GISBORNE
DISTRICT COUNCIL

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Subject: Biological survey of Kopututea dunes

Author: Caitlin Hollis (Student intern. Parks &Community Property)

Dept Manager: Grahame Smail: Parks and Community Property Manager.

SUMMARY

This Report will cover the overall information gathered during a biological and ecological survey of the Kopututea dunes. The report will include an introduction to Koputututea, General Dune information, Specific Kopututea dune information. The method and aims of the survey that was carried out. The findings of which native and exotic plants species were identified as present and the patterns and relationship that were concluded as a result of the survey. Recommendations for Native block plantings will also be suggested.

Keywords: "list of keywords" .

1. BACKGROUND

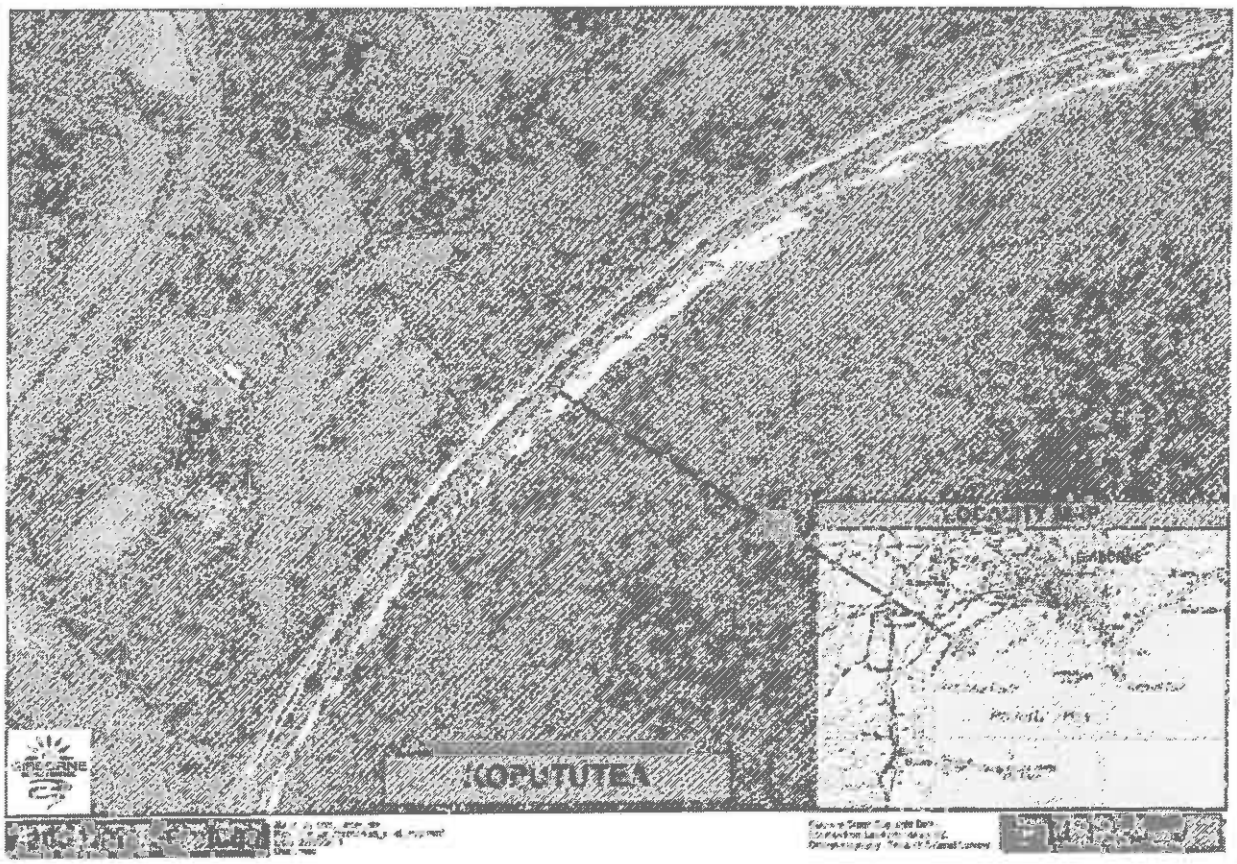
Introduction to Kopututea

Description of Kopututea:

Kopututea is a stretch of dune landscape stretching for seven kilometres along the Pacific Ocean, south of the developed area of Gisborne City towards Makaraka and Manutuke to the mouth of the Waipaoa River. This open space stretches as far as the eye can see, and has an appearance of desolated dune wilderness. Very little development has occurred along the dunes, other than one formed carpark (see below), partially located within Kopututea, at its most eastern boundary, and many informal parking areas and vehicle access tracks.
(Gisborne district council. *Kopututea Co-mangement plan*. Pg. 2)

Location:

Map of Kopututea



2. DUNE DISCUSSION

Why are dunes important? Dunes are narrow but precious buffers of land that adapt to keep the natural forces presented by the seas at bay. Unfortunately dunes are under pressure from human activities. Protecting dunes is vital to preserve values we hold such as natural habitats, heritage and protection from erosion and floods.

- **Natural habitats:**
  Coastal dunes once were patterned by colourful arrangements of Native grasses, rushes, and trees. However now almost all these plants that once thrived on the

dunes are being over taken by exotic plants, pests and otherwise. Fragments of what once was still remain such as New Zealand's native sand binder *Spinifex sericeus and* scattered shrubs like Karo *(Pittosporum crassifolium)* and Pohutakawa *(Meterosideros excelsa)*. Dunes and beaches are also extremely important in preserving the diversity of New Zealand's native fauna. Many birds used to use the dunes and beaches as mating sites. The increasing rate of human impact of dunes has led to common native birds becoming not so common. Human pressure on beaches and dune systems are heavily impacting diversity of life found.

- **Heritage:**
  Dunes are ingrained in the heritage of New Zealand. It was important for the first Maori settlers to be by the coast where water was abundant. Cultural sites include the burial grounds, living areas, and spiritual places to Maori. Dunes and beaches provide a reminder of cultural, spiritual and emotional history and can help us understand who we, as New Zealanders are.
- **Protection from erosion and floods:**
  Dunes are physical buffers which are eroded and then built up again by the natural processes. Dunes contain sand reserves that enable the beach to be maintained even if erosion occurs. Dunes are natural mechanisms that reduce the impact of severe storm waves, resulting in less flooding the surrounding area, therefore less damage.

Kopututea Dunes

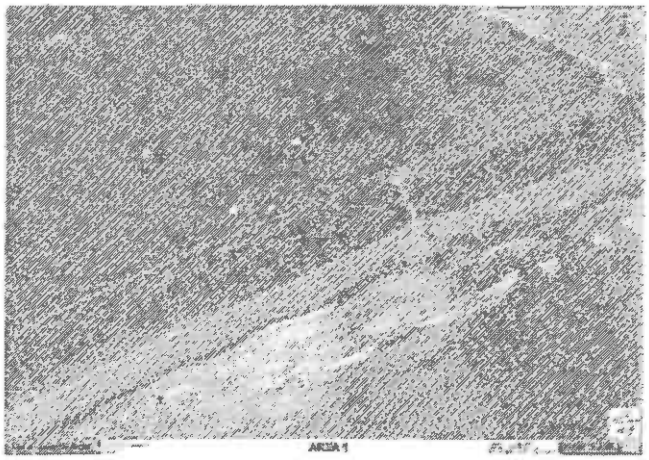
This foredune has been built up by the sea over the last 65 - 75 years. In its natural state the land is hummocky and ridged. The dunes run parallel to the coastline.
The sands of the second and backdune on the land on the seaward side of Centennial Marine Drive are stabilised by a cover of weeds, sand grasses and shrubs including Spinifex (Spinifex sericeus), Harestail, Knobblyclub rush (*Finicia nodosa*), Catsear, Melilotus(*Melilotus indicus*),
The soil on the foredune under natural cover has a mat of dead roots, underlain by a horizon of pale brown sand, held together by a strong fibrous mat of both living and dead roots.
Underneath is loose grey sand, in which roots penetrate to about 30 cm.
Opoutama sand which comprises the dune soil of the second and back dune dries out extensively in the summer and productivity is limited more by deficiencies of moisture than by mineral nutrient deficiency. In the winter the soil drains freely and the consolidated sands provide a strong firm surface.
On the backdune near Centennial Marine Drive a ribbon planting of Norfolk Pines occurred some 35 years ago. While not considered wholly appropriate to the site they have provided some scale and relief to the dune landscape.
At the time of European settlement the vegetation on the beachlands which extended nearly 500 metres inland and was mainly manuka and bracken fern with some kanuka. In the swamps which were small but numerous raupo, Sedges and toetoe flourished.
(Gisborne district council. *Kopututea Co-management plan*. Pg.6)

