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**RESERVE MANAGEMENT PLAN FOR
MŌTŪ KARAKA SCENIC RESERVE:
MILESTONE 1, CURRENT STATE**



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RESERVE MANAGEMENT PLAN FOR MŌTŪ KARAKA SCENIC RESERVE: MILESTONE 1, CURRENT STATE

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DRAFT

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1. INTRODUCTION

The Department of Conservation commissioned Wildland Consultants to provide specialist ecological input for the preparation of a management plan for Mōtū Karaka Scenic Reserve. This reserve encompasses approximately 28 hectares of sand dune ecosystems on the west coast of the North Island, approximately eight kilometres south of Whanganui. Mōtū Karaka Scenic Reserve is approximately 2.7 kilometres in length and lies within the Whitiau sand dune system. Mōtū Karaka has been vested as a scenic reserve to Ngāti Apa as part of the Ngāti Apa Treaty Settlement. The reserve is to be administered and managed by Ngāti Rangiwhakaturia (a hapū of Ngāti Apa).

A reserve management plan for Mōtū Karaka Scenic Reserve is required to guide the management and restoration of the reserve. This draft report is the first milestone required for input into the Reserve Management Plan, and includes the following:

- A literature review to collate and assess previously identified values, and records of flora and fauna.
- Findings from a May 2017 survey of the reserve, including up-to-date assessments of:
 - Vegetation and habitats (with a map).
 - Flora and fauna.
 - Current ecological condition.
 - Management issues.
 - Opportunities for ecological restoration.

A final report for the reserve is to be developed further in conjunction with Ngāti Rangiwhakaturia and Ngāti Apa to ensure the aspirations for the site and management are captured. The final report will include detailed management recommendations for the reserve.

2. METHODS

2.1 Desktop assessment

A desktop assessment and inventory of the ecology of Mōtū Karaka and its significance was undertaken. Flora and fauna species previously recorded within the site or likely to occur at the site were collated from existing records and databases. The natural history and ecological context of the site were investigated, and current management issues and cultural values were identified.

2.2 Field survey

A field survey was undertaken on 19 May 2017. The site was walked through and notes on the ecology taken. A list of plant species seen during the site survey was compiled (Appendix 1). Field maps of the latest aerial photographs were used to map vegetation and habitats within the project area. Management issues, the ecological condition of the site, and potential opportunities for restoration and management priorities were assessed.

Vegetation types were mapped and described using the Atkinson system (Atkinson 1985). Pest plants encountered were identified and their distributions and densities were mapped in the field onto hard copy prints of digital aerial photographs. The maps were then used for data input into ArcGIS 10.4 (GIS programme). The locations and distributions of each environmental pest plant species were digitised. Environmental pest plant species were labelled with their common name and a brief description of the extent of the infestation, as percentage cover, and overlaid on the aerial photograph.

All bird species either seen or heard during the field survey were identified and recorded. Casual invertebrate observations were also noted.

Potential sites for indigenous vegetation restoration were identified during the field survey. This includes areas where natural regeneration could be encouraged.

