

APPENDIX 1

A brief survey of the vegetation of the proposed reserve area

1. Historical.

The area to the north-west of the Pukepuke Reserve is now mostly covered in vegetation, with Marram and Lupins on the dunes and a mixture of small native herbs and introduced pasture plants on the flats. Old maps of Pukepuke lagoon clearly demonstrate that drifting sands were still advancing over the swamp vegetation in the 1930's and it is probably about this time that the first attempts at dune stabilisation using Marram Grass were attempted (Wilson, 1959). Aerial photographs (10 chains/inch) taken in 1942 show that at that time much of the area to the west of Pukepuke was still drifting sands. An analysis of aerial photographs taken since that time is summarised in Figs. 11 and 12 and Tables 1, 2, 3. The area analysed is marked on Fig. 5 and is approximately 333 acres in extent.

In 1942, 54% of the area was open sand, but since then this percentage has decreased, to 6% in 1968 (Table 1). This represents about 160 acres of new vegetation cover on the 333 acre plot. The rate of colonisation has not been constant during this period, and there is an indication that 'blow outs' of the existing vegetation have become more frequent since 1958 (Table 2). (In this respect it is relevant to record that further Marram planting occurred in the area in 1957 or shortly after and that rapid colonisation of some blow-outs occurred in the 1963-1968 period.) If the rate of colonisation is expressed in terms of the proportion of bare sand actually available for colonisation (Table 3) it appears that although the overall rate of colonisation on a per unit area basis has decreased, nevertheless the small patches of sand remaining are shrinking faster than the large expanses of earlier years.

Table 1. Relative proportion of bare sand and vegetation in the study area.

<u>Date</u>	<u>Bare sand</u>	<u>Vegetation</u>
1942	54	46
1958	22	78
1968	6	94

Table 2. Rates of colonisation acres/year.

<u>Period</u>	<u>Years</u>	<u>Gross colonisation</u>	<u>Blow outs</u>	<u>Net colonisation</u>
1942-58	16	7.7	0.3	7.4
1958-68	10	6.0	0.6	5.4

Table 3. Rates of colonisation of the bare sand available for colonisation, expressed as percentages.

<u>Date interval</u>	<u>Amount of available bare sand actually colonised during the time interval</u>	<u>Colonisation of bare sand available on a per annum basis</u>
1942-58	58%	3.6%
1958-68	74%	7.4%

2. The present vegetation of the area.

General accounts of the vegetation can be found in Carnahan (1957) and in the important papers by Esler already quoted (Esler 1969, 1970). The proposed reserve area was visited in May 1972 with Dr. Cowie and the following notes made.

- (i) Dune unit 'A' Figs. 5, 6 and 7, and ground photos Figs. 8 and 9. The landward end of the dune unit is composed of a sheet of mobile sand, and there is clear evidence of erosion of the lateral dunes. Despite this, small Marram dunes are forming along the inner flanks of the unit. The central portion is mainly occupied by Juncus spp. and Leptocarpus simplex with only small areas of the more typical sand flat association of small native herbs towards the seaward end. The following native species were recorded, but the list is certainly incomplete.

Graphalium luteo-album (forming zones around hollows)

Carex pumila (colonising seaward end flats)

Juncus spp.

Senecio laetus

Leptocarpus simplex

Selliera radicans (round leaved form)

Scirpus

Lobelia anceps

Coprosma acerosa

Cassinia leptophylla

Epilobrium billardieriarum

Spinifex hirsutus

Desmoschoenus spiralis

In addition the following species (excluding pasture grasses) were recorded:

Senecio ? elegans

Trifolium spp.

Medicago spp.

Ammophila arenaria

Leontodon hispidus

Lagurus ovatus

A careful search should be made in the area for:

