Te Raekaihau Point ecological rehabilitation plan 2010-2014

Prepared for Wellington City Council by

Frances Forsyth & Paul Blaschke

Blaschke & Rutherford Environmental Consultants

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Blaschke & Rutherford Environmental and Ecological Consultants
34 Pearce St, Vogeltown, Wellington 2
Tel/fax (0061 4)3898 545; Mob (027) 246 2848
Email: paul.blaschke@xtra.co.nz

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Introduction

The Wellington south coast has long been a popular play area for the people of Wellington. Stunning views and a wide variety of coastal forms from shallow sandy bays to rocky spits and reefs mean there is something there for everyone. Te Raekaihau Point is especially popular for its rugged, wilderness feel. No matter what the weather someone will be there; swimming, diving, picnicking, rock climbing or just marvelling at a massive southerly swell from the protection of their car.

It was not surprising then, that when a marine education centre was proposed for the site, many locals came out strongly in support of keeping it free of such buildings. Feelings run high when it comes to "their" Point. Wellington City Council is currently developing plans to restore Te Raekaihau Point and its environs, following on from a number of projects around Wellington's South Coast aimed at improving the environment, accessibility and providing more recreation opportunities.

This plan provides a framework for the ecological rehabilitation work that will be necessary to maintain and enhance ecological and natural values of the Point. It complements a landscape plan currently being developed for the site (see http://www.wellington.govt.nz/projects/new/teraekaihau.html for details of this project). Public consultation has been carried out for both the landscape and ecological components of the project. Many submissions to Wellington City Council recommended rehabilitating native vegetation at the Point.

The consultation process comprised two rounds of submissions the second of which included two open days (one at the Point), plus a number of direct consultation meetings with community groups. Details of the consultation process are described by WCC in association with the landscape plan. A brief overview of submissions made on the proposal for ecological rehabilitation is contained in Appendix one. Most submissions urged retaining the wild landscape feel and enhancing existing natural systems and processes.

Historical context

Te Raekaihau Point is a rocky shore platform between Houghton and Lyall Bays. It has been created by the erosion of the headland caused by the rough seas of the locality. Over time, all the soil and clay has washed away from the tip of the headland and only hard rock remains. This rock is now a reef that protects the headland from waves and further erosion. The inshore part of the reef is covered with gravel and cobbles washed ashore when seas are rough.

Like so many of the rocky reefs on the south coast of the Wellington region Te Raekaihau Point is flanked by inlets where sediment, in particular sand, accumulates. This is then blown from Houghton and Princess Bays onto the Point by the prevailing northwest wind. Today, it forms low dunes at the back of Princess Bay and on top of the gravel at the western side of the Point. In pre-European times these dunes were larger and would have reached to the base of the headland (where the road runs now) and been covered, in part, with the same low-growing vegetation still present to some extent at the Point today. The eastern side of the Point is a gravel beach

In 1855 a large earthquake rocked the region and land at the Point (including the rocky reef) was raised 1.5m. This increased the area of reef above the high water mark to give us the landform we know so well today.