3. SITE DESCRIPTION AND BACKGROUND

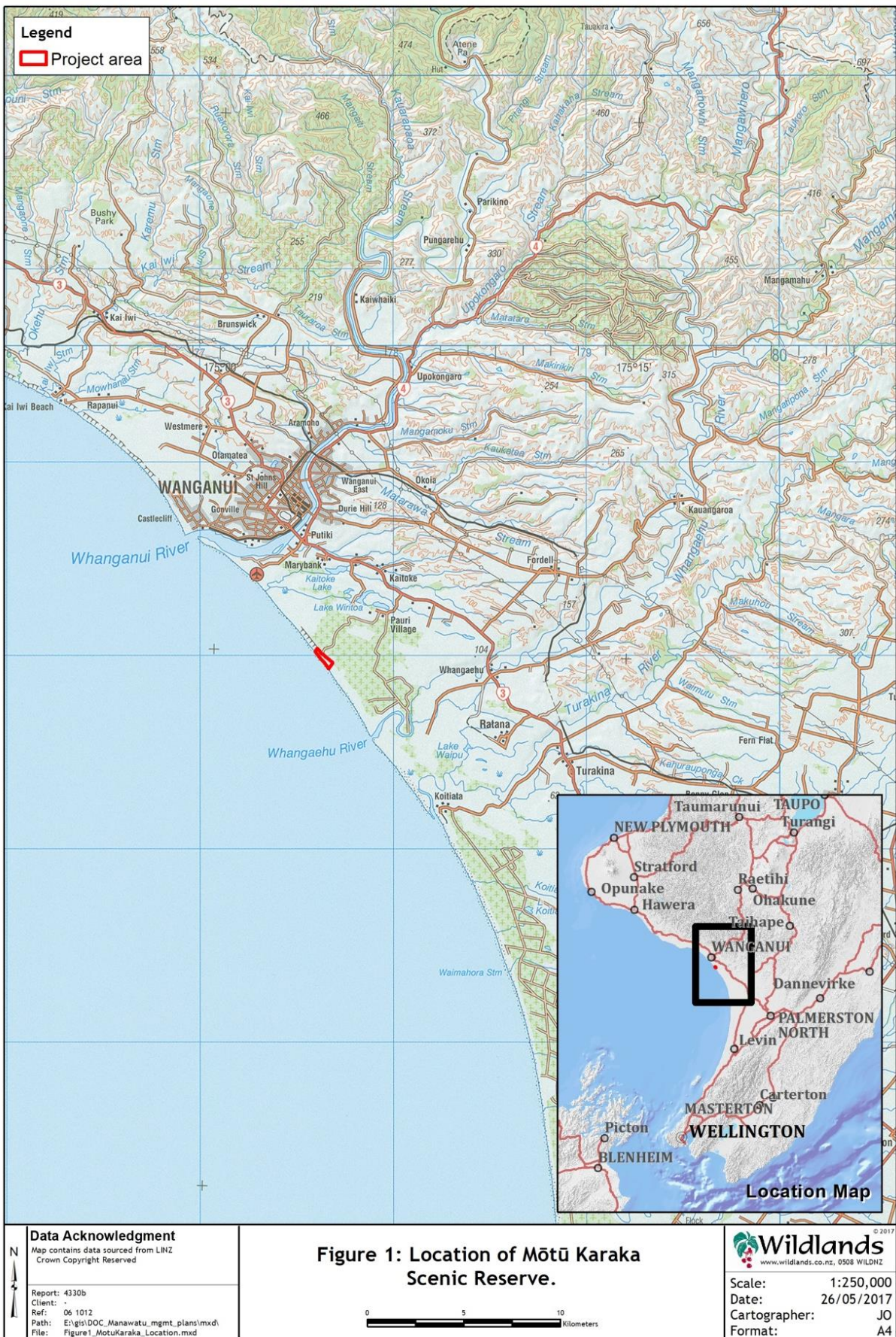
3.1 Location

Mōtū Karaka Scenic Reserve (c.27.8 ha) is located on the west coast of the North Island approximately eight kilometres south of Whanganui (Figure 1), within the Foxton Ecological District. Whitiāu Scientific Reserve (243 ha) is located between Mōtū Karaka and the true right of the Whangaehu river mouth. Whitiāu Scientific Reserve was protected as a scientific reserve in 1991 as a rare example of a comparatively-natural dune ecosystem.

3.2 Ecological context of Foxton Ecological District

Foxton Ecological District contains the most extensive sand-dune system in the country. The sand-belt runs from Patea to Paekakariki and includes several estuaries, and many wetlands and dune lakes. The dune vegetation has been greatly modified through farming, plantation forestry, and the introduction of exotic plants. Remaining indigenous forest areas comprise a few remnant coastal swamp forests containing nīkau (*Rhopalostylis sapida*), pukatea (*Laurelia novae-zelandiae*) and kahikatea (*Dacrycarpus dacrydioides*). Isolated patches of the native sand sedge pīngao (*Ficinia spiralis*) with sand pimelea (*Pimelea villosa*) and sand coprosma (*Coprosma acerosa*) occur throughout the dunes (McEwen 1987). Only six percent of Foxton Ecological District retains a cover of indigenous vegetation or habitats (McEwen 1987a).

Dune systems throughout New Zealand have been heavily modified since European arrival, primarily as a result of the widespread and rapid stabilisation of active dunes with marram grass (*Ammophila arenaria*), and the establishment of *Pinus radiata* plantations (Hilton 2006). In 1958, active dunes comprised 16,627 hectares of the Manawatū coastline, but by the 1990s this had been reduced by 80% to less than 2,400 ha (Hilton 2006). The remaining dune fragments in the Manawatū, despite their reduced area, are of national significance, and support threatened or regionally threatened species (Hilton 2006).



