

**VEGETATION AND FLORA OF THE
WHANGARA SAND DUNES**

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1990**

**Report prepared by Wildland Consultants Ltd
for the Department of Conservation, East Coast Conservancy**

CONTENTS

Introduction

Figure 1. Location map of the survey area and Waiapu ecological district

Vegetation

Figure 2. Map of Whangara sand dune survey areas

Flora

Botanical Conservation Values

Conclusions

Figure 3. Whangara sand dunes - recommended area for reserve

References

Appendices

1. Vascular flora
2. Glossary

INTRODUCTION

This report was prepared for the Department of Conservation, East Coast Conservancy. It is an inventory of the vegetation and flora of the Whangara sand dunes and identifies areas and features of botanical significance. A "walk-through" survey field inspection of the dunes was made on 28 February 1990 in the company of John Galilee, Department of Conservation, East Coast Conservancy.

The Whangara sand dunes are in the Waiapu ecological district (described and defined in McEwen 1987) about 25km north of Gisborne (Figure 1., NZMS260 Y17 664806).

VEGETATION

The survey area has been divided into 11 areas which are defined in Figure 2. The vegetation in each of these areas is described below. Where the vegetation communities are described in zones (as for survey areas 3,5,7 & 8) zone (i) is closest to the mean high spring level with zones (ii)-(iii) occurring progressively further inland. Vegetation structural classes and type names are first approximation names as described and defined by Atkinson (1985). Refer to Appendix 2 for definitions of vegetation type names and a glossary of common names.

Survey area 1.

The predominant vegetation in this area is marram tussockland and Indian doab-haresfoot trefoil grassland (ratstail and catsear are common with occasional *Isolepis nodosa*, spinifex occurs locally throughout). Adjacent to the Whangara river there is a small area dominated by blackberry, *Isolepis nodosa*, and fennel.

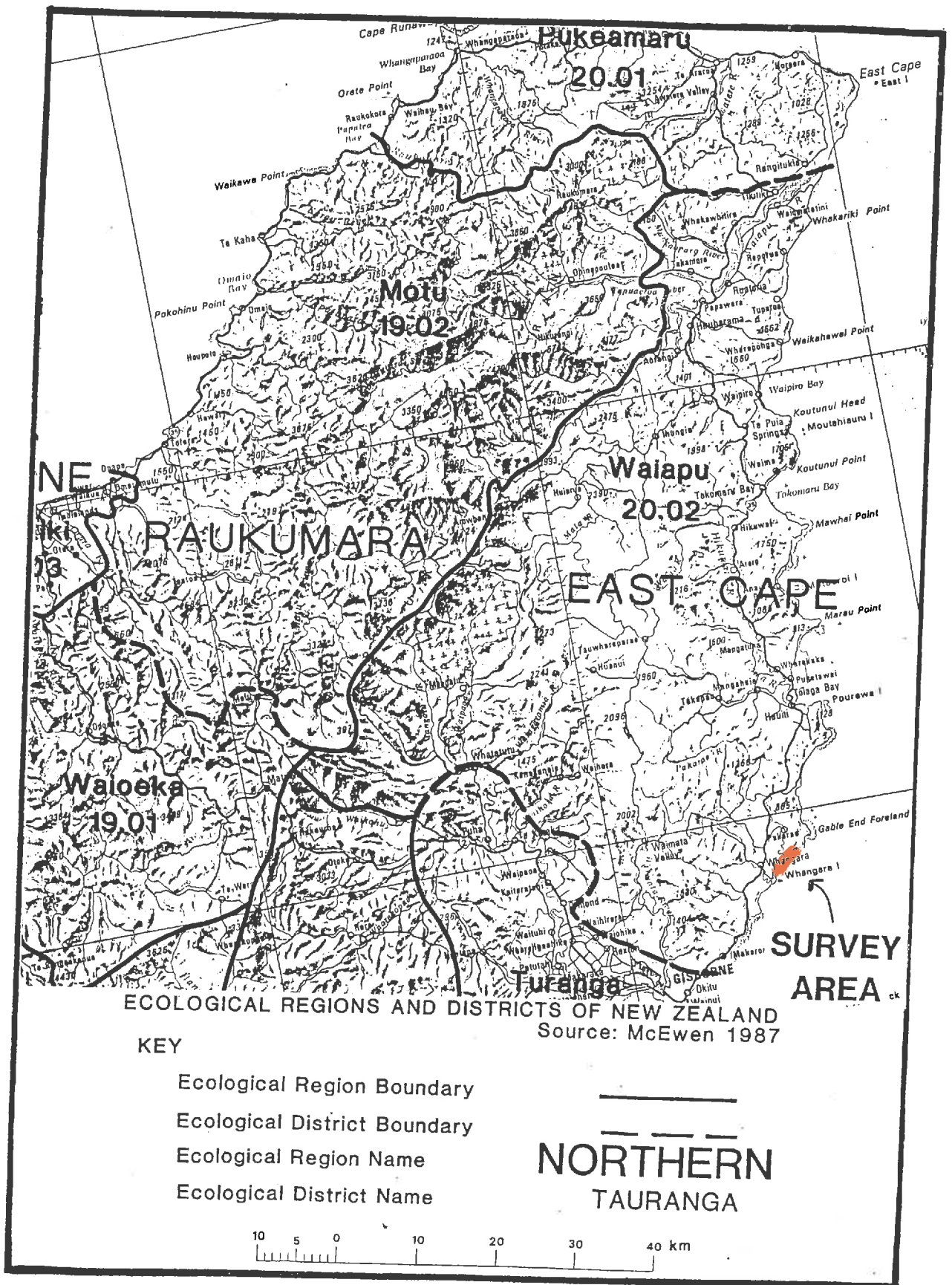
Survey area 2. (Stream margins)

