

9. Appendices

9.1 SPECIES RANKING SYSTEMS

Department of Conservation Species Priority Ranking System

The Department of Conservation's Species Priority Ranking System (Molloy & Davis 1994) was designed to categorise threatened species according to their urgency for conservation action.

Plants and animals were scored using five factors, encompassing 17 criteria. These factors were:

1. **Distinctiveness:** taxonomic distinctiveness.
2. **Status:** number of populations; mean population size, size of largest population; geographic distribution; condition of largest population; and the population decline rate.
3. **Threats:** legal protection of habitat; habitat loss rate; predator/harvest impact; competition; and other factors affecting survival.
4. **Vulnerability:** habitat and /or diet specificity; reproductive and/or behavioural specialisations; and cultivation/captive breeding potential.
5. **Values:** Maori cultural values; Pakeha cultural values.

Plants were then grouped into three categories depending on the score they received from the ranking exercise. The categories were:

- A: Highest priority threatened plants for conservation action.
Second priority threatened plants for conservation action.
- C: Third priority threatened plants for conservation action.

In addition, four other specialist categories were designated:

- X: Plants which have not been sighted for a number of years and are presumed extinct.
- I: Plants about which little is known but, based on existing knowledge, are considered to be under threat.
- O: Plants that are threatened in New Zealand but are known to be secure in parts of their range outside New Zealand. Plants threatened in New Zealand and overseas were ranked in the appropriate A, B, or C category.
- M: Plants that are rare or localised, and of cultural importance to Maori.

IUCN

Together with the Department of Conservation, the New Zealand Botanical Society established a New Zealand Threatened Plants Committee in 1993 which reviews the status of indigenous flora every few years, using a modified version of the International Union for Conservation of Nature (red data book categories). The last review was by Cameron et al in 1995. These categories are described below.

Presumed extinct	Plants and animals which are no longer known to exist in the wild or in cultivation after repeated searches of the type localities and other known or likely places.
Critical	Plants and animals which face an extremely high probability of extinction in the wild within the immediate future (proposed category by Mace et al. 1993).
Endangered	Plants and animals in danger of extinction and whose survival is unlikely if the causal factors continue operating.
Vulnerable	Plants and animals believed likely to move into the Endangered category in the near future if the causal factors continue operating.
Rare	Plants and animals with small populations which are not Endangered or Vulnerable but are at risk.
Insufficiently known	Plants and animals that are suspected but not definitely known to belong to any of the above categories because of lack of information.
Taxonomically indeterminate '	Plants and animals about which there is doubt regarding taxonomic status and which require further investigation; and genetic variants which are distinct at a level which may not warrant formal taxonomic recognition.
(Local)	A non-IUCN category designed to act as a watchlist for plants that are sufficiently restricted to warrant noting and some monitoring.

9.2 EXPLANATION OF FIELDS IN THE PLANT PROFILES

- i. **Species:** The taxonomic name of the plant, and authorities for formally described taxa (following Brummitt & Powell 1992). Double quotes are used to identify plants whose taxonomic status is not formally recognised, but where present evidence suggests the plant is sufficiently distinct to warrant some level of taxonomic rank. These plants, as well as plants assigned to an aggregate, or an affinity, do not have taxonomic authorities, owing to their uncertain taxonomic status.
- ii. **Family:** The family the plant is ascribed to.
- iii. **Endemic/Indigenous to:** The geographical range of the plant.
- iv. **Common name:** Any common name the plant is known by. If there is more than one name, the most widely used is underlined.
- v. **Ranking:** The Department's Species Priority Ranking System (Molloy & Davis 1994), and/or the IUCN threatened status rank. If only one ranking appears, then the plant has not been ranked in the other system. For these unranked plants, where the information is available, a rank has been recommended.
- vi. **In cultivation:** Plants are listed as "Yes" if they are readily available in cultivation from a known provenance. If a plant is not in cultivation, or is in cultivation but the provenance is not known, it is then listed as "No". Information on where provenanced material is cultivated may be obtained from the relevant conservancy botanist.
- vii. **Descriptor:** A brief description of the plant form.
- viii. **Conservancy:** Present day and historic distributions in conservancies are listed. Conservancies where the plant has been recorded but not relocated since 1984 are in brackets. This is an update of the distributions as reported in Molloy & Davis (1994). During the Department's restructuring in 1997, changes were made to conservancy areas and boundaries. The most

TABLE 3. CONSERVANCY ANNOTATIONS.