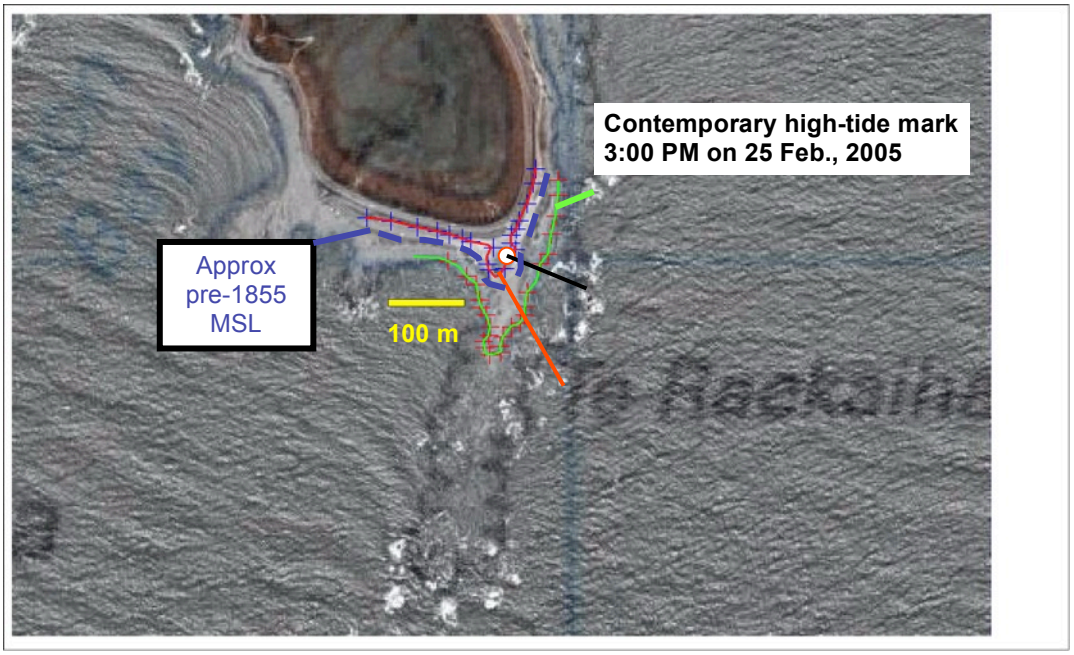


Fig. 1: This graphic (created by Tim Little, VUW, for the Te Raekaihau Pt Coast Care Group) shows the present day high tide mark and the approximate mean sea level before the uplift event in 1855. Note how far the reef extends offshore, as indicated by the white water. The dark markings are from a topographic map underlying the aerial photo.

From the early 20th century until 1960 sand and gravel were mined from a number of south coast beaches including this one. Such natural resources are always in demand in urban areas and the coastal resource was cheaper and more accessible than the alternative quarry products. Mining ceased following concerted efforts by the Houghton Bay Residents Association to protect the site for recreation.

Figs 2 & 3: Historic photos of Te Raekaihau Point. Left, sand mining in 1961. This was the last of many years of mining at the Point. Right, a popular spot for people with cars.

By the mid twentieth century Te Raekaihau Point and the neighbouring Princess Bay were already popular recreation destinations (B Mitcalfe, pers. comm.). The aspect of the site makes it one of only a few beaches in Wellington that catch the late afternoon sun and this combined with its proximity to the city means that it continues to be popular. The variety of landform (bay, dune, rocks and gravel spit) gives the area broad appeal and the vegetation-covered escarpment devoid of housing means the site is dark at night and excellent for stargazing.

Observation and submissions indicate that one of the more popular pastimes for visitors to this part of the south coast, at any time of the year, is viewing the seascape from one's car. In order to get as close to this landscape experience as possible visitors have been driving vehicles closer to the sea over the years, enlarging the area used for car parking. There is now a demand for some of this informal parking area to be made vehicle-free so that the land can return to a more natural setting.

This informal car parking area at the base of the spit has a cover of clean fill. There are contradictory explanations of how much fill has been added to the spit and over what period it was added. The fill appears to be at least several metres thick in places and comprises gravel and clay, chunks of asphalt and concrete and some bricks.

In the late 1990s Te Raekaihau Point was proposed as a potential site for a Marine Education Centre. However, although support for the idea of an Education Centre was high the ensuing resource consent and appeal process eventually confirmed the case for retaining the Point as a natural ecological and geomorphic feature. It is now proposed that the Centre be sited further to the north east and the Point be permanently protected as a natural area.

Site description

The site for the proposed rehabilitation reaches from the eastern side of Houghton Bay, known as Princess Bay, to the south of Waitaha Cove. It includes the dunes of Princess Bay, the sand-veneered rocky coastline on both sides of the Point, and the rock and gravel spit of the Point itself and the incipient dunes on top of the gravel spit (Plan 1). The Taputeranga Marine Reserve covers the area marked in blue in Fig. 4. Te Raekaihau is the Point at the eastern edge of the reserve.

Fig 4: Map showing the extent of Taputeranga Marine Reserve. Courtesy of Department of Conservation.

The dunes to the west are severely degraded owing to loss of vegetation cover and high pedestrian traffic levels. Sand is currently lost from here at a steady rate. It accumulates amongst vegetation on the spit and beyond to the east and is also blown into the ocean at Lyall Bay. These dunes have small areas of pingao and spinifex plus larger areas of marram and introduced pasture grasses. They have high levels of weed infestation, particularly the areas closer to the carpark and road. Weed control under Wellington City Council's Key Native Ecosystems programme has recently commenced and will be continued under the planned restoration for Te Raekaihau Point.