Beside the small stream here, there are small areas of *Bolboschoenus fluviatilis* sedgeland, *Cyperus ustulatus* sedgeland and tall fescue grassland (with local sea rush, oioi, *Schoenoplectus validus*, spike sedge, *Bolboschoenus fluviatilis* and exotic grasses and herbs (including Mercer grass, creeping buttercup, paspalum, Yorkshire fog, and creeping bent).

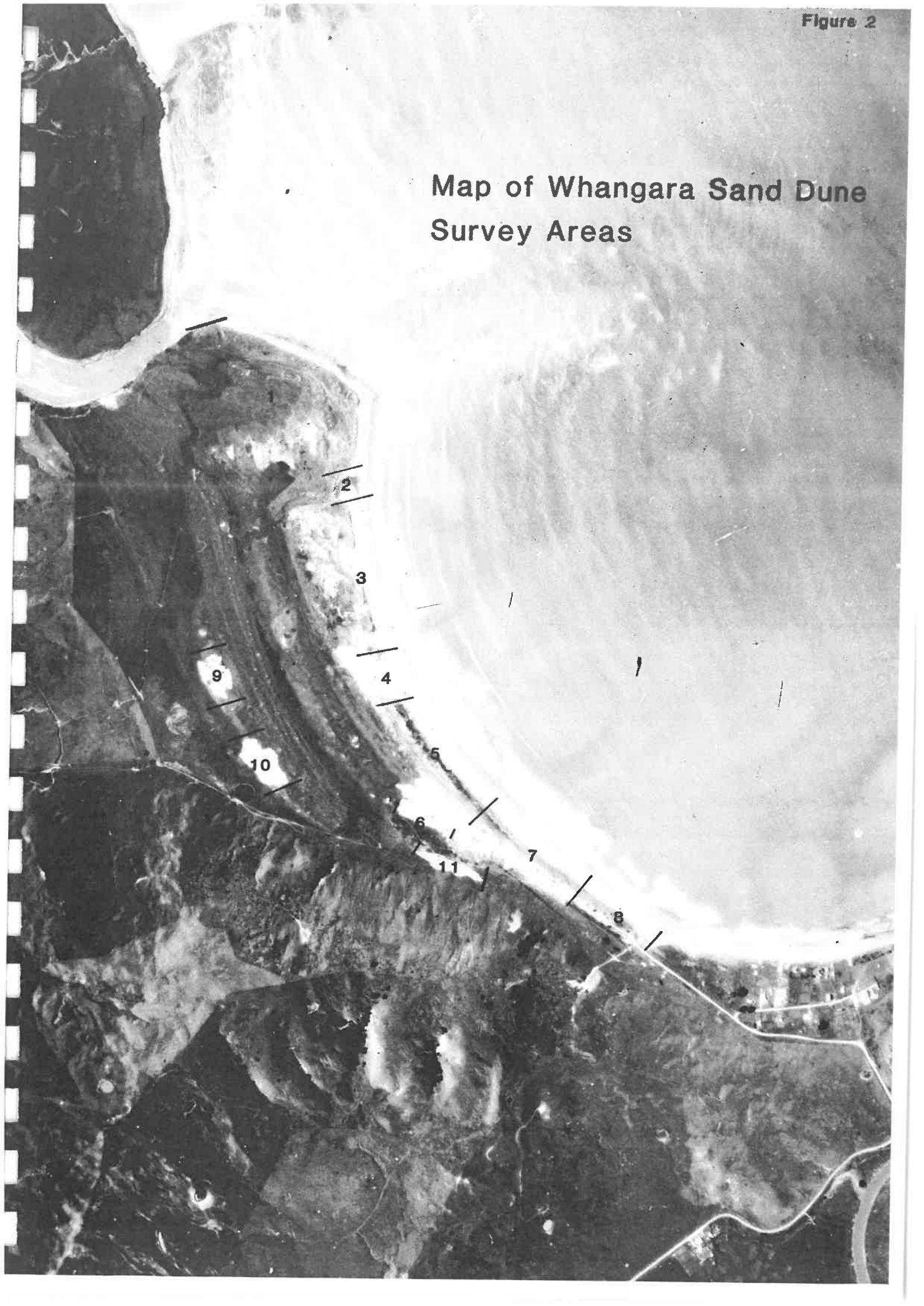


Whangara sand dunes, looking north.
Spinifex and marram on the front of the foredune with *Isolepis nodosa*/spinifex-*Coprosma acerosa* sedgeland behind (survey area 5)

FIGURE 1.
LOCATION OF THE SURVEY AREA AND
BOUNDARIES OF ECOLOGICAL REGIONS
AND ECOLOGICAL DISTRICTS



Map of Whangara Sand Dune Survey Areas



Survey area 3.

Three main zones occur in this area :

- (i) *Spinifex* sandfield (with local marram, and scattered *Calystegia soldanella*)
- (ii) *Spinifex* grassland.
- (iii) *Isolepis nodosa*/*spinifex* grassland (*Spinifex* dominates this zone with local *Isolepis*; other species locally present include haretail and *Zoysia pauciflora*). There is local marram tussockland in this zone.
- (iv) *Isolepis nodosa*/haretail-Indian doab grassland (ratstail, catsear and haresfoot trefoil are common)
and
Isolepis nodosa sedgeland (with local *Muehlenbeckia complexa* and sweet brier)



Plate 1. Survey area 3. *Isolepis nodosa*/*spinifex* grassland

Survey area 4. "Blowout"

Erosion of this area has occurred recently. Spinifex grassland and spinifex sandfield occurs adjacent to much of the affected area except for a small area of marram grassland which occurs on the seaward side.



Plate 2. Survey area 4. Dune blowout

Survey area 5.