ANNOTATION	CONSERVANCY
NL	Northland
AU	Auckland
WK	Waikato
BP	Bay of Plenty
EC/HB	East Coast/Hawke's Bay
TT	Tongariro/Taupo
WG	Wanganui
WL	Wellington
NM	Nelson/Marlborough
WC	West Coast
CA	Canterbury
OT	Otago
SL	Southland

important of these were: the Chatham Islands were removed from the Canterbury Conservancy and became part of the Wellington Conservancy; and the East Coast and Hawke's Bay Conservancies were amalgamated, with some slight changes to conservancy boundaries that also affected Wanganui Conservancy.

- ix. **Habitat:** A general description of the habitat type/s the plant can be found in.
- x. **Threats:** Key threats to the plant. No assessment was made of the relative impact of each threat and therefore they are not presented in any priority order.
- xi. **Work undertaken to date:** A brief summary of recent management, research, survey, and monitoring. Definitions of terms requiring explanation:
 - population enhancement: the additional planting of a threatened plant in a site where it is already present;
 - translocation: transferring plants to a site within the plant's historical range where it is not already present or has become extinct;
 - habitat restoration: establishment of plants other than the target threatened plant to restore suitable habitat.
- xii. **Priority sites for survey:** Those sites that are a priority for survey work. For example, historic sites and unsurveyed sites with suitable habitat within the plant's range.
- xiii. **Objectives and priority sites for monitoring:** Representative/important sites for monitoring once initial survey has been completed. The objectives of monitoring are described, e.g., to identify the population trends of a plant over time; to see the effect of management practices on the population.
- xiv. **Research questions:** Primary research needs for the plant to help direct management practices.
- xv. **Management needs:** The key management practices needed to reverse the trends of decline in those populations at risk. This can include advocacy to increase awareness of threatened plants, and in situ and ex situ management. For definitions of terms, see "xi. Work undertaken to date".
- xvi. **Selected references:** A list of selected references relating to the taxonomy, ecology, and conservation of the plant where they are readily available.

9.3 CATEGORY A PLANT PROFILES

Acaena rorida B.H.Macmillan

- Family:** Rosaceae
Endemic to: Moawhango Ecological Region.
Common name: -
Ranking: A, Critical. **In cultivation:** Yes.
Descriptor: A piripiri (bidibidi) with creeping stems and pink-grey foliage.
Conservancy: WG.
Habitat: Damp hollows in tussockland.
Threats: Hybridism; weed encroachment (*Hieracium pilosella*, *Holcus lanatus*); lack of legal land protection.

Work undertaken to date

Research on taxonomic distinctiveness and the extent and threat of hybridism with *A. novae-zelandiae* and/or *A. anserinifolia*; monitoring since 1991.

Priority sites for survey

Species has already been extensively surveyed for; no further survey needed.

Monitoring: objectives and priority sites

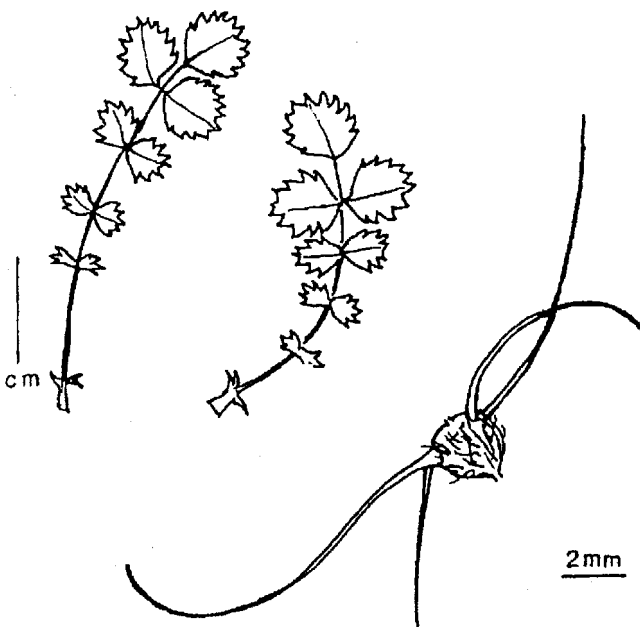
Continue monitoring to determine population trends and to assess habitat quality at Mangaohane Plateau.

