insert plant labels next to a sample of plants to help learn species names,
- identify planted groups with a numbered peg or similar,
- map plantings to identify each group and seedlings,
- complete a site history sheet (Appendix 3)
- measure plants using criteria in Appendix 4 at planting – key measurement is survival and plant height
- enter data on fieldsheets (Appendix 5), enter on Excel spreadsheets, analyse and present data on growth for each species,
- undertake maintenance as required and assessments 3-6 months apart after planting over the first year.

Appendix 1 – Vascular plant list, Rarawa Beach, Far North, Northland

Compiled by Wendy Holland
19 June 2012

Opportunistic survey – short visit following track from carpark just before camping ground to the beach whilst discussing backdune restoration opportunities with David Bergin, Michael Bergin, Laura Shaft (from Dunes Trust of New Zealand), Vicky Rawnsley, Betsy Young and Ada Weeding (from Friends of Rarawa Beach), Wendy Holland (Department of Conservation – Community Technical Advisor), Graeme La Cock, Department of Conservation.

Scientific name	Common Name	Threat status
Ferns		
<i>Asplenium oblongifolium</i>	shining spleenwort, huruhuruwhenua	
<i>Histipteris incisa</i>	water fern, matata	
<i>Pteridium esculentum</i>	bracken, rarahu	
Dicots		
<i>Atriplex hollowayi</i>	Holloway's crystalwort	Nationally Vulnerable
<i>Avicenna marina</i> subsp. <i>australasica</i>	mangrove, manawa	
<i>Centella uniflora</i>	centella	
<i>Coprosma acerosa</i>	sand coprosma	Declining
<i>Coprosma repens</i>	taupata	
<i>Melicytus novae-zelandiae</i>	coastal mahoe	
<i>Metrosideros excelsa</i>	pohutukawa	
<i>Muehlenbeckia complexa</i>	pohuehue	
<i>Pimelea villosa</i>	sand daphne	Declining
<i>Pittosporum crassifolium</i>	karo	
<i>Plagianthus divaricatus</i>	saltmarsh ribbonwood	
<i>Psuedopanax lessonii</i>	houpara	
<i>Sarcocornia quinqueflora</i> subsp. <i>quinqueflora</i>	glasswort	
<i>Tetragonia implexicoma</i>	NZ spinach, kokihi	
Monocots		
<i>Apodasmia similis</i>	oioi	

<i>Austroderia splendens</i>	toetoe	
<i>Carex virgata</i>	pukio	
<i>Cordyline australis</i>	ti kouka, cabbage tree	
<i>Cyperus ustulatus f. ustulatus</i>	giant umbrella sedge	
<i>Ficinia nodosa</i>	wiwi, knobby clubrush	
<i>Ficinia spiralis</i>	pingao	Relict
<i>Juncus pallidus</i>	giant rush	
<i>Macherina juncea</i>		
<i>Phormium tenax</i>	kotari, harakeke, flax	
Exotics		
<i>Acacia longifolia</i> subsp. <i>longifolia</i>	Sydney golden wattle	
<i>Ammophila arenaria</i>	marram grass	
<i>Asparagus scandens</i>	climbing asparagus	
<i>Cakile maritima</i>	sea rocket	
<i>Callistachys lanceolata</i>	oxylobium	
<i>Cortaderia selloana</i>	pampas	
<i>Lagurus ovatus</i>	hares-tail	
<i>Lupinus arboreus</i>	yellow tree lupin	
<i>Monstera deliciosa</i>	fruit salad plant	
<i>Paraserianthes lophantha</i>	brush wattle	
<i>Paspalum vaginatum</i>	saltwater paspalum	
<i>Pennisetum clandestinum</i>	kikuyu	
<i>Phytolacca octandra</i>	inkweed	
<i>Pinus radiata</i>	pine	
<i>Solanum linnaeanum</i>	apple of Sodom	
<i>Solanum mauritianum</i>	woolly nightshade	
<i>Solanum nigrum</i>	black nightshade	
<i>Watsonia meriana</i> var. <i>bulbillifera</i>	watsonia	
	?hawksbeard	
	?dandelion	

Appendix 2 – Recommended plants for revegetation, Rarawa Beach, Far North, Northland