Three main zones occur in this area :

- (i) Spinifex sandfield (with local marram and scattered *Calystegia soldanella*)
- (ii) Spinifex grassland.
- (iii) *Isolepis nodosa*/marram-spinifex-Indian doab-ratstail sedge-grassland (with local haretail, catsear, fleabane, and other exotic grasses and herbs)
and
Isolepis nodosa / spinifex - *Coprosma acerosa* shrub - grass-sedgeland (these three indigenous species often dominate the hollow behind the foredune, other indigenous species present are *Deyeuxia billardierei* and *Zoysia pauciflora*, there are scattered exotic species, eg. marram, fleabane, Yorkshire fog, haretail, catsear and occasional sweet brier.)
- (iv) (*Isolepis nodosa*)/bracken-paspalum fernland
and
exotic grasses and herbs

Survey area 6. (Sand Mining)

Sand mining operations are being carried out here with marram being used to revegetate sand mining sites.

Survey area 7.

Three main zones occur in this area :

- (i) Spinifex sandfield (with small areas of marram sandfield)
- (ii) Spinifex grassland
- (iii) *Isolepis nodosa*/marram-spinifex-Indian doab-ratstail sedge-grassland (with local haretail, catsear, fleabane, melilot and other exotic grasses and herbs)

Survey area 8.

Five zones occur in this area :

- (i) Marram sandfield and spinifex sandfield
- (ii) Spinifex grassland
- (iii) *Isolepis nodosa*/marram-Indian doab-ratstail (with local



Plate 3. Survey area 5. Marram on the foredune



Plate 4. Survey area 5. Spinifex on the foredune (Note low slope angle)

harestalk, catsear, fleabane, melilot and other exotic grasses and herbs)

- (iv) exotic grasses and herbs
- (v) *Carex pumila* sedgeland and *Carex pumila*-exotic grasses and herbs sedgeland. This zone occurs locally behind zone (iii) and is common on the south side of the road. Also on the south side of the road there are a few scattered maritime pine.

Survey area 9.

This area has been fenced and no stock were present. It comprises sandfield (unvegetated, approx 20%), spinifex grassland (approx. 20%), exotic grasses and herbs (including haresfoot trefoil, ratstalk, catsear and sheeps sorrel, approx 50%). There is local *Isolepis nodosa*. Where spinifex grassland occurs adjacent to areas of exotic grasses and herbs the spinifex appears to be spreading by creeping rhizomes into the areas of exotic herbs and grasses.

Survey areas 10. & 11.

These areas of sand are unfenced and are surrounded by exotic grasses and herbs.

FLORA

Twenty indigenous vascular plant taxa and 51 adventive taxa were recorded on the dunes and these are listed in Appendix 1. No rare or endangered taxa were recorded. The indigenous species are all relatively common, however spinifex, *Zoysia pauciflora*, *Deyeuxia billardierei*, *Calystegia soldanella*, *Coprosma acerosa*, sea rush, New Zealand celery and *Carex pumila*, generally only occur in coastal vegetation communities.

BOTANICAL CONSERVATION VALUES

The study area is a mozaic of indigenous and adventive vegetation. Survey areas 3, 4, and 5 contain good examples of indigenous vegetation on sand dunes, however the adventive grass marram occurs throughout these areas, as it does throughout the entire study area.

The vegetation of coastal sand dune systems of the Waiapu ecological district has been briefly documented in Partridge (in prep.). The Waiomoko River sand dunes (south of the study area) contain one of the best examples of indigenous vegetation on coastal sand dunes at the southern end of the Waiapu ecological district (Beadel 1990). There is not enough information available to accurately assess the botanical conservation values of the Whangara sand dune system, however it is one of the larger sand dune systems at the southern end of the Waiapu ecological district and contains examples of vegetation in better condition than is present in other parts of the district (eg. Pouawa sand dunes and Makorori Beach).


Given the available information, the area outlined in Figure 3. as suitable for reservation is of high botanical conservation value, with the remaining area dominated by adventive species and being of low botanical conservation value.

CONCLUSIONS

An area suitable for reservation is delineated in Figure 3., however the presence of marram which is common in parts of the study area and occurs locally throughout the remaining area, detracts from its botanical conservation values. To determine the future relative abundance of marram at Whangara (ie. compared with spinifex and other native species), more information on sand movement is required. The Waiomoko river dune system contains a higher quality example of indigenous vegetation on sand dunes and priority should be given to the Waiomoko area with respect to reservation.