3.3 Site characteristics

The project area is situated within a larger coastal sand dune belt that stretches from the Whanganui River in the north to the Whangaehu River in the south. The c.28 hectare site is approximately 1,100 metres long by an average of c.250 metres wide.

The Whitiāu Scientific Reserve is immediately adjacent to the southern boundary of the site and continues to the mouth of the Whangaehu River. The Whitiāu Scenic Reserve is adjacent to the northern boundary of the site and extends north to the Kaitoke Stream. Duneland also extends to the east of the reserve until it reaches radiata pine (*Pinus radiata*) forest 100-150 metres further to the east. The mean high tide mark on the beach and dune interface marks the western boundary of the reserve.

Vehicle access to the site is via Pauri Domain Road. This road leads to the gas pipeline yard at the eastern boundary of the reserve before becoming a four wheel drive track that leads to the beach. There are several four wheel drive tracks on duneland within the reserve.

The site comprises undulating duneland fully exposed to weather from the Tasman Sea. The seaward edge of the site comprises cliff edge along most of its length. Two large steep-sided hills are located within the reserve at the end of Pauri Domain Road. The site is clothed in low-growing vegetation apart from the front of the foredune, several areas of exposed gravel on top of the cliff edge, occasional patches of bare sand, and the vehicle tracks.

3.4 Cultural history

Ngāti Apa (North Island) is based in the Manawatū-Rangitikei area, with more than 3,200 members. In 1840, Ngāti Apa had land interests stretching from Mōtū Karaka south to Omarupapako, and inland to the upper Rangitikei area. The Ngāti Apa Deed of Settlement (2008) notes that Mōtū Karaka had a traditional fishing kainga (settlement) that was utilised by many hapu. Swamps located in the area were utilised by hapu to catch tuna (eels) and were used as a food resource in times of battle. Hapu also utilised a rich source of harakeke (flax) and cultivated this in areas further inland.

In December 2010, the Ngāti Apa (North Island) Treaty Settlement was legislated. As part of this Treaty Settlement, Mōtū Karaka was vested as a scenic reserve to Ngāti Apa for the purposes specified in section 19(1)(a) of the Reserves Act 1977 - “protecting and preserving in perpetuity for their intrinsic worth... areas possessing such qualities of scenic interest, beauty, or natural features or landscape”. Ngāti Apa are currently in the process of transferring Mōtū Karaka Scenic Reserve to be administered and managed as such by relevant hapu. Ngāti Rangihakaturia (a hapu of Ngāti Apa) is involved in the preservation of an endangered annual herb *Sebaea ovata*.

4. VEGETATION AND HABITATS

4.1 Overview

Vegetation within the c.28 hectares duneland site comprises a mosaic of sedgeland and grassland with occasional pōhuehue (*Muehlenbeckia complexa*) and rārahu (bracken; *Pteridium esculentum*). Shrubs and trees have established over small areas at several locations. Narrow foredunes occur at the base of a coastal cliff (Appendix 2; Plate 1). Swards of both the indigenous spinifex (*Spinifex sericeus*) and the introduced marram (*Ammophila arenaria*) grass are abundant on the foredunes.

Nine vegetation and habitat types were identified and mapped (Figure 2), and these are described below.

4.2 Vegetation and habitat types

Wīwī sedgeland (25.22 ha)

A mosaic of sedges and grasses, with local shrubs, herbs and ferns occurring on the undulating duneland. The most abundant species across the whole site is the indigenous sedge wīwī (*Ficinia nodosa*), but several other species are locally abundant in swards, while others are widespread throughout, but cumulatively only cover a small area (Appendix 2; Plate 2)

Marram and the indigenous pātīti (*Microlaena stipoides*) are locally dominant grasses. Pōhuehue is locally common throughout; kiokio (*Blechnum novae-zelandiae*), rārahu (bracken) and toetoe (*Austroderia toetoe*) are locally scattered. Ngaio (*Myoporum laetum*), gorse (*Ulex europaeus*) and boxthorn (*Lycium ferocissimum*) occur infrequently. Native spinach (kōkihi; *Tetragonia implexicoma*) is locally common in association with the aforementioned shrubs. Lupin (*Lupinus arboreus*) is locally common and scattered throughout. The invasive pink ragwort (*Senecio glastifolius*) is frequent and scattered throughout the site. Small radiata pine (*Pinus radiata*) trees and saplings are occasional. Sand coprosma/tarakupenga (*Coprosma acerosa*) is common at several locations.