The ground level relative to sea level has fluctuated over the last century due to quarrying and additions of clean fill. There is no way of knowing what the surface contours would have been had these changes not occurred. Wellington City Council has made a decision not to alter the contours further apart from an area at the eastern entrance where the levels need to be altered (mainly raised) to make it safer for traffic interactions. At the northern margin of the site is a large sealed car parking area backed by a steep bank. It is in this area that penguins are known to nest. No other seabirds are known to breed at the site.

The landward portion of the Point itself has the most varied vegetation on the site although it is intersected by a myriad of pedestrian and vehicle tracks. Karo and taupata (*Coprosma repens)* form the canopy along with wire vine (*Muehlenbeckia complexa)* and other smaller plants such as *Coprosma propinqua* and thick-leaved mahoe (*Melicytus crassifolius*). See Appendix two for a complete list of species present at the site.

The spit itself comprises large gravel and cobbles. It receives varied storm cast debris, especially kelp and driftwood. Such spits are naturally relatively bare of vegetation with the most common plants being wind shorn taupata shrubs.

Current ecological issues

Issues at the coast are the same as those at many urban coastal sites. Because the site is constantly disturbed, both by people and by environmental conditions, a broad range of weeds have become established. Vehicle traffic on the gravel spit has caused compaction of the usually free draining substrate and constant trampling on the dunes means all but the hardiest introduced species struggle to survive. Storm surge is expected to worsen with predicted sea level rise and natural colonisation of the area by native coastal plants and animals is compromised by the generally degraded state of other nearby coastal sites and the presence of pest animals.

Weeds and pest animals

The rehabilitation site has a broad variety of weeds ranging from small herbaceous plants that have probably arrived by fly tipping of garden waste to large shrubs and trees, some of which are non-local natives. Some of these plants are a problem because they are very successful and could, in time, predominate. Such homogenisation of the plant community can lead to local extinctions of native species of both plants and animals and a diminution of the local natural character of the site.

The most serous of these weeds, boneseed (*Chrysanthemoides monilifera*), is already being controlled by WCC. Other species needing control are karo (*Pittosporum crassifolium*), pohutukawa (*Metrosideros excelsior*), marram (*Ammophila arenaria*), sea couch grass (*Elytrigia pycnantha)*, Cape ivy (*Senecio mikanoides*), and lupin (*Lupinus arboreus*).

Rabbits and rats are known to be present at the site. The rabbits currently browse pasture grasses to the east of the spit and will pose a threat to future plantings. Rats threaten native wildlife, in particular, penguins nesting at the site. They also deter other seabirds from breeding and roosting there. It is likely that possums and other rodents also visit the site.

Figs 5 & 6: Left, Onion weed on the dune. Right, compacted fill.

Compaction

Any attempt to re-establish natural vegetation at the site is likely to be thwarted to some extent by ground compaction due to the movement of vehicles. Coastal vegetation by nature requires a free draining root zone so that it is not inundated with salt water during high seas. This is most problematic where fill has been dumped as most of the fill is impervious clay: at present few plants have established in the fill zone. However, it is likely that weeds will be the predominant plants to colonise such inhospitable land.

Sand movement

Although bare sand is natural in any dune system, sand that remains bare of vegetation moves continually under the influence of wind. At present some sand at the site is being trapped by vegetation at the back of the spit while the rest blows into the sea and ends up in Lyall Bay. There is strong support from local community groups and WCC staff for the re-establishment of dune vegetation at the Princess Bay end of the site. This would encourage dune building and stabilisation and a return to a landscape more similar to that of 100 years ago.

Trampling

High visitor numbers in the summer months means that any remnant dune vegetation currently struggles to survive. A calm sunny day will see hundreds of people visiting and they prefer to site themselves on the soft sand of the remnant dunes. Previous

attempts by WCC and community groups to re-establish native sand-binding plants such as pingao in this area have not met with great success.

