

Ecosystem-based restoration of Moutohora: Threatened plants

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1. Introduction

Moutohora (area 143 ha) is the largest island in the Bay of Plenty with no introduced animal pests. Previous infestations of goats, rabbits and Norway rats combined with human vegetation damage led to a highly depauperate vegetation cover, and a marked reduction in indigenous biodiversity. Since introduced animals have been removed (Jansen 1993) there has been a planting programme designed to return the island to an approximation of its original state (McGlynn 1990; Smale and Owen 1990). The vegetation pattern and vascular plant species have been mapped, described and listed (Ogle 1989; Regnier 1986), and a vegetation monitoring programme using photopoints and permanent plots was established in 1990 (Shaw 1997). The rate of natural regeneration on the island is very rapid, with former open areas now clothed in dense pohutukawa forest and remaining areas of grassland rapidly infilling with pohutukawa and kanuka.

Moutohora now provides an opportunity for the introduction of appropriate threatened plants (cf. Owen 1989). A clear ecosystem-based rationale is needed, however, to guide any further planting, and to provide a framework for the assessment of potential species for introduction.

The original version of this account was written in 1994, and has been revised (see Acknowledgments) during a wider review of threatened plant management in the Whakatane Field Centre (Shaw 1997).

2. Plans, strategies and guidelines

The draft management plan for Moutohora includes various provisions relating to the introduction of biota to the island (Hunt 1992).

The Conservation Management Strategy (CMS) for Bay of Plenty Conservancy has background information on Moutohora, and contains policies on island management.

The Department has guidelines for the transfer of indigenous terrestrial fauna and flora (Department of Conservation 1990).

3. Ecological context

Moutohora is in White Island Ecological District, which also includes the Rurima Islands, Whakaari (White Island) and the Volkner Rocks (Te Paepae

Aotea). White Island Ecological District is in the Northern Volcanic Plateau Ecological Region. The other ecological districts in this region are Motiti, Tauranga and Otanewainuku. Motiti Ecological District includes Motiti, Motunau (Plate Island), Schooner Rocks, and Karewa.

4. Ecosystems and potential habitats

Moutohora has a range of ecosystems and habitat types present, which may suit various threatened taxa:

- forest (sea level to 352 m asl);
- shrubland (secondary);
- geothermal (sinter only);
- grassland (being rapidly colonised with woody species);
- sand dunes
 - stable;
 - unstable (foredune);
- boulder bank (small area only);
- wetland (very limited).

5. Candidate species

When considering regionally threatened plants that could be introduced to Moutohora, it seems appropriate to focus on those that are threatened within the coastal bioclimatic zone of the Northern Volcanic Plateau Ecological Region. Threatened plant species in the coastal bioclimatic zone of the Whakatane Ecological Region should also be considered because of its close proximity to Moutohora.

The following threatened or local species occur within the areas outlined above (from Beadel 1988 and 1992; Cameron *et al.* 1995):

Austrofestuca littoralis

Cyclosorus interruptus

Euphorbia glauca

Korthalsella salicornioides

Lepidium oleraceum

Pimelea tomentosa

Pimelea arenaria
Pterostylis micromega
Rorippa divaricata
Sicyos australis
Thelypteris confluens
Utricularia australis

Some of the above will not be suitable candidates because of the lack of substantial suitable potential habitat; *Cyclosorus interruptus*, *Thelypteris confluens*, *Pterostylis micromega*, and *Utricularia australis*.

Candidate species can be grouped under relevant habitats

Duneland

<i>Austrofestuca littoralis</i>	Rare' Rare on the mainland coast.
<i>Euphorbia glauca</i>	Rare Present on Taumaihi and Tuhua.
<i>Pimelea arenaria</i>	Local Rare on the Bay of Plenty mainland coast.