(Māakoako) herbfield on cliff (0.62 ha)

The cliff face along the coastal edge of the site has several herb and sedge species growing on it. Māakoako (*Samolus repens* var. *repens*) is the most common, along with occasional *Isolepis cernua*, *Selliera rotundifolia*, *Schoenus nitens*, *Plantago coronopus*, *Epilobium komarovianum*, and *Lobelia anceps*.

Spinifex grassland (0.56ha)

Spinifex grassland occurs on the low foredune at the base of the coastal cliff. Spinifex is abundant, with wīwī, purple groundsel (*Senecio elegans*), sand oxalis (*Oxalis rubens*), and sand wind grass (*Lachnagrostis billardierei*) also present. Pīngao (*Ficinia spiralis*) is occasional.

Spinifex gravelfield (0.13 ha)

Several areas of exposed gravel field are located on the top of the cliff edge. The gravelfields are largely open with little vegetation (Appendix 2; Plate 3). Spinifex is growing onto the gravelfields from surrounding areas, but otherwise the vegetation is sparse, with small, low-growing herbs and sedges including *Zoysia minima*, remuremu (*Selliera radicans*), *Selliera rotundifolia*, *Isolepis cernua* and *Carex pumila*.

Schoenus nitens sedgeland (0.01 ha)

Two patches of *Schoenus nitens* growing as dense swards within seepages were identified as a separate vegetation unit. *Thelymitra* sp. were observed. A survey during summer may reveal additional seasonal species.

Ngaio-boxthorn shrubland (0.48 ha)

On the top of the northern-most steep-sided hill, ngaio, and boxthorn have established a canopy below the summit. Pōhuehue is common on the exposed hillslope adjacent to the shrubland.

Ngaio-boxthorn-māpou shrubland (0.40 ha)

On the top of the southern-most steep-sided hill, ngaio, boxthorn and māpou (*Myrsine australis*) are locally common, with occasional *Ozothamnus leptophylla*. The canopy formed by the shrubland within the lee of the summit is providing suitable habitat for indigenous ferns including kōwaowao (*Microsorium pustulatum*) and makawe (*Asplenium flaccidum*); the indigenous herbs punakura (*Lobelia anceps*) and kōkihi, and akakiore (New Zealand jasmine; *Parsonsia capsularis*). Rārahu (bracken) is dominant on the exposed hillslope adjacent to the shrubland

Exotic grassland (1.30 ha)

In the northeastern corner of the reserve the topography is notably flatter and the vegetation comprises of mixed swards of several exotic grasses, including cocksfoot (*Dactylis glomerata*), kikuyu (*Cenchrus clandestinus*), marram, and paspalum (*Paspalum dilatatum*). Wīwī is also locally common (Appendix 2; Plate 4).

Marram grassland (0.49 ha)

Marram grass is locally dominant on the low foredune at the base of the coastal cliff, interspersed with areas of spinifex grassland. There is occasional wīwī and purple groundsel.



Figure 2: Vegetation Map of Mōtū Karaka Scenic Reserve.

5. FLORA

Fifty indigenous and sixty two naturalised vascular plant species were recorded during the survey. Four species classified as Nationally Threatened or At Risk, as per de Lange *et al.* (2013) were recorded at the site, as follows:

- Tarakupenga, tātarakeke (*Coprosma acerosa*) (At Risk-Declining).
- *Selliera rotundifolia* (At Risk-Declining).
- Pīngao (*Ficinia spiralis*) (At Risk-Relict).
- Mīkoikoī (native iris; *Libertia peregrinans*) (Threatened-Nationally Vulnerable).

Tarakupenga were recorded throughout the reserve and were too numerous to map. *Selliera rotundifolia* was seen on the coastal cliffs. Pīngao was recorded at six separate sites on or near the foredune (Figure 2). Mīkoikoī (native iris; *Libertia peregrinans*) was recorded at one location near the northern boundary of the reserve (Figure 2).

In addition, the following notable plant species were recorded (see Figure 2):

- One *Coprosma acerosa* × *C. repens* recorded on the southern ridge of the southern-most hill.
- autetauranga (sand pimelea; *Pimelea villosa*) (At Risk-Declining) was recorded just beyond the southern boundary of the reserve.