The area outlined in Figure 3. is fenced. The vegetation behind the foredune (eg zone iv in survey area 5, (*Isolepis nodosa*)/ bracken-paspalum fernland and exotic grasses and herbs) is recovering well from past grazing pressure (see plate 5), There are few or no shrubby adventive species in this area and it is likely that the future vegetation cover will be a mozaic of bracken, *Muehlenbeckia complexa* and *Isolepis nodosa*.

Whangara Sand Dunes – recommended area for reserve

 Recommended area for reserve
(inland boundary follows existing electric fence line)

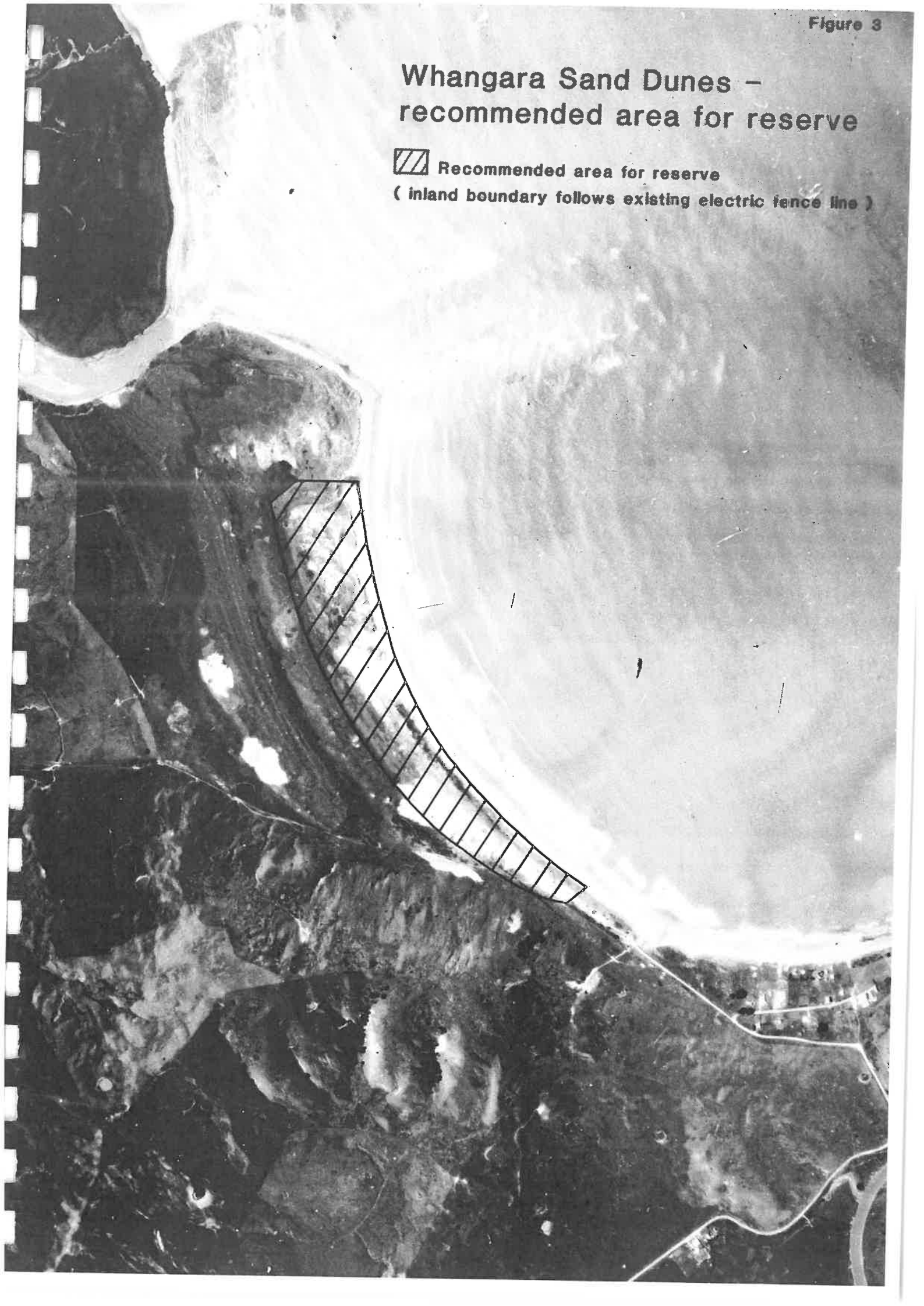




Plate 5. Survey area 5. (zone iv) (*Isolepis nodosa*)/bracken-paspalum fernland and exotic grasses and herbs

The study area is suitable for pingao replanting. Sites most suited to pingao planting are areas where there is

(a) active sand accretion and

(b) dunes with a slope of 8-14 degrees with a somewhat convex face and a fairly level top

eg. the seaward side of the foredune, particularly the narrow zone just above the strand zone (eg the foreground area in plates 4 & 5) where marram does not thrive also the lee slope of the foredune.

Areas further inland are also suitable for pingao planting programs eg. survey area 9 which is fenced off from stock.

Blowouts. Where marram is the only species on the foredune it is likely to contribute to any future blowouts. Marram builds a dune that is higher and steeper (24-28 degrees) than spinifex dunes (14-16 degrees). Marram's clumped habit causes irregular deposition of unprotected sand in its lee and this sometimes leads to wind-channelling and blowouts (Esler 1970*). Where spinifex or pingao is the dominant species on the foredune then it is more likely to be a stable.