Boulderfield

<i>Sicyos australis</i>	Vulnerable Strand plant; only Bay of Plenty records Moutoki and Tuhua (1995).
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Forest

<i>Pimelea tomentosa</i>	Rare Scattered in coastal and semi-coastal forest Matata to Ohiwa.
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Shrubland and forest margins

<i>Korthalsella salicornioides</i>	Insufficiently known. Known from Kohi Point and Whakarewarewa in BOP.
<i>Rorippa divaricata</i>	Endangered Records from Tuhua and near Rotorua.

Cliffs

<i>Lepidium oleraceum</i>	Endangered Present on Karewa, Motuputa, and Te Paepae Aotea (Volkners). Formerly present on Tuhua and local on the mainland coast. Threatened by lowered fertility (lack of guano) on main- land; also browsing, insect attack, parasitic fungi.
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Atriplex billardieri is a nationally threatened species not currently known from the Bay of Plenty, but which was once locally distributed on beaches throughout New Zealand (Wilson and Given 1989):

¹ Rankings from Cameron *et al.* (1995).

Duneland

<i>Atriplex billardieri</i> (formerly <i>Theleophyton</i> <i>billardieri</i>)	Endangered. Likely to have been previously present on BOP beaches. Now known from Northland, Southland, Chathams. Open beaches and sandy banks close to high tide.
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Appropriate regionally rare species not included in the national threatened plant list (Cameron *et al.* 1995) could also be considered for introduction to Moutohora. Potential coastal candidates are

<i>Planchonella costata</i>	Rare in Bay of Plenty. Karewa, Tuhua.
<i>Coprosma acerosa</i> var. <i>acerosa</i>	Local in Bay of Plenty. Local on dunes.
<i>Tetragonia tetragonioides</i>	Rare on Bay of Plenty mainland (Matata, Bowentown Heads, Wahieroa). Good population on Matakana Island.
<i>Pisonia brunoniana</i>	Currently only known from Karewa in Bay of Plenty. May have been present on Moutohora in the past.

Two species already planted on Moutohora may be candidates for further management effort (also not listed in Cameron *et al.* 1995):

<i>Melicytus novae-zelandiae</i> var.	Not currently known on Bay of Plenty mainland. On Matakana Island. Naturalised on Papamoa dunes (from plantings). Common on several offshore islands. Planted locally on Moutohora; could be planted more widely in appropriate sites on coastal margins.
<i>Desmoschoenus spiralis</i>	Already introduced to Moutohora but better site selection required. Local on the mainland Bay of Plenty coast.

6. Current situation

Pingao (*Desmoschoenus spiralis*) has been planted at McEwan's Bay and Boulder Bay. The Boulder Bay plantings are on stable sand, which is not appropriate for this species. Pingao was previously included in the 1993 edition of the threatened and local plant list, but was subsequently dropped from the 1995 version (Cameron *et al.* 1995).

7. The future

Any further introductions should only be made with the intention of restoring the island ecosystem closer to an original state.

This has important implications for the range of plants that could be introduced. It would also provide a clear ecosystem focus (cf. Atkinson and Towns 1991) for the management of threatened plants on the island. This type of approach could also provide a focus for volunteer and advocacy work on Moutohora.

It should be noted that not all of the candidate species listed above may have been present naturally on Moutohora. Islands, especially smaller ones, tend to have less habitat diversity and smaller numbers of species.

Any future planting should involve relatively small numbers of plants placed in carefully selected suitable sites. There should be a dual objective:

1. The establishment of self-sustaining populations of some Bay of Plenty threatened plants.
2. Restoring those elements to the Moutohora ecosystem which will give it a special ecological character closer to what it would have been prior to vegetation clearance by humans and the liberation or escape of various introduced animals.

The establishment of appropriate threatened plants on the island will not preclude future liberations of threatened fauna, and may even enhance the habitat for some invertebrates.

The following extract from Atkinson (1992) is directly relevant to Moutohora:

"Success with restoring threatened species on Mana Island cannot be measured by counting the number of such species that can be grown on the island. The only satisfactory criterion of success will be that populations of the threatened species are largely self-sustaining with respect to reproduction so that any human intervention needed is minimal."

8. Acknowledgements

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