Eleven species are considered to be pest plants (See Table 1). The distribution and abundance of environmental pest plants recorded at Mōtū Karaka Scenic Reserve are mapped in Figure 3.

Table 1: Environmental pest plants recorded at Mōtū Karaka Scenic Reserve.

Common Name	Botanical Name
Alder	<i>Alnus glutinosa</i>
Boxthorn	<i>Lycium ferocissimum</i>
Broom	<i>Cytisus scoparius</i>
Caper spurge	<i>Euphorbia lathyris</i>
Coastal wattle	<i>Acacia sophorae</i>
Gorse	<i>Ulex europaeus</i>
Pampas	<i>Cortaderia selloana</i>
Purple groundsel	<i>Senecio elegans</i>
Radiata pine	<i>Pinus radiata</i>
Sweet briar	<i>Rosa rubiginosa</i>
Marram	<i>Ammophila arenaria</i>

6. FAUNA

6.1 Avifauna

One pīhoihoi (New Zealand pipit; *Anthus novaeseelandiae novaeseelandiae*), which is classified as “At Risk-Declining” in Robertson *et al.* (2017), was seen during the site visit.

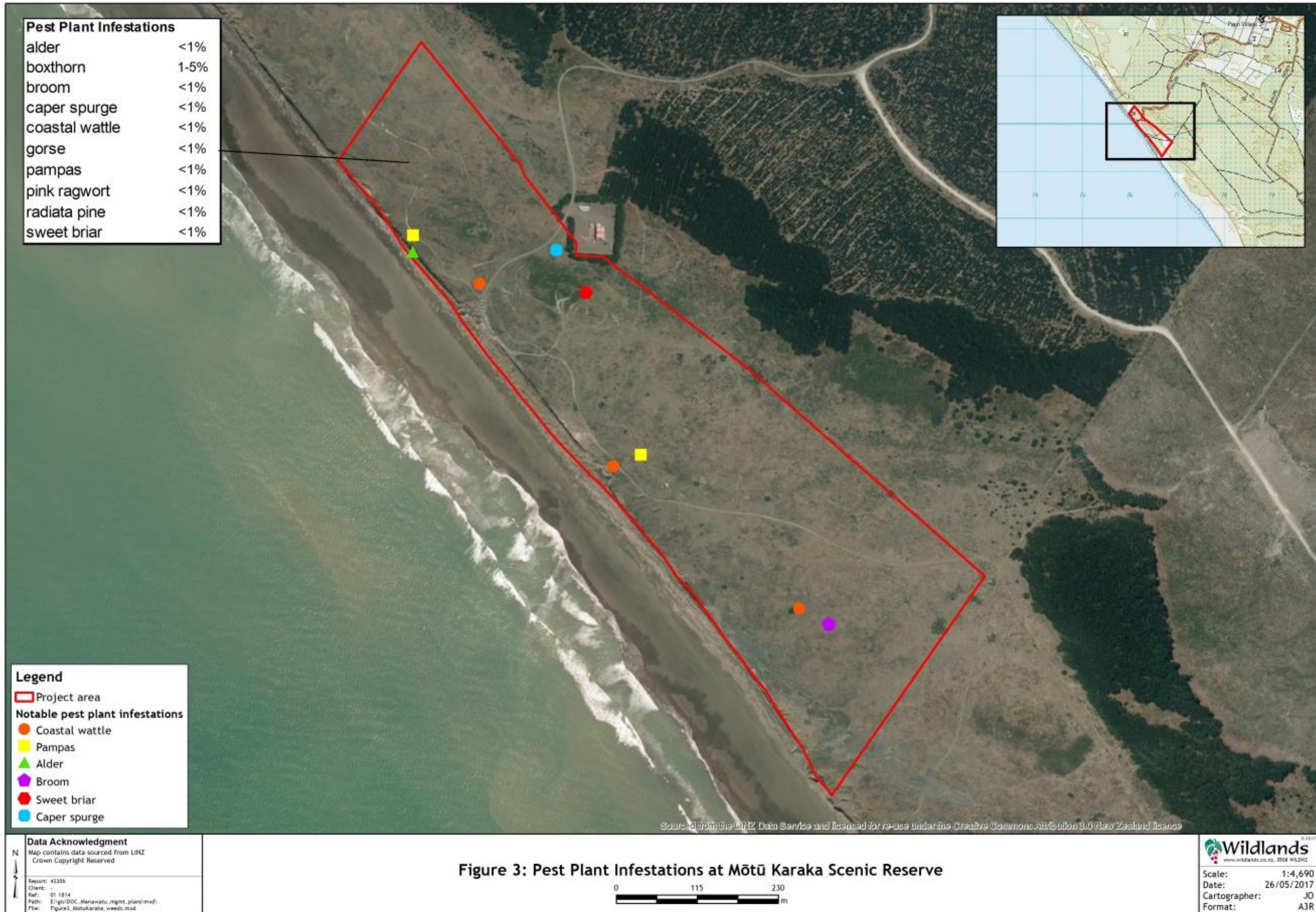
6.2 Invertebrates

Invertebrate surveys were carried out in 2002 as part of a nationwide survey for the red katipo spider (*Latrodectus katipo*) (Patrick 2002). No katipo were found at Mōtū Karaka, but two butterfly and three moth species were found:

- The coastal copper (*Lycaena salustius*), which is common at Mōtū Karaka as it is over many parts of the coastal North Island. Its larvae feed on pōhuehue species. The common blue (*Zizina otis labradus*), is also present at Mōtū Karaka. A common butterfly of the South Pacific, its green larvae feed on a variety of exotic legumes such as clover. The butterfly flies low over turfs where its larval hosts are common in dune hollows.
- Marram grass is locally common on the foredunes, but some indigenous moths have adapted to feeding on its foliage. The coastal noctuid moth *Agrotis innominata* is relatively common, whereas nationwide its populations are patchy in distribution. In some populations its female is short-winged and therefore immobile adding significance to its occurrence in that locality. It is not known if the females here are flightless or fully winged.
- Shrubland where *Ozothamnus* is present supports a large noctuid moth *Graphania homoscia* whose colourful larvae browse the foliage by night and hide low down amongst the dense foliage during the daytime. The plain brown moth is distinctive in colour and size and found from coastal to montane localities in scattered places nationwide.
- The yellow geometrid moth *Anachloris subochraria* is also found at Mōtū Karaka.