Storm surge and sea level rise

The south coast is famous for its storms; that is one thing that people specifically go there to watch. However, predicted sea level rise of 0.5-1.4m[1] will mean that the off-shore reef that currently protects the shore will be less effective. At high tides during southerly storms it is expected that storm surge will cause sand dune erosion in the future. Unless the dune is given space to come and go during and between storm events; and is given the protection of a vegetative covering, the car park and ultimately the coastal road will come under threat from erosion.

Depauperate nature of nearby coast

Natural colonisation of the area by native coastal plants and animals is further compromised by the generally degraded state of other nearby coastal sites. This means that in order to rehabilitate natural ecosystems, some supplementation of the current plant community composition will be necessary. It is probable that further native animal colonisation will follow naturally once more healthy habitats of vegetation are established. For example there is no reason that the currently depauperate numbers of seabirds using the headland cannot be increased.

Ideally, Te Raekaihau Point could be weeded and left to regenerate naturally. Unfortunately, human intervention means that the site is cut off from other, natural shore ecosystems. Coast road verges are, in places, grassed, mown and planted with non-local and exotic trees. In other areas the vegetation and animal life has suffered a similar fate to that at Te Raekaihau following quarrying and dumping of fill, plus compaction by vehicles. This inhibits the natural colonisation of the site by many of the local coastal species that are not currently present.

Management recommendations

Principles for ecological rehabilitation:

- Rehabilitation is based on monitored weed removal, staged over/up to five years

- Rehabilitation uses natural coastal processes such as sand accretion (build-up) and wave action, and natural re-establishment of (non-weedy) species on bare ground

- Because much of the Point is naturally bare, not all areas should be planted. Planting will be carried out to buffer existing vegetation, replace some grassed areas and stabilise the ground surface especially following weed removal

- Variety of plant growth forms (shrubs, grasses, herbs, etc) will be used, but predominantly low-growing plants to maintain views

[1] Ministry for the Environment guidance in 2008 recommended that Local Government planners provide for a sea level rise of at least 0.5 m. However, recent research suggests that this recommendation was conservative and may need to be revised upwards in the near future.

- Planted species are restricted to those known to be native to the Wellington South Coast and having proven potential to be successfully propagated offsite and transplanted into the site

- All plant materials are to be eco-sourced from the Wellington South Coast

- No vehicle access beyond formed carparking areas. Pedestrian beach access is channelled to a few single file foot tracks incorporating sand ladders

Aims of ecological rehabilitation

Following the above principles being proposed and confirmed during the consultation process (after minor adjustment), the following specific aims for rehabilitation are proposed. These four aims cover a range of important ecological functioning and biodiversity restoration processes, and are all capable of being monitored and adjusted over time, in response to monitoring results. All these aims are likely to be relevant over a longer time period than the five-year span of this plan.

1. Ecological rehabilitation of a degraded coastal gravel beach and headland to a self-sustaining state, including establishment of populations of appropriate rare and threatened coastal plant species

2. Decrease in cover of problem weed species

3. Increase in the number of nesting penguins returning year-on-year and other shore birds (e.g. white fronted tern, reef heron, shags, red and black billed gulls) are seen more frequently at the site

4. Habitat for skinks and geckos, including beach cast debris, is established. Increasing numbers of skinks will be present with the potential for translocation of gecko from other sites

Actions

Much of the focus of this plan is on taking action to reduce damage to the site and to allow natural regeneration of native plant species and encourage a return to the site of animals, especially birds that once lived there. There are also areas where planting is planned. A recommended species list for planting has been devised for the site (Table 1), based on species already present there, species listed at nearby sites and species that are known to be easy to source, propagate and transplant. Every species selected for the site needs to be extraordinarily hardy in order to survive in this harsh environment.

Site preparation

The areas of the gravel spit and to the east of the site have become severely compacted as a result of vehicle traffic and need to be ripped to enable effective colonisation by native plants. The ripping needs to be to a depth of at least 0.5m to break up the hard pan that has formed and to facilitate drainage. This needs to occur in autumn to reduce dust from the process. Follow-up weed spraying will be necessary at least once in late winter, and in subsequent years to knock back weeds.

The aim of ripping the site is to reduce compaction and allow wave actions to restore a more natural landform. This reflects comments expressed in submissions. It is likely that ripping will bring debris such as concrete and bricks to the surface and these will need to be removed.