Research questions

What is the taxonomic status of *A. rorida*? Do the putative hybrids pose a threat to the species?

Management needs

Weed control at sites; secure legal land protection; assess need for translocations within site.



Selected references

- Macmillan, B.H. 1991. *Acaena rorida* and *Acaena tesca* (Rosaceae) - two new species from New Zealand. *New Zealand Journal of Botany* 29: 131-138.
- Rogers, G.M. 1993. Moawhango Ecological Region. Survey report for the *PNAP*. *New Zealand PNAP No. 27*. Department of Conservation, Wanganui.

Asplenium pauperequitum Brownsey et P.Jackson

- Family:** Aspleniaceae
Endemic to: Poor Knights and Mokohinau Islands.
Common name: Poor Knights spleenwort.
Ranking: A, Critical. **In cultivation:** No.
Descriptor: A fern with short, erect rhizomes, and shiny, dark red-brown rachises bearing hair-like scales. Laminae are a glossy dark green on top, paler below, fleshy, and triangular in shape.
Conservancy: NL, (AU).
Habitat: Rhyolitic rock, either in crevices of exposed bluffs or on rock surfaces under a forest canopy.
Threats: 90% of the population has gone from the Poor Knights Islands (extinct on the Mokohinau Islands); spread of disease and pests (aphid, brown/black scale); very fragile-does not respond well to disturbance; competition from *Asplenium haurakiense*; no one has successfully cultivated *A. pauperequitum*. The results of limited attempts at cultivation suggest that prothallus takes three years to sexually mature, and then a further two to four years to mature (i.e. to produce the first frond); populations are prone to extreme fluctuations, probably in part caused by climatic perturbations; collectors.

Work undertaken to date

Attempts at survey, monitoring, cultivation; research on reproduction; control of competitors not effective as it detrimentally affects the micro-climate.

Priority sites for survey

Tawhiti Rahi; more survey in the Mokohinau Islands (especially Fanal (Motukino) Island).

Monitoring: objectives and priority sites

Continue monitoring to determine population dynamics at the Citadel (Tawhiti Rahi) using photo points.

Research questions

How is A. pauperequitum cultivated and propagated?
Does this species have a boom/bust pattern linked to wet and dry weather cycles?

Management needs

Control of diseases at Aorangi (hygiene plus pesticides); advocacy with iwi, e.g., use oil, not pesticides, for scale infestation, as pesticide use is not condoned.

Selected references

- Brownsey, P.J.; Jackson, P.J. 1984. *Asplenium pauperequitum* - a new fern species from the Poor Knights Islands, New Zealand. *New Zealand Journal of Botany* 22: 315-321.
- de Lange, P.J.; McFadden, I.; Cameron, E.K. 1995. Preliminary report of the flora and fauna of Fanal Island, Mokohinau Islands Nature Reserve. *Science and Research Series No. 94*. Department of Conservation, Wellington.
- Wright, A.E. 1992. Survival battle for tiny fern. *New Zealand Botanical Society Newsletter* 30: 12.



***Australopyrum calcis* subsp. *calcis* Connor et Molloy**

- Family:** Poaceae
Endemic to: Nelson/Marlborough.
Common name: Limestone wheatgrass.
Ranking: A, Critical. **In cultivation:** Yes.
Descriptor: A low-statured grass with a narrow, compact head.
Conservancy: NM.
Habitat: Restricted to dry limestone outcrops.
Threats: Weed encroachment, especially by introduced grasses; grazing by stock; small population size makes it susceptible to catastrophic events.