6.3 Herpetofauna

Mōtū Karaka has been identified by the Department of Conservation as containing potential lizard habitat, with pōhuehue (*Muehlenbeckia complexa*) and *Coprosma* sp. providing both habitat and fruit. Species recorded in the Foxton Ecological District include common skink (*Oligosoma polychroma*), glossy brown skink (*O. zelandicum*), ornate skink (*O. ornatum*), and copper skink (*O. aeneum*), Raukawa gecko (*Woodworthia maculata*) and barking gecko (*Naultinus punctatus*). Glossy brown skink, ornate skink, and barking gecko are classified as At Risk-Declining by Hitchmough *et al.* (2016). Two introduced Australian frogs, the southern bell frog (*Litoria raniformis*) and brown tree frog (*L. ewingii*), are also known to be present (Department of Conservation 2017).



6.4 Pekapeka/bats

It is unlikely that Mōtū Karaka contains habitat for native bats. It is unknown if long-tailed bats (*Chalinolobus tuberculatus*; Threatened-Nationally Vulnerable, O'Donnell *et al.* 2013) are present in the wider region, or whether surveys for their presence have taken place nearby. Radiata pine forest in the region may also provide suitable habitat for long-tailed bats. The nearest known record in the Manawatū-Whanganui region is from Te Namu, approximately 15 kilometres north of Hunterville (Borkin and Parsons, 2010).

7. CURRENT STATE AND THREATS AT MŌTŪ KARAKA

The duneland vegetation at Mōtū Karaka Reserve comprises indigenous and exotic species. Eleven of the plant species have been identified as environmental pest plants and these threaten the ecological health of the dune system. The pest plants compete for habitat with indigenous species and threaten the survival of indigenous plants, some of which are Nationally Threatened or At Risk. If left unmanaged, the pest plants will in time dominate the landscape. For example, coastal wattle (*Acacia sophorae*) has established to completely dominate the dune system at Castlecliff Beach, Whanganui (DOC Whitiāu Scientific Reserve work plan), 10 kilometres north of Whitiāu and Mōtū Karaka, and no regeneration occurs underneath its canopy.

Vehicle tracks criss-cross the scenic reserve including on one of the large sandhills. Four wheel driving is a threat to the integrity of the dune ecosystem as it increases erosion of the dunes, and threatens the survival indigenous dune plants (Appendix 2: Plate 5).