It is hoped that native plants will self-seed in this difficult soil. However, monitoring will be required and possibly further weed spraying. Should it prove that native plant species are unable to colonise this part of the site, and that weeds become a problem there, planting should be done. Only very hardy species that have already proven themselves elsewhere on the Point should be used. There is a strong preference from the local community groups for very low growing species in this area, in order to preserve views.

Weeds and pest animals

Weed control is the basis of the ecological rehabilitation planned for the site. Currently, weeds are established over a high proportion of the vegetated parts of the site and inhibit regeneration of native plants. The most troublesome species, including some woody non-local New Zealand natives such as karo and pohutukawa, were noted previously.

Not all weeds can or need to be controlled. Resources should be targeted onto woody weed species spreading onto bare ground and preventing native regeneration, e.g. boneseed, karo, pohutukawa, marram, and Cape ivy. Where pasture grasses, onion weed and other herbaceous weeds are growing beside native plants they should be controlled if resources allow, to encourage the spread of natives. Lupin is a good shelter planter for establishing plants on dunes and need not be removed until later in the programme.

Most removal of woody weeds will need to be done by council contractors. Hand weeding of herbs would be suitable for volunteer groups if resources are available (e.g. using the model of regular weeding by the "Wednesday weeders" group at Zealandia Sanctuary).

Weeding will need to proceed over the full 5-year plan period and beyond. Weed control will continue to be a significant issue until long-term management and weed control on the escarpment on the other side of the road is undertaken. Careful monitoring of weed cover, using a combination of surveillance of the whole site, weed mapping, photo points, and possibly sample transects, should proceed over the plan period.

All weeded areas where replanting is planned need to be planted in the autumn or winter following weed control. The exception to this principle is the part of the Point beyond the planting boundary (Plan 1), which would be naturally largely bare and where no planting is proposed. However, ongoing weed control will be required.

Pest animals are likely to require control, especially if penguin habitat is provided. Periodic rabbit control is already undertaken by Greater Wellington Regional Council. Depending on the cost it may be possible to extend the current regime to the broadcast of Pindone after laying a pre-poisoning bait to reduce rabbit levels even further. In order to encourage shorebirds and lizards, monitoring for the presence of other pest animals is recommended, followed by planning for their control.

Dogs are not currently thought to be a significant threat to wildlife at this site. However, the "dogs-on-leash" policy for the site should be enforced to minimise any such threats, and to enhance the amenity for other site users.

Planting and sand stabilisation

There is a strong preference for low levels of planting at the site. It is felt that it would be preferable, where practicable, for plants to establish themselves, in order to maintain the natural character of the site. From a practical perspective, the large size of the site suggests that low levels of planting would be preferable.

However, there are two areas where wide-scale planting will be essential. The first is the degraded dunes on the west and along the beach area bordering the carpark. Planting is essential here to stabilise the sand so that it will be protected from storm surge and will trap more sand as it is blown from the west. In the longer term, planting will also make the dunes more pleasant from a recreational perspective, although freshly planted dune areas will need to be fenced off. The second area of planting is the large grassy space at the eastern end of the site. With planting, and the reconfiguration of paths and beach access, this area will then become a high-quality visiting and breeding site for shore birds especially little blue penguins.

Other areas of more restricted ecological planting are discussed below. At the northern edge of the central part of the site is a large sealed car parking area backed by a steep bank adjacent to the coastal road (The Esplanade). This area will be covered by the accompanying landscape plan developed by Wellington City Council. All planting specified in that plan will follow the recommended species list attached to this rehabilitation plan and all plants for the entire site will be eco-sourced.

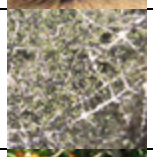
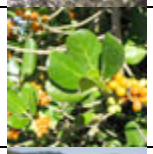
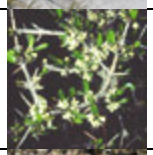
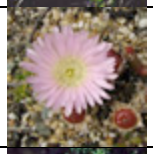
Areas of rehabilitation and planting

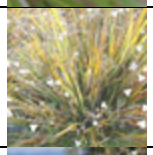
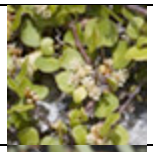
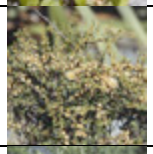
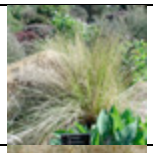
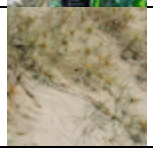
As discussed above, the areas of different rehabilitation and planting treatments are summarised as follows:

1. Areas of dune rehabilitation
2. Taupata shrubland
3. Areas of "infill" planting to buffer existing shrublands
4. Area of no planting on Point
5. Area for landscape planting adjacent to carpark

These five areas are shown on Plan 1.