Compiled by Wendy Holland
19 June 2012

Recommended Plants for Revegetation that are present at Rarawa Beach		
Scientific name	Common Name	Threat status
Ferns		
<i>Pteridium esculentum</i>	bracken, rarahu	
Dicots		
<i>Coprosma acerosa</i>	sand coprosma	Declining
<i>Coprosma repens</i>	taupata	
<i>Melicytus novae-zelandiae</i>		
<i>Metrosideros excelsa</i>	pohutukawa	
<i>Muehlenbeckia complexa</i>	pohuehue	
<i>Pittosporum crassifolium</i>	karo	
<i>Psuedopanax lessonii</i>	houpara	
<i>Tetragonia implexicoma</i>	NZ spinach, kokihi	
Monocots		
<i>Apodasmia similis</i>	oioi	
<i>Austroderia splendens</i>	toetoe	
<i>Cordyline australis</i>	ti kouka, cabbage tree	
<i>Ficinia nodosa</i>	wiwi, knobby clubrush	
<i>Phormium tenax</i>	kotari, harakeke, flax	
Recommended Plants for Revegetation that were not recorded in the 19 June 2012 visit but occur in other backdune habitats in the Aupouri Ecological District		
Scientific name	Common name	Threat status
Dicots		
<i>Corynocarpus laevigatus</i>	karaka	
<i>Coprosma rhamnoides</i>		
<i>Coprosma robusta</i>	karamu	
<i>Geniostoma rupestre</i>	hangehange	

<i>Kunzea ericoides</i> var. <i>linearis</i>	rawiri	Declining
<i>Leptospermum scoparium</i>	manuka	
<i>Leucopogon fasciculatus</i>	mingimingi	
<i>Macropiper excelsum</i>	kawakawa	
<i>Melicope ternata</i>	wharangi	
<i>Myporum laetum</i>	ngaio	
<i>Ozothamnus leptophyllus</i>	tauhinu	
<i>Vitex lucens</i>	puriri	
Monocots		
<i>Astelia banksii</i>	kowharawhara	

Appendix 3 – History sheet of activities undertaken

Group identity:

Location:

Date of activity:

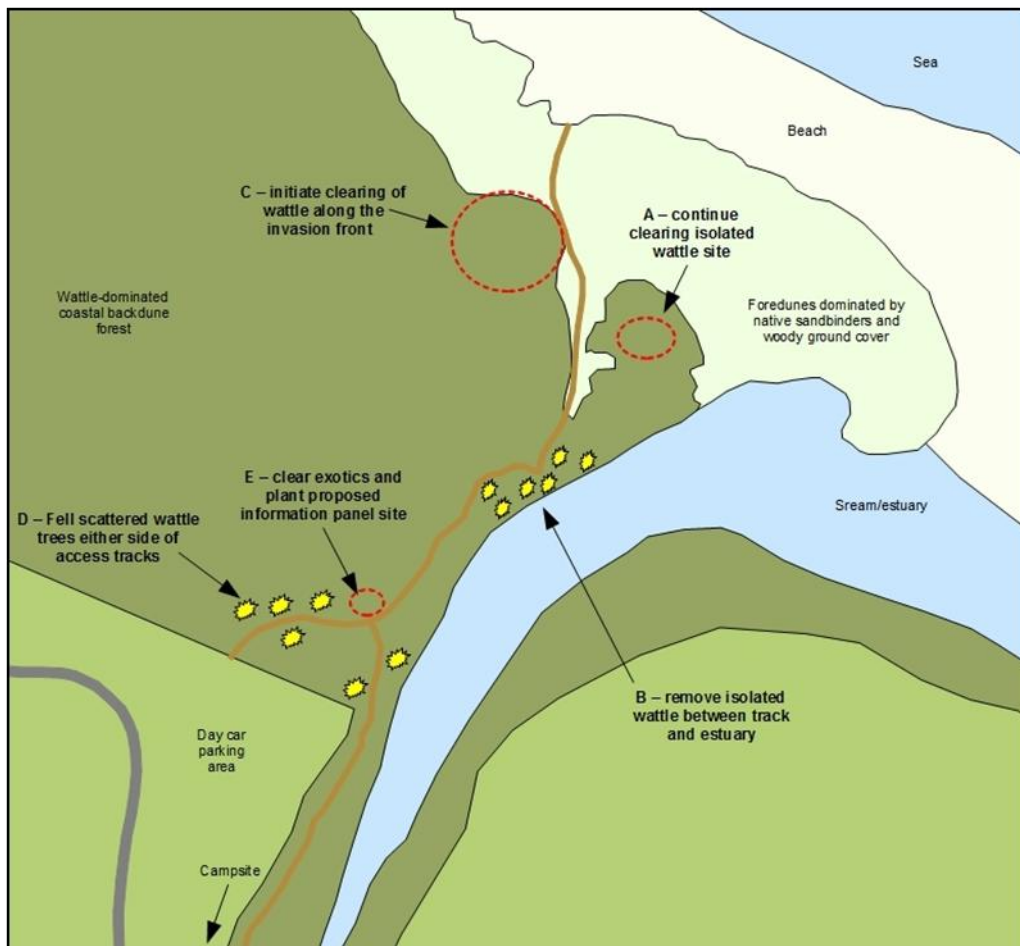
Who involved (e.g. number at working bee, contractor...):