The presence and population size of both indigenous fauna species and pest animals is largely unknown at the site. Pest animals threaten indigenous fauna and therefore ecosystem values. Pest animal control would become a priority if indigenous fauna species that are vulnerable to predation (e.g. common gecko, ornate skink) were confirmed as present at the site.

8. ASPIRATIONS FOR MŌTŪ KARAKA

To protect and enhance the ecological values of Mōtū Karaka by minimising the impact of four wheel driving, and pest plants and animals on the ecological values of the reserve. Aspirations will be developed for the final report following consultation with iwi.

9. OPPORTUNITIES FOR ECOLOGICAL RESTORATION

9.1 Pest plant control

Species-led control for each of the 11 identified pest plant species (Table 1) is recommended. Each species requires different methods and timeframes for effective control. To facilitate the long term control of these species, establishing appropriate

indigenous species in some places (but not all) where pest plants have been removed is recommended as part of the control methodology. Pest plant control methods and timeframes will be developed further for the final report.

9.2 Guidelines for vehicle use

Recommended methods to minimise disturbance caused by four wheel driving which are consistent with the terms of reference for scenic reserves are to be developed further for the final report.

10. HOW TO ADMINISTER BYLAWS TOOLS AND HOW TO IDENTIFY FEATURES

To be prepared for final report.

11. OBJECTIVES, ACTIONS, MILESTONES

To be prepared for final report.

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VASCULAR PLANT SPECIES RECORDED DURING FIELD SURVEY OF MOTU KARAKA SCENIC RESERVE

INDIGENOUS SPECIES

Monocot. trees and shrubs

Cordyline australis tī kōuka, cabbage tree

Dicot. trees and shrubs

Coprosma acerosa s.s. sand coprosma, tarakupenga, tātaraheke
Coprosma propinqua × *C. repens*
Dodonaea viscosa akeake
Leptospermum scoparium agg. mānuka
Melicytus ramiflorus subsp. *ramiflorus* māhoe
Myoporum laetum ngaio
Myrsine australis māpou, matipou, māpau
Ozothamnus leptophyllus tauhinu
Pimelea villosa s.s. autetauranga; sand pimelea

Dicot. lianes

Calystegia soldanella panahi, shore bindweed
Muehlenbeckia complexa pōhuehue
Parsonsia capsularis akakiore

Ferns

Adiantum cunninghamii huruhuru tapairu, maidenhair fern
Asplenium flaccidum makawe, ngā makawe o Raukatauri
Blechnum penna-marina subsp. *alpina*
Blechnum triangularifolium
 (*Blechnum* Green Bay cliff)
Microsorium pustulatum kōwaowao, pāraharaha, hound's tongue fern
Paesia scaberula mātātā
Pteridium esculentum rārahu, bracken

Orchids

Thelymitra sp.

Grasses

Austroderia toetoe toetoe
Lachnagrostis billardierei sand wind grass
 14

<i>Microlaena stipoides</i>	pātītī, meadow rice grass
<i>Spinifex sericeus</i>	kōwhangatara, spinifex
<i>Zoysia minima</i>	

Sedges

<i>Carex pumila</i>	
<i>Carex testacea</i>	
<i>Cyperus ustulatus</i> f. <i>ustulatus</i>	toetoe upoko-tangata
<i>Ficinia nodosa</i>	wīwī
<i>Ficinia spiralis</i>	pīngao
<i>Isolepis cernua</i>	
<i>Schoenus maschalinus</i>	
<i>Schoenus nitens</i>	

Rushes

<i>Apodasmia similis</i>	oioi
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Monocot. herbs (other than orchids, grasses, sedges, and rushes)

<i>Libertia peregrinans</i>	mīkoikoi; native iris
<i>Phormium tenax</i>	harakeke, flax
<i>Pseudognaphalium</i> sp.	pukatea

Dicot. herbs (other than composites)

<i>Acaena novae-zelandiae</i>	piripiri
<i>Epilobium komarovianum</i>	
<i>Lobelia anceps</i>	punakura
<i>Nertera depressa</i>	
<i>Oxalis rubens</i>	sand oxalis
<i>Persicaria decipiens</i>	tutunawai
<i>Ranunculus acaulis</i>	
<i>Samolus repens</i> var. <i>repens</i>	māakoako
<i>Selliera radicans</i>	remuremu, rekoreko, raumangu
<i>Selliera rotundifolia</i>	
<i>Tetragonia implexicoma</i>	kōkihi, rengamutu, rengarenga, tūtae-ikamoana