Table 1: Species recommended for planting

Latin name	Common name	Image	Area where planting is recommended	Currently present or nearest known site
Acaena pallida	Sand piripiri		Landscaping road edge, dune rehab	Yes
Aciphylla squarrosa	speargrass		To close unwanted pathways	Quarry[4] Kau Pt[4] & Tapu Te Ranga Island[6]
Austrofestuca littoralis	Sand tussock		Sow seed on ripped area of gravel spit	Sinclair Head[2]
Coprosma propinqua	Mingimingi		To close unwanted pathways, taupata shrubland	Yes
Coprosma repens	Taupata		Taupata shrubland, landscape planting beside car park	Yes
Desmoschoenus spiralis	Pingao		Dune rehab	Yes
Discaria toumatou	Matagouri (Wild Irishman)		To close unwanted pathways	Sand-veneered land above Hue Te Taka penninsula[4]
Dysphyma australe	Iceplant		Landscaping road edge, dune rehab. at car park	Yes
Euphorbia glauca	Shore spurge		Landscaping road edge	Quarry & The Sirens Rocks[4]
Lepidium oleraceum	Nau, Cook's scurvy grass		Plant in association with seabird roosts and nesting sites	Nationally vulnerable
Leptinella squalida subsp. *squalida*			Dune rehab beside car park	Owhiro Bay – Sinclair Head[2]

Latin name	Common name	Image	Area where planting is recommended	Currently present or nearest known site
Libertia grandiflora	Mikoikoi, New Zealand iris		Landscape planting, between road edge & car park	Owhiro Bay – Sinclair Head[2]
Libertia ixioides	Mikoikoi, New Zealand iris		Landscape planting, between road edge & car park	Owhiro Bay – Sinclair Head[2]
Linum monogynum var *chathamica*	NZ true flax, rauhuia		Landscape planting, road edge	Owhiro Bay - Sinclair Head[2, 5], Breaker Bay[4] Tapu Te Ranga[6], Long Gully[7]
Muehlenbeckia complexa	Wire vine		Taupata shrubland, buffer planting	Yes
Olearia solandri	Coastal tree daisy		Taupata shrubland, landscape planting beside car park	Sinclair Head[2], Wgtn coast[5], Long Gully[7]
Ozothamnus leptophyllus	Tauhinu		Taupata shrubland, landscape planting beside car park	Sinclair Head[2], Wgtn coast[5], Tapu Te Ranga[6], Long Gully[7]
Phormium cookianum	Coastal flax		Taupata shrubland, landscape planting, car park, in moderation	Sinclair Head[2], Wgtn coast[5], Hue Te Taka[1], Tapu Te Ranga[6], Long Gully[7]
Poa cita	Silver tussock, wi		Landscape planting, road edge at car park, dune rehab at car park	Wgtn coast[5], Hue Te Taka[1], Tapu Te Ranga[6]
Spinifex sericeus	Spinifex		Dune rehab	Wgtn coast[5], Hue Te Taka[1], Long Gully[7]

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1. Brownsey, PJ, 1992: Terrestrial, biological & ecological survey of Hue Te Taka Penninsula, South Wellington coast.
2. Druce, AP, 1968-1992: Indigenous vascular plants between Owhiro Bay and Sinclair Head, South Wellington coast, SL to 1,000 ft.
3. Druce, AP, 1976: Plant Checklist for South Wellington Coast and adjacent hills from Paekakariki to Te Kaukau Pt
4. Forsyth, F, Personal observations
5. Freegard & Weeber Y, 1986: Plant checklist for the Wellington Coast.
6. Mitcalfe B & Horne C, 1998-1999: Some indigenous plants of Tapu Te Ranga Island, Island Bay, Wellington
7. Ogle, CC, 1985: Plant checklist for Wellington South Coast Wildlife Management Reserve, Long Gully, Sinclair Head to Karori Stream.
8. Ogle, CC, 1986: Plant checklist for Wellington South Coast Wildlife Management "speargrass weevil" Reserve.