Limosella lineata

Ranunculus acaulis

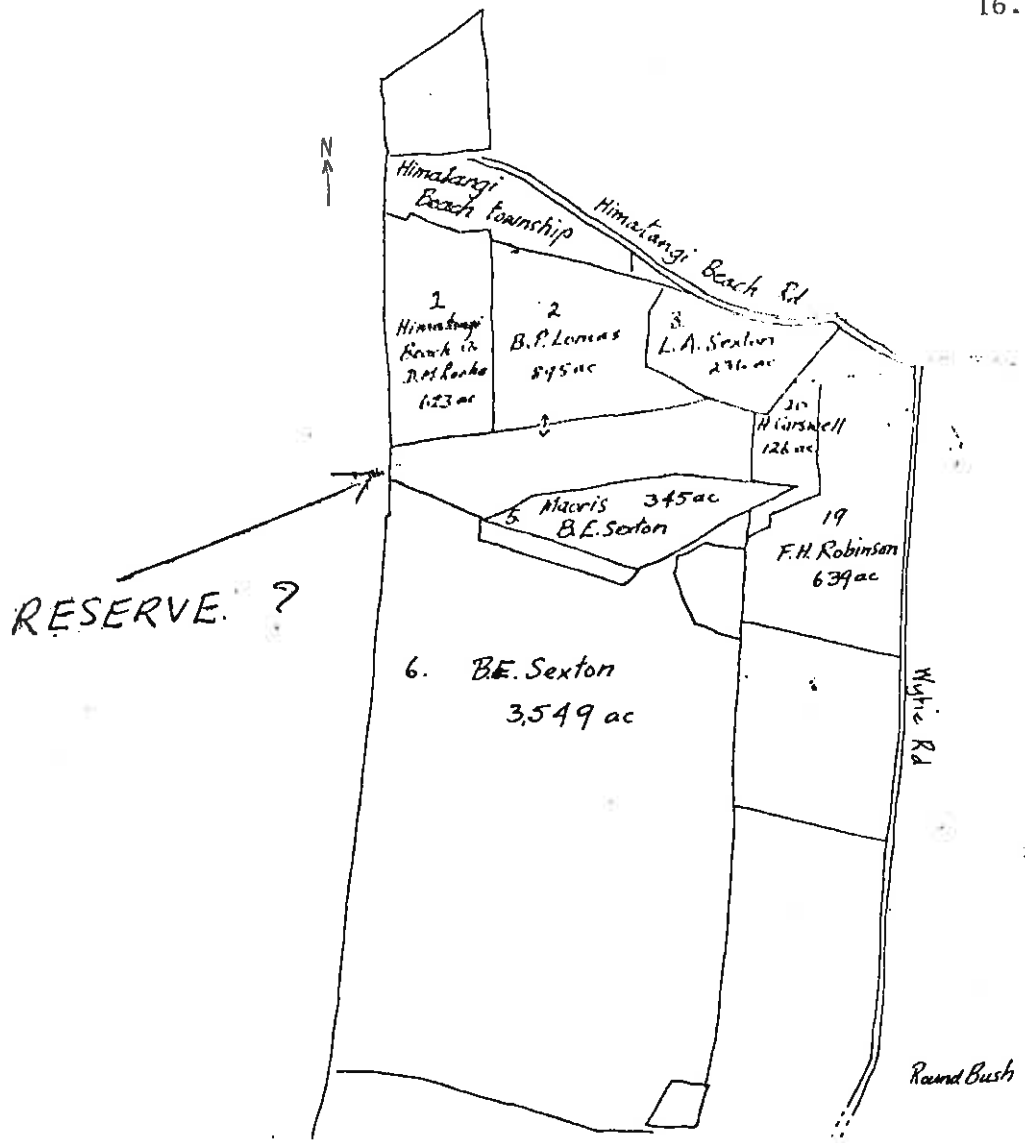
Eleocharis neo-zelandica

as these plants are present in the flats described by Esler (1969) and are rare in New Zealand. The foredune in the area is in good condition and is formed by Spinifex on its seaward slope, with Marram, Pingao, Coprosma and Cassinia on its landward flank and in the small jumble of dunes to its immediate rear. In the hollow behind the foredune are gravel and shell deposits, with pieces of pumice and larva. Similar deposits to the North also have small shell middens and fire sites. The seaward end of Dune Unit A is apparently wetter than the landward end and has areas of Carex pumila and Selliera radicans and their associates.

The dune unit to the immediate North of the one described is apparently older, with a cover of Cassinia, Coprosma and Pimelia arenaria bushes among the Marram. The flat is colonised by Toe Toe, Flax and Lupins with the occasional young Pine and Cabbage Tree (Cordyline australis). Leptocarpus is however still frequent, linking the vegetation to that of the flat already briefly described.

- (ii) Dune unit 'B' (Fig. 10). Good Pingao dunes can be seen in this area, but the unit is dominated by Leptocarpus and introduced grasses are common. It is apparent from Fig. 10 that various vegetation zones can be recognised within the unit, the denser vegetation apparently occurring at the (?wetter) seaward end. Temporary pools are present in the area, and show an interesting

vegetation zonation. The only especially interesting species seen in the traverse of this unit was Gunnera arenaria, although the small patch observed appeared to be dead. This large flat is particularly suitable for studies of the sort outlined in part 4 (a) of this proposal.



1 in = 1 mile

Criteria for reserve

1. Continued instability
2. Young sand plains with *Limosella*, *Ranunculus acaulis*, *Eleocharis n.3*, *Carex pumila* etc. } These are rare in NZ.
3. Older sand plains with *Leptocarpus* + toetoe
4. A good area of *Desmoschoenus*
5. Minimum of exotics particularly tree lupin & tall fescue
6. Good fore dune

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A PROPOSAL FOR A RECREATIONAL AND EDUCATIONAL
RESERVE ON THE MANAWATU SAND COUNTRY

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