Work undertaken to date

Species formally described in 1993; survey (on open limestone lenses) at type locality; monitoring programme planned to determine population dynamics (1998); part of habitat covenanted; fencing of habitat where possible; an identification sheet has been produced; ecology determined.

Priority sites for survey

Survey further limestone lenses of the mid Leatham Valley, Marlborough to extend distribution; locate suitable habitat for translocation.

Monitoring: objectives and priority sites

Continue monitoring to determine population dynamics, optimal habitat regimes, rate of encroachment, and the impacts of sheep grazing.

Research questions

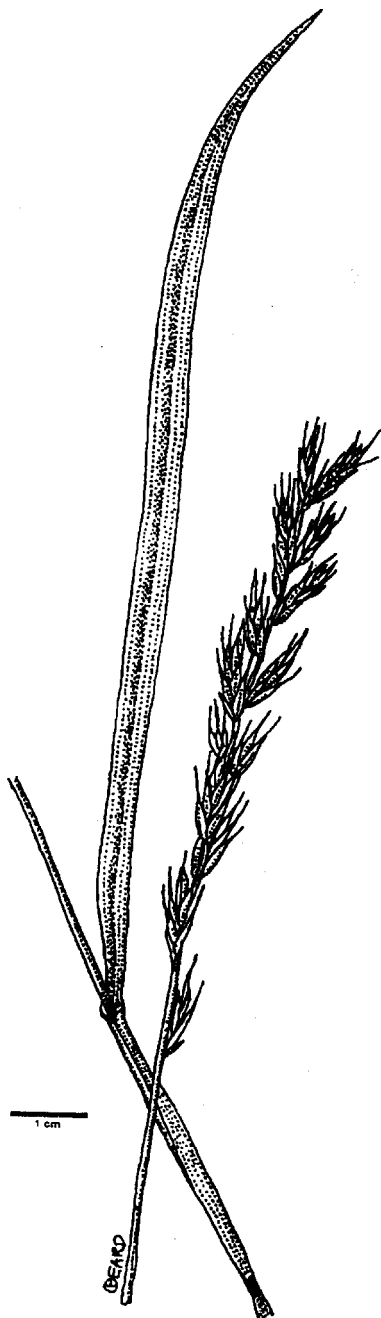
What are the optimal habitat requirements? Important factors appear to be base-rich substrates, free drainage, and those habitats which minimise competition (e.g., low-light regime).

Management needs

Possible weed and stock control depending on monitoring results; goat control; advocacy and negotiation with lessee (pastoral lease), especially for further legal land protection centred on limestone outcrops; establish in cultivation for research, advocacy, and insurance purposes; maintain plants in cultivation for seed production for translocation trials; locate sites for translocation; habitat restoration and fencing.

Selected references

- Connor, H.E.; Molloy, B.P.J.; Dawson, M.I. 1993. *Australopyrum* (Triticeae: Gramineae) in New Zealand. *New Zealand Journal of Botany* 31: 1-10.
- Molloy, BPJ 1994 Observations on the ecology and conservation of *Australopyrum calcis* (Triticeae: Gramineae) in New Zealand. *New Zealand Journal of Botany* 32: 37-51.



Australopyrum calcis subsp. optatum Connor et Molloy

- Family:** Poaceae
Endemic to: Central and north Canterbury.
Common name: Limestone wheatgrass.
Ranking: A, Vulnerable. **In cultivation:** Yes.
Descriptor: A low-statured grass, smaller than *A. c.* subsp. *calcis*, with a narrow, compact head.
Conservancy: CA.
Habitat: Now confined to base-rich substrates, mainly limestone overhangs.
Threats: Recreational users on Castle Hill; lack of legal land protection; grazing; degradation and destruction of shrub remnants opening the canopy and allowing exotic grasses to thrive, causing smothering of *A. c.* subsp. *optatum*:

Work undertaken to date

Species formally described in 1993; surveys have been done through Canterbury and Southern Otago: habitat restoration and protection pending; trials conducted at Castle Hill revealed a canopy cover is required for optimal growth. Many of the