3. SURVEY

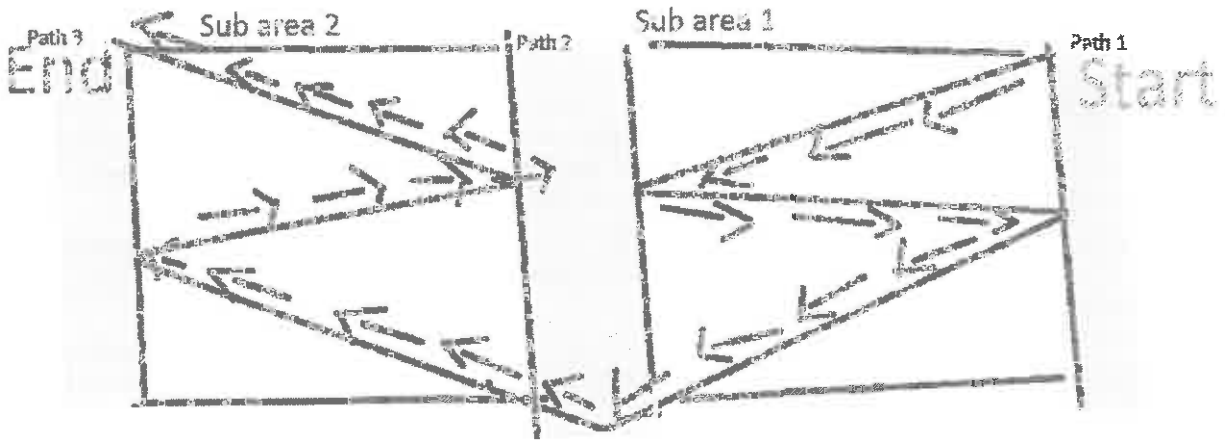
Aims.:

1.) Identify the species of plant life present on the Kopututea dunes.
2.) Map the location of where the plant species are found
3.) Represent the patterns of plant species using the information gathered by aim 2.

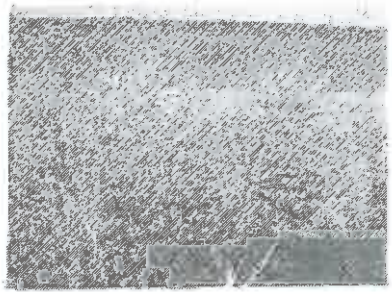
Area: The stretch of land assessed for the plant life on the dunes was split up into six areas of about 1km long beach (areas are attached)
Each area had 5- 10 sub areas within them defined by access pathways that run from the road right down to the beach were used as markers to map the existing species found in each sub area. Total sub areas of the approximate 6 km = 42
*Note Area 6 only had 2 large sub areas



Surveying method:
The survey taken between the 9th and the 13th of December 2013.
To get an appropriate range of what plant species were on the sand dunes a zig zag pattern was used to assess. The zig zag gives the surveyor a rational idea of what is present in each sub area. It also allows the surveyor to see the dominant species compare to those that are not so. The zig-zag for each sub area consists of starting at the path before and heading diagonally to the middle of path on the opposite side of the sub area repeat this back down again within the sub area . Mirror these steps but starting at beach end this time. This takes you back to the road side end.