There are a number of rare and threatened plants native to the Wellington South Coast that for various reasons are not included on this list. Some are difficult to propagate and others are difficult to establish by planting, for instance shore spleenwort (*Asplenium obtusatum*). Others, such as *Muehlenbeckia ephedroides,* are only naturally present on sites far from Te Raekaihau Point and insurance populations might be better sited closer to existing ones.

Details of dune rehabilitation

Plans for rehabilitation of the dunes to the west of the site are based on the experiences of the Island Bay Dune Care Group. This group found that spinifex did better at the top of the dune and pingao at the bottom. It will be interesting to see if this is the case in Princess Bay which has a different aspect.

The very top of the dune area, closest to the car park, has a mixed substrate of fill and sand. In identical conditions at Island Bay piripiri, iceplant, coastal flax and *Poa cita* have thrived. Given the strong preference for low-growing plants to preserve views it is recommended that flax is used sparingly here. Leptinella is another low-growing sand binder that would work well along the top of the dune near the car park.

Attempts have already been made to plant the dunes to the west of the bathing sheds but have proven unsuccessful. A barrier at the edge of the deck might prevent people from jumping off onto the dune and damaging plants. A low fence at the base of the dune is also recommended. This could be low bollards with a rope between, just a hint to keep off while the plants are becoming established. This could be reinforced with signage at the bathing shed. In the meantime a similar mix of plants should be used here as beside the car park, grading up to rauhuia, olearia, tauhinau and taupata along the bank below the road.

Figs 7 & 8: Left, degraded dune area. Right, site for proposed taupata shrubland.

Planting should begin at the western end of the dunes, aiming to plant as far as the eastern end of the one way car park within four years. Planting does not need to proceed in a linear manner. Working with bands of young plants in the shelter of existing vegetation is likely to be more successful. Where possible, lupins can be left on the dunes as they provide much needed shelter for young plants. They should be

removed at a later date when their shelter is no longer needed. Other weeds should be removed gradually, ahead of planting.

Details of taupata shrubland

The second major area of ecological planting is at the eastern end of the site. A coastal shrubland is proposed for the whole of this area with walkways only at the perimeter. Preparation involves ripping the existing vehicle tracks to a depth of 50cm to improve drainage, pre-planting spray to eliminate weeds, in particular grass, and spreading of mulch to a depth of 20cm where possible. Planting would then be done through the mulch.

Species suitable for planting in this shrubland are: taupata (up to 60% of total plants), coastal flax, olearia, tauhinu, wire vine and mingimingi. Spacing should be at 0.8m centres with very thick mulching. Plants should be set in groups of 3-5-7 of the same species rather than peppered individually across the site. The plan is based on considerable infill planting in the second and third years, possibly even reducing the planting centres to 50cm. The aim is to achieve a fairly dense shrubland where shorebirds can have high levels of privacy. Cook's scurvy grass, a nationally vulnerable rare plant, is also recommended for planting near established seabird nests and roosting sites.

The taupata shrubland is a large project and the initial planting will need to be made within the first 12 months of the project (using available eco-sourced plant stocks). Because it can take ten to twenty years for penguins to establish, it is vital to kick-start the vegetation cover and to plan for a relatively severe drought or storm at some stage in that timeframe resulting in plant losses. Pedestrians will need to be educated about the shore bird project and advised to keep out of the area, especially while plants are being established.

Other ecological planting

Further planting will need to be carried out along access routes between the parking area and the beach. A number of broad tracks that have been created by vehicles need closing off and prickly plants such as Spaniards and matagouri are suitable for this. These plants can be used to close of the end of tracks closest to the car park while the rest of the track can be planted in the same shrubs as the penguin shrubland. These plants can also be used to buffer existing vegetation on the gravel spit where they are exposed and struggling with the elements.

Smaller sand binding plants are more suitable for planting alongside those tracks that will remain open and in particular alongside sand ladders. Piripiri, leptinella and ice plant are preferred as they will tend not to overhang the pathway, pingao and spinifex and flax being more suitable for filling large gaps.