Revegetation of sand-mining sites should use indigenous species e.g. spinifex.

*Marram is an efficient binder of sub-surface sand. However normally sand is held among its aerial parts and it is only when deflation occurs that the roots play a major role in retaining sand. If a wind channel develops, extreme coherence by the roots causes the eroding dune to stand like a pillar against the wind. Such a solid barrier accelerates a blow-out by causing deeper wind channels to form around the margins. Once started the process is irreversible. The plant loses its vigour and is eroded away without the opportunity of spreading into new deposits of sand. This occurs less readily with spinifex because its fast-growing prostrate surface rhizomes often form the nucleus for accumulation of sand.

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APPENDIX 1.

VASCULAR FLORA OF WHANGARA SAND DUNES

Key : NZFRI Specimen lodged in Forest Research Institute
Herbarium, Rotorua

INDIGENOUS VASCULAR TAXA

1. Dicot. shrubs

Coprosma acerosa

2. Dicot. lianes

Calystegia sepium

C. soldanella

Muehlenbeckia complexa

3. Ferns

Pteridium esculentum

4. Grasses

Deyeuxia billardierei

Spinifex sericeus

Zoysia pauciflora (NZFRI)

5. Sedges

Bolboschoenus fluviatilis

Carex pumila

C. testacea

C. virgata

Cyperus ustulatus

Eleocharis acuta

Isolepis nodosa

Leptocarpus similis

Schoenoplectus validus

6. Rushes

Juncus gregiflorus

J. maritimus var. *australiensis*

7. Monocot. Herbs (Other Than Orchids, Grasses, Sedges And Rushes)

Lemna minor

8. Dicot. Herbs (Other Than Composite)

Apium prostratum

ADVENTIVE VASCULAR TAXA

1. Gymnosperms

Pinus pinaster

2. Dicot. trees and shrubs

Lupinus angustifolius

Lycium ferocissimum

Myoporum insulare

Rosa rubiginosa

Rubus sp. (*R. fruticosus* agg.)