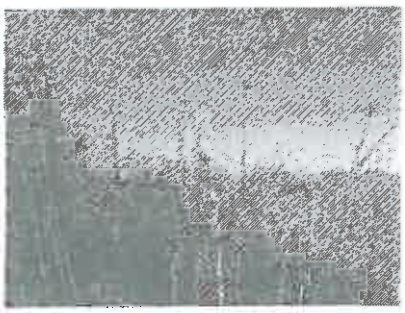
4. VEGETATION
Native Vegetation.



***Spinifex sericeus* (Spinifex) Native (50-70cm)**
An attractive plant with long runners. Spinifex's most distishuguishable feature ais the "tumble weed" seed heads that are very easily dispersed with wind and water.

Benefits: Strictly coastal where it is confined to sandy beaches. This is the main dune forming indigenous plant in New Zealand. It is usually found at the front of actively accumulating foredunes.It is an important pioneer species which colonises coastal dunes, binding loose sand with its horizontal runners.

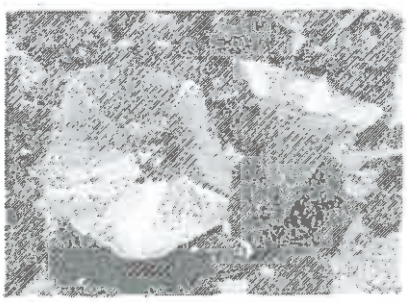
Implications: It does not tolerate stable dune systems and does not compete well with other introduced dune plants



Ficinia nodosa (Knobbly club rush) Native (60-90 cm)
A tough but architectural plant with stout green stems and brown seed clusters just below the pointed tip.

Benifits: Easily grown from fresh seed and by the division of whole plants. Does best when planted in a free draining soil in a sunny site. Ideal in coastal sites but remarkably cold tolerant.

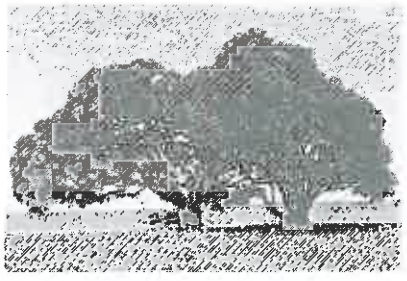
Implications: Invasive when thriving, which it does because it is tolerant to heat, dryness and cold.



Calystegia soldanella (Rauparaha) Native (5-13 cm)
This is a common low-growing plant with bright arrow head shaped leaves and showy lilac and cream flowers (4-7cm). Leaves die down in winter making this plant a herbaceous perennial.

Benefits: Indigenous to New Zealand so it preserves New Zealand plant diversity, this species brings in the bees for pollination for other potential angiosperm species.

Implications: Once it is established it is hard to get rid of it!



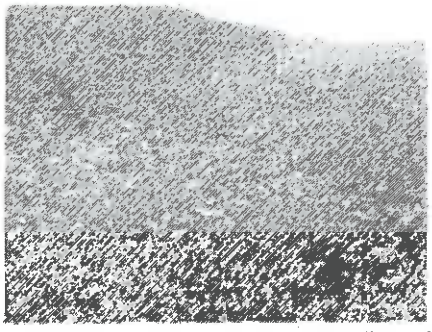
***Meterosideros excelsa* (Pohutakawa) Native (3-25m)**
The pohutakawa is an iconic tree. Its crimson inflorescences are made up of a mass of stamens and are laden with nectar. The oblong, leathery leaves are covered in dense white hairs underneath It usually grows as a multi-trunked spreading tree with a dome-like spreading form.

Benefits: This species is spiritual to many New Zelanders. Unfortunately Pohutukawa is at risk from possum (*Trichosurus vulpecula*) browsing. This can seriously damage and even kill trees. The nectar provides nutrition for native creatures, including lizards. This tree is also used as shade areas for people to rest under and adding beauty to the landscape.

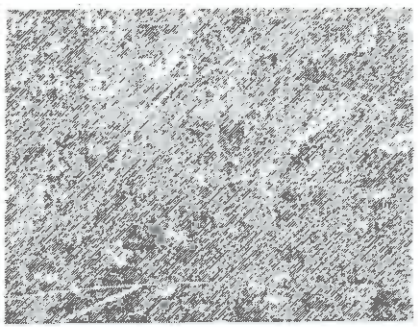
***Pittosporum crasifolium* (Karo) Endemic**
Karo is a very popular tree for gardens because of its attractive shape and fragrant and bold flowers. Seed dispersal by birds results in natural establishment of seedlings on dunes. The leaves of Karo are very similar to Pohutakawa (5-12cm).
Benefits: This species is endemic to New Zealand, preserving New Zealand plant diversity. It is also extremely beautiful and gives character to the beach.
Implications: Birds readily spread its seed and in places south of its natural range, it has become a weed.

The native Pingao is found in dunes closer to Waikanae.

Exotic vegetation:



***Lagurus ovatus* (Harerieils) Exotic**
Lagurus ovatus is a clump-forming annual growing to 50 cm tall, with pale green grassy foliage and numerous short, oval green flowerheads, turning to a pale cream colour as they ripen, all summer long-Ripened flowerhds resemble a rabbit tail in texture and appearance hence the name
Benefits: Beneficial in dune stabilization, to reduce the impact of harsh winds
Implications Introduced species like hare tails can out-compete native plants and disrupt animal life, making them formally "invasive species".



***Melilotus indicus* (Melilot) Exotic**
Flowers yellow and pea-like, 2 mm long, in dense narrow racemes slightly longer than the leaves.
Fruit is an almost globular pod, 2 – 3 mm long.
Benefits: Brings in bees for pollination that is useful to the native angiosperms such as Pohutakawa and Karo growing in the area.
Implications: Considered poisonous to some people and can out-compete natives and more beneficial plants.

Hypochaeris radicata (Catsear) Exotic
The leaves, which may grow up to eight inches, are lobed and covered in fine hairs, forming a low-lying rosette around a central taproot. Forked stems carry bright yellow flower heads, and when mature these form seeds attached to windborne "parachutes". All parts of the plant exude a milky sap when cut.
Benefits; All parts of the Catsear plant are edible; they will also bring in the bees for pollination
Implications; None

***Araucaria heterophylla* (Norfolk island pine) Exotic**
The trees grow to a height of 50–65 m, with straight vertical trunks and symmetrical branches, even in the face of incessant onshore winds that can contort most other species.
The cones are globose, 10–12 cm long and 12–14 cm diameter, and take about 18 months to mature. They

disintegrate at maturity to release the nut-like edible seeds.
Benefits; Provides relief to the dune landscape, home for birds that disperse native seeds
Implications: Pollen may cause allergic reaction

***Tamerix aphylla* (Athel pine) Exotic**

Tamarix aphylla grows as a tree to 18 metres high. The tiny leaves are alternately arranged along the branches, and exude salt, which can form a crusted layer on the surface, and drip onto the ground beneath the species can reproduce by seed
Benefits: Is a great windbreaker plant and provides shelter to native seedlings such *as Pittosporum crassifolium*. This species has a high salt content which allows it not to lose at lot of water and there for not drying out. It is perfectly suited as a babysitter beach dune/ desert plant.
Implications: None

A range of other grasses (Poaceae) Exotic
Benefits; Provides stability to the dunes with their root systems, and flowers can bring in pollinators.
Implications: Can potentially out-compete more beneficial plants
Examples include; Buffalo grasses, Couch etc.

5. DISPERSAL

Incipient dune

Spinifex sericeus is the predominant species of the incipient foredune for the first 4-6 kilomenters heading towards the Waipaoa River. With ***Calystegia soldanella*** (Rauparaha) becoming the dominant species of the incipient foredune in the last kilometre towards the mouth of the river.

These two species are accompanied by ***Lagurus ovatus*** also known as Haretails. This species is widely dispersed and evenly over dunes with large clusters found close to the access ways and the dune crests. This result is most likely to of occurred because of strong wind seed dispersal and the help of humans and cars going up and down the access ways and catching seeds of their clothing or cars and moving and dropping it in other areas.

Foredunes (second) dunes

A plant species wildly dispersed in the established dunes of Kopututea is ***Ficinia nodosa*** a.k.a Knobbly Clubrush. This species is thriving and is becoming to a point, invasively spread thoroughly throughout the established dunes. ***Hypochaeris radicata*** (Catsear) is also widely dispersed however not to the same extent as Haretails or Fincia nodosa. Catsear species dispersal range is from the incipient dune right back towards to road.

Backdunes

A range of exotic grasses dominate the rear dunes with wild shrubs like Sweet pea *Lathyrus latifolius* distributed in a random patches within the first two areas, then sparsely dispersed in the remaining areas. ***Ficinia nodosa*** is also largely dispersed, dominantly ranging from the incipient dune right up to a few meters from the road. A range of different grass weeds such a species are largely present in the back dunes and up to the incipient dunes, found especially of walkways running parallel to the dunes and sea.

Trees and large shrubs found in the back dune area include ***Araucaria heterophylla*** (Norfolk island pine), ***Tamarix aphylla*** also know as Athel tree, the endemic species ***Pittosporum crassifolius*** (Karo) and the famous new Zealand coastal tree ***Metrosideros excelsa*** (Pohutakawa). These trees and shrubstend to be found closer to the road. With Karo liking shelter from a larger tree.

6. RECOMMENDATIONS

Adding to the Native plant communities found on the Kopututea dunes would only benefit. By planting Natives it helps sustain cultural, economic, biological and social aspects of the environment.

Incipient dune:

Plantinig of *Demoshoenus spiralis* (Pingao) in amongst Spinifex in Area 2 or between access ways 15-20 would be an ideal spot for some block planting in the incipient dune. Planting would have to be cordoned off to alert people so they don't accidently trample seedlings. Planting Pingao could also be tried in Area 6 (Acess areas 38-40) where *Calystegia soldanella* is the dominant species of the incipient dune. This would be a quiet place to plant Pingao but there is still the problem to people driving over them ignorantly (naively).

Fore dune:

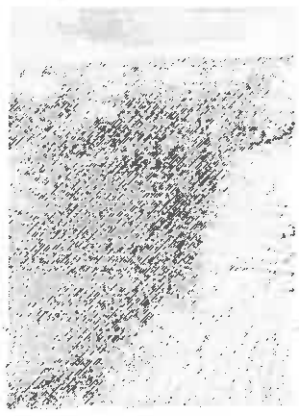
Muehlenbeckia complexa and Ozothamnus leptophlyus would be good trees/shrubs to have as native wind breakers in the Foredune. Unfortunately there is a trend of people driving off the access ways and directly on to the dunes, in the fore dune area. Cars driving over the seedlings would cause harm to the plant and it might not recover. Therefore recommend to plant the shrubs in a mainly undisturbed area at first. The fore dune area between access ways 33-36 would be ideal where there is not a large amount traffic or potential for the plant seedlings to be run over.

Backdunes:

Comprosma repens and *Dondanea viscosa* are attractive native plants of new Zealand which are adapted to deal with dune conditions. The same problem of people diving over the dunes pose the problem of where to plant these species For

C .*repens* in the shadow of a larger more established tree/shrub would provide a level protection. For D.viscosa an area that is away from traffic like between Areas 3, 4 and 5 (Acess ways 25-36) is the most ideal place to survive successfully. Karo (*Pittosporum crassifolium)* is also an attractive native that is well adapted to Back dune conditions. Like C.repen seedling like to sprout in the protection of a larger more established tree/shrub.

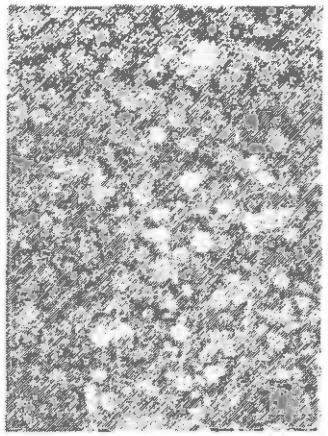
Incipient dune:



Desmoschoenus spiralis also known as **Pingao** would be a great plant to have seeding on the incipient dune, there is proof that it survives successfully on the dunes closer to Waikainae. However more care would be needed further down the dunes. Having this plant re introduced to this part of the dune system would bring ecological, spiritual and cultural value. Pingao has runners like Spinifex which makes it an excellent sand trapper and therefore efficient sand dune stabilizer. When Pingao matures its leaves turn a

golden-brown which can be harvested sustainably for weaving and use in tukutuku panels and kete. This is an extremely important plant species in making Kopututea sustainable in all aspects (biological, cultural, social and economic).

Foredunes:

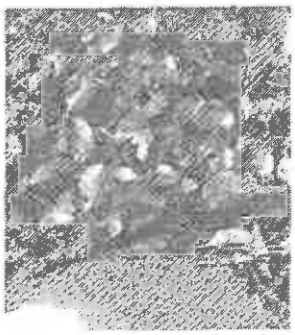


Muehlenbeckia complexa is a hardy vigorous semi-deciduous New Zealand native vine found naturally on sand dunes and in coastal scrub throughout New Zealand. It is a sprawling coastal creeper/climber that grows into a tangled mass of brown wiry stems with small round leaves and little cream flowers followed later by black seeds held in a fleshy cup. It will form a dense mound up to 2 m wide and it will climb over other plants. It will climb to a height of 5m or more covering trees. In its native environment it plays a key role sealing human and natural disturbances on the forest edge. It also suppresses the growth of introduced weeds, such as blackberry, and promotes increased insect diversity. The Rauparaha copper butterfly caterpillar depends on these plants for food and pheasants enjoy the abundant silver berries in autumn and early winter

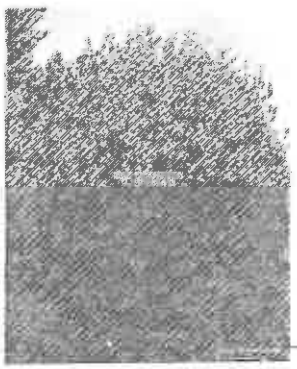
Implications: Could potentially out-compete other natives

Ozothamnus leptophyllus is also known as Tauhinu is a very salt resistant shrub. It will grow on the crests of fore dunes. This plant species has small silver-green leaves and an abundant amount of small tuft flowers appear on it though summer that express a pleasant musk scent.

Back dunes:



Comprosma repens (Taupata, Mirror plant or looking glass plant) Common low-growing shrub or small tree bearing pairs of green very shiny dark green leaves inhabiting the edge of coastal forests and seaside rocks. Leaves 6-8cm long, leathery, with small pits at junction of veins. Fruit orange. Well adapted to a coastal habitat like other coastal Comprosma. It is a very distinct plant because of it glossy leaves which gave it the name mirror plant and looking glass plant. This species is dotted all around gisborne. It is an attractive plant.



Dodonaea viscosa *(Akeake)* Akeake is a small tree up to seven metres in height with pale green, long, thin and willow-like leaves, tiny flowers without petals and striking reddish-yellow seed capusules, which have thin, broad wings. Akeake is common in coastal and lowland scrub and forest throughout the North Island and as far south as Greymouth and Banks Peninsula in the South Island. It grows from sea level up to 550 metres wherever severe frost is not a problem. It withstands strong winds, salt spray and dry conditions, but needs a well drained soil.

Implications: Both male and female plants are needed to produce seeds. This makes it uncommon for this species to naturalize.

Koputututea dunes are a part of Gisborne history and will be a part of gisborne for the future. The Dunes at present are splashed with some New Zealand natives however they are not at their peak where they could be thriving. By planting other Native species we are diversifying the dunes, at the same time preserving biological essence of New Zealand therefore maintaining a natural and true New Zealand on the beaches of Gisborne.

Kopututea block planting areas

Author: Caitlin Hollis (Student Intern, Gisborne District Council), April 2014.

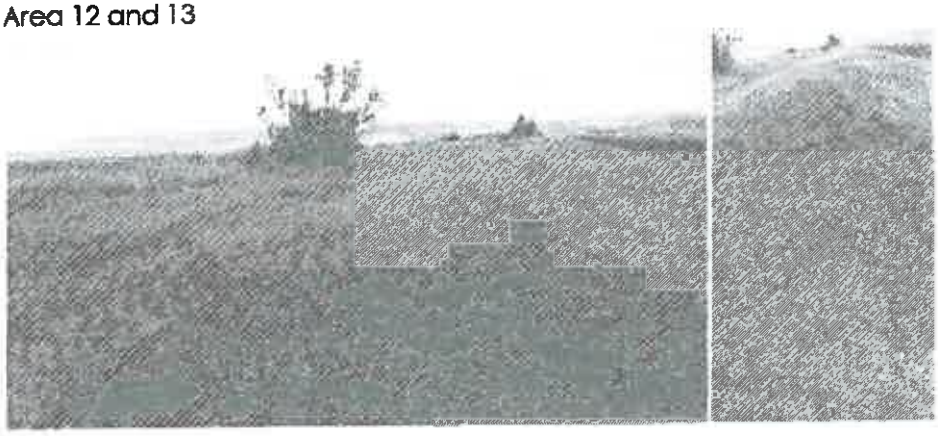
These areas chosen for block planting are great places. These areas will provide instant visual effect to the bare landscape. It is important to note that the first plantings will provide information on the nutrients availability of the soil and other factors such as how much salt burn the plants are likely to receive from the beach and so forth. The plants survival rate will lead to further reorganising to what native's best suit the landscape and soil. A large variety of different coastal dune natives introduced would give the biggest visual impact and provide the best information for future reference.

Areas 11, 12 and 13 distance = 340.23m

This section chosen at present is very bare and has mostly small exotic grasses inhabiting the area. This area also provides easier access to for the community to view and help out with the planting process. Visual comparisons will be able to be made with the surrounding almost barren area.

Area 11

Area 12 and 13



Areas 18, 19 and 20 Distance = 355.34m

This would be a good area to start block planting because it has a few trees which will act as wind breakers for the young natives as they get established. Native plants that are not on the back dunes yet could be trialled. Such as Akeake, Tauhinu etc. Where there is more protection available.

Areas19-20

Kopututea block planting areas

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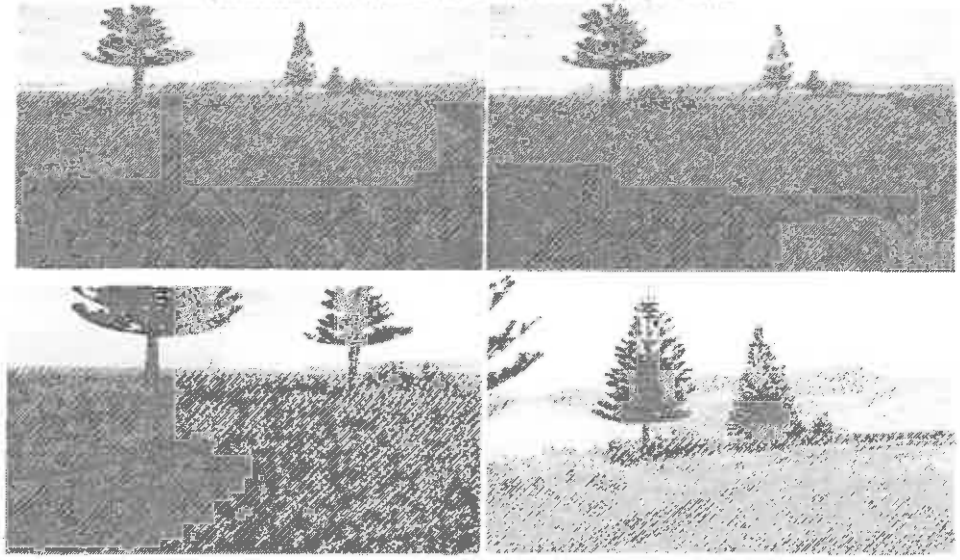

AREA 2 : KOPUTUTEA

AREA 3 : KOPUTUTEA