A number of people during the consultation suggested that seed of sand tussock could be distributed over the centre of the gravel spit once the weeds there have been controlled. This declining species is present near Sinclair Head approximately 6km from Te Raekaihau Point. As a wind dispersed species on an extremely windy coast it may eventually self colonise.

Penguin and seabird habitat

Currently, little blue penguins use and nest in the roadside bank east of the toilet black access drive. This location means that penguins must cross the carpark to access the sea and their nests are highly accessible to people and dogs. It is not suggested that these nests be destroyed but long-term alternative habitat should be provided and that was discussed above (taupata shrubland). On the roadside bank, the nest locations should be marked during weed control, and if possible weed control should not be undertaken during the nesting and fledgling season from August to February.

The proposed eastern taupata shrubland provides the best option for enhancing penguin and seabird habitat. Eventually, storm build-up of beach debris will provide nesting material, but in the meantime the habitat should be enhanced by the provision of wooden artificial nest boxes. Initially, about 10 should be provided, reasonably evenly spaced over the area, and using the existing small taupata islands to provide shelter. Once monitoring shows that these boxes are being used, extra boxes could be added near to those already in use.

Monitoring and pest control on traplines or bait stations will be required, as discussed above. Volunteers from the "Places for Penguins" programme (Forest and Bird Society) may be available to assist with monitoring or habitat enhancement.

Birds other than little blue penguin that currently visit the site include white-fronted tern, reef heron, shags and red and black billed gulls. It is expected that as off-shore waters in the marine reserve become richer in sea life these birds will gather in increasing numbers here, although increases in black-backed gull populations would need to be monitored for consistency with Wellington Airport's need for low gull populations in the area. With adequate pest control, shelter and privacy some may also start breeding at Te Raekaihau Point. It is important to leave beach-cast debris such as wood and seaweed lying on the beach. This provides habitat for a variety of animal life from sand hoppers to skinks. It also provides nesting material for birds.

With the improvement in bird habitat that will be provided by this plan, it is suggested that Te Raekaihau Point could become an important seabird and wildlife habitat that complements the Taputeranga Marine Reserve and other penguin nesting and habitat enhancement programmes that have begun around the Wellington coastline. That is why the provision of animal habitat has been proposed as a specific aim of this rehabilitation plan.

Beach access/ sand ladders

Up until now access to the beach has been informal with visitors clambering down banks or driving directly onto the beach. This has broken the natural vegetation into small fragments. In the last ten years access-ways have become wider and more numerous. The traffic of pedestrians and vehicles has suppressed the natural growth of plants and compacted the ground. With the restriction of vehicles to the formal car park area and ripping of the compacted ground it is expected that natural vegetation will begin to return to these areas (see planting section above).

There are also a number of sites where people are scrambling across the dune to reach the beach and contributing to erosion. This results in unsightly gravel on the beach and restricts access to the nimble, sure-footed few. Installing sand ladders at these places will prevent erosion and improve access.

Figs 9 & 10: Left, One of the access-ways requiring a sand ladder. Right, vehicle access-way to be closed with planting.

Monitoring

In order to achieve the aims of the rehabilitation plan ongoing monitoring will be required. Weeds are the greatest threat to the success of this plan and must be controlled rigorously. They will need to be monitored regularly and the plan reviewed in light of any threats that they pose.

Shorebirds are vulnerable to a number of pest animals when nesting or roosting. It is expected that as food stocks in the Marine Reserve increase there will be a corresponding increase in the number of shorebirds present at the site. Following on from this we may see an increase in pest animal populations as they feed on the birds and their young. Pest animals need to be monitored and their numbers kept as low as possible before we can expect to see positive flow-on effects from the Marine Reserve in local bird populations. Keeping mammalian predators low will also help lizard populations.

Interpretation

Interpretive signs will be invaluable to keep visitors abreast of proposed changes to the site. They will be needed to explain why it is necessary to keep off the dune plantings in the short-term, especially those by the bathing sheds, and to encourage visitors to keep to newly created access-ways such as sand ladders. The history of the site is another subject warranting signage. Finally, there is support for descriptions of the plants and wildlife at the site and the measures being taken to protect them.

During the consultation process there were a number of submissions in favour of signage. It was requested that it be sited in a manner sympathetic with the natural landscape.