3. Grasses

Agrostis stolonifera

Ammophila arenaria

Anthoxanthum odoratum

Bromus diandrus

Catapodium rigidum

Cynodon dactylon

Digitaria sanguinalis

Festuca arundinacea

Holcus lanatus

Lagarus ovatus

Lolium perenne

Paspalum dilatatum

P. distichum

Polypogon monspeliensis

Sporobolus africanus

4. Sedges

Cyperus eragrostis

5. Rushes

Juncus effusus
J. tenuis

6. Composite herbs

Cirsium arvense
Conyza albida
Hypochaeris radicata
Picris echioides
Sonchus oleraceus
Xanthium spinosum

7. Dicot. herbs (other than composite)

Acaena agnipila
Anagallis arvensis
Atriplex sp.
Cakile maritima
Foeniculum vulgare
Linum bienne
Melilotus indicus
Mentha sp.
Myosotis sp.
Oenothera stricta
Orobanche minor
Phytolaca octandra
Plantago lanceolata
Portulacca oleracea
Ranunculus scleratus
Rumex acetosella
Trifolium arvense
T. dubium
T. repens
Yucca sp.

APPENDIX 2

GLOSSARY

2.1 COMMON NAMES USED IN THE TEXT

blackberry	<i>Rubus</i> sp. (<i>R. fruticosus</i> agg.)
bracken	<i>Pteridium esculentum</i>
catsear	<i>Hypochaeris radicata</i>
creeping bent	<i>Agrostis stolonifera</i>
creeping buttercup	<i>Ranunculus repens</i>
fennel	<i>Foeniculum vulgare</i>
fleabane	<i>Conyza albida</i>
haresfoot trefoil	<i>Trifolium arvense</i>
haretail	<i>Lagarus ovatus</i>
Indian doab	<i>Cynodon dactylon</i>
maritime pine	<i>Pinus pinaster</i>
marram	<i>Ammophila arenaria</i>
melilot	<i>Melilotus indicus</i>
Mercer grass	<i>Paspalum distichum</i>
New Zealand celery	<i>Apium prostratum</i>
oioi	<i>Leptocarpus similis</i>
paspalum	<i>Paspalum digitatum</i>
ratstail	<i>Sporobolus africanus</i>
sea rush	<i>Juncus maritimus</i> var. <i>australiensis</i>
sheeps sorrel	<i>Rumex acetosella</i>
spike sedge	<i>Eleocharis acuta</i>
spinifex	<i>Spinifex sericeus</i>
sweet brier	<i>Rosa rubiginosa</i>
tall fescue	<i>Festuca arundinacea</i>

2.2 TECHNICAL TERMS, SYMBOLS AND ABBREVIATIONS

(Vegetation structural class definitions from Atkinson 1985)

Grassland: Vegetation in which the cover of grass in the cover of grass in the canopy is 20-100% and in which the grass cover exceeds that of any other growth form or bare ground. Tussock-grasses are excluded from the grass growth-form.

Fernland: Vegetation in which the cover of ferns in the canopy is 20-100% and in which the fern cover exceeds that of any other growth form or bare ground. Tree ferns >10cm dbh are excluded as trees (cf. FOREST)

- Sandfield:** Land in which the area of bare sand (0.01-2mm diam.) exceeds the area covered by any one class of plant growth-form. Dune vegetation often includes sandfields which are named from the leading plant species when plant cover exceeds > 1%.
- Sedgeland:** Vegetation in which the cover of sedges in the canopy is 20-100% and in which the sedge cover exceeds that of any other growth form or bare ground. Included in the sedge growth form are some species of *Carex*, *Uncinia* and *Isolepis*. Tussock-sedges and reed-forming sedges (cf. REEDLAND are excluded).
- Tussockland:** Vegetation in which the cover of tussocks in the canopy is 20-100% and in which the tussock cover exceeds that of any other growth form or bare ground. Tussocks include all grasses, sedges, rushes, and other herbaceous plants with linear leaves (or linear non-woody stems) that are densely clumped and > 10cm height. Examples of the growth form occur in all species of *Cortaderia*, *Gahnia*, and *Phormium* and in some species of *Chionochloa*, *Poa*, *Festuca*, *Rytidosperma*, *Cyperus*, *Carex*, *Uncinia*, *Juncus*, *Astelia*, *Aciphylla* and *Celmisia*. It is sometimes useful to separate flaxland as a subclass for areas where species of *Phormium* are dominant.