Activities undertaken (may be one or more):

Weeding (species removed, method of control for different species, estimates of time taken, etc...)

Planting (e.g. notes on species planted, comments on quality and size of stock, source of seedlings, use of fertilisers, any rabbit protection used, etc...)

Site of activities (indicate on attached map or provide sketch map):



Comments or notes:

Attach photographs, maps, data sheets, other relevant information...

Appendix 4 – Assessment criteria for planted natives

Instructions for measuring planting projects of native trees, shrubs, ground cover and grasses including any site design codes, treatment codes, and assessment variables.

All information and plant measurements to be entered on customised field sheets using standardised alphanumeric codes for transcribing data into Excel spreadsheets for data analysis.

Location – enter concise name of trial and location

Page No. – for each project, keep sheets together and number each page

Planting date – enter date when planting undertaken

Other – enter brief details of any other relevant information if required

Rep/Block No. – replicate or block number as per planting layout (if required)

Plot No. – as per planting layout and design

Treatments – Depending on planting design, enter descriptor for each treatment in shaded area. Enter appropriate treatment code for each of the one or more treatments in separate column(s). For more than 2 treatments, further columns may need to be inserted into field sheet

Plant No. – each seedling to have a unique identifier – Rep/Block No./Plot No./Plant No.

Recorder and date – enter names of those undertaking assessment and date of assessment

Height (H) – total tree height to nearest cm using height pole. Measure natural height

Dead seedlings – enter as a dash (-) in the height column to allow calculation of survival by species

Crown spread – Length (L) by breadth (B) – maximum spread of live (green) crown to nearest cm using height pole in horizontal position

- first measure width of greatest crown spread, take second measure at right angles
- for analysis, plant spread calculated as square root of length x breadth

Vigour score (V) – subjective visual assessment of tree vigour or health based on a comparison within each species into one of 5 categories:

1. poor - few or no leaves, just alive
2. unthrifty - loss of leaves, severe frosting damage or browsing, poor foliage colour
3. average - moderate health and vigour
4. good - minor browsing, frosting damage, etc..., otherwise good growth
5. excellent - healthy plant with good foliage colour and growth

Comments – any addition information on plant condition such as:

Br – browsing by animals (possum, domestic stock etc...)

In – insect attack

Fr – frosting damage

Br – breakage of stems or branches

Comments can be in code form as above for common factors or more explicit to cover severity of plant condition and range of factors that appear to be influencing performance

Appendix 5 - Field sheets – can be customised to suit each project and size of groups. Templates for 5, 10 and 12 tree groups are attached

ERL Field Data Sheet – 5 plants/cluster																		
Location:				Planting date:					Other:									
Block No.	Plot No.	Species & Treatment	Plant No.	Recorder:					Recorder:					Recorder:				
				Date:					Date:					Date:				
				H	L	B	V	Comments	H	L	B	V	Comments	H	L	B	V	Comments
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ERL Field Data Sheet – 10 plants/cluster																			
Location:				Planting date:					Other:										
Block No.	Plot No.	Species & Treatment	Plant No.	Recorder:					Recorder:					Recorder:					
				Date:					Date:					Date:					
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ERL Field Data Sheet – 12 plants/cluster																		
Location:				Planting date:					Other:									
Block No.	Plot No.	Species & Treatment	Plant No.	Recorder:					Recorder:					Recorder:				
				Date:					Date:					Date:				
				H	L	B	V	Comments	H	L	B	V	Comments	H	L	B	V	Comments
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