NATURALISED AND EXOTIC SPECIES

Gymnosperms

<i>Pinus radiata</i>	radiata pine
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Dicot. trees and shrubs

<i>Acacia sophorae</i>	coastal wattle
<i>Alnus glutinosa</i>	common alder

<i>Cytisus scoparius</i>	broom
<i>Juglans</i> sp.	
<i>Lupinus arboreus</i>	lupin
<i>Lycium ferocissimum</i>	boxthorn
<i>Populus</i> sp.	poplar
<i>Rosa rubiginosa</i>	sweet briar
<i>Rubus</i> sp. (<i>R. fruticosus</i> agg.)	blackberry
<i>Ulex europaeus</i>	gorse

Grasses

<i>Agrostis stolonifera</i>	creeping bent
<i>Ammophila arenaria</i>	marram
<i>Bromus willdenowii</i>	prairie grass
<i>Cenchrus clandestinus</i>	kikuyu grass
<i>Cortaderia selloana</i>	pampas
<i>Cynodon dactylon</i>	Indian doab
<i>Cynosurus cristatus</i>	crested dogstail
<i>Dactylis glomerata</i>	cocksfoot
<i>Digitaria sanguinalis</i>	summer grass
<i>Holcus lanatus</i>	Yorkshire fog
<i>Lagurus ovatus</i>	harestail
<i>Paspalum dilatatum</i>	paspalum
<i>Schedonorus arundinaceus</i>	tall fescue
<i>Sporobolus africanus</i>	ratstail
<i>Stenotaphrum secundatum</i>	buffalo grass

Sedges

<i>Cyperus congestus</i>	purple umbrella sedge
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Composite herbs

<i>Arctotheca calendula</i>	cape weed
<i>Cirsium arvense</i>	California thistle
<i>Cirsium vulgare</i>	Scotch thistle
<i>Erigeron sumatrensis</i>	broad-leaved fleabane
<i>Crepis capillaris</i>	hawksbeard
<i>Hypochaeris radicata</i>	catsear
<i>Jacobaea vulgaris</i>	ragwort
<i>Leontodon taraxacoides</i>	hawkbit
<i>Senecio bipinnatisectus</i>	Australian fireweed
<i>Senecio elegans</i>	purple groundsel
<i>Sonchus oleraceus</i>	puha, sow thistle

Dicot. herbs (other than composites)

<i>Cerastium fontanum</i>	mouse-ear chickweed
<i>Digitalis purpurea</i>	foxglove
<i>Euphorbia lathyris</i>	caper spurge

<i>Galium aparine</i>	cleavers
<i>Geranium molle</i>	dovesfoot cranesbill
<i>Linum catharticum</i>	purging flax
<i>Lotus pedunculatus</i>	lotus
<i>Lotus suaveolens</i>	hairy birdsfoot trefoil
<i>Oenothera stricta</i>	evening primrose
<i>Orobanche minor</i>	broomrape
<i>Parentucellia viscosa</i>	tarweed
<i>Plantago coronopus</i>	buck's-horn plantain
<i>Plantago lanceolata</i>	narrow-leaved plantain
<i>Polycarpon tetraphyllum</i>	allseed
<i>Portulaca oleracea</i>	wild portulaca
<i>Ranunculus repens</i>	creeping buttercup
<i>Rumex acetosella</i>	sheep's sorrel
<i>Sagina procumbens</i>	pearlwort
<i>Silene gallica</i>	catchfly
<i>Solanum dulcamara</i>	bittersweet
<i>Stellaria media</i>	chickweed
<i>Trifolium pratense</i>	red clover
<i>Trifolium repens</i>	white clover
<i>Vicia sativa</i>	vetch

DRAFT





Plate 1: Low foredunes at the base of a coastal cliff. 19 May 2017.



Plate 2: Wiwi is the most abundant species in the mosaic of sedges and grasses that covers the undulating duneland. 19 May 2017.



Plate 3: Gravelfield on top of the coastal cliff. 19 May 2017.



Plate 4: Exotic grassland with wīwī on flat topography in the northeastern corner of the reserve. 19 May 2017.



Plate 5: Dune vegetation with 4WD tracks visible in distance.
Coastal wattle is present in the foreground. 19 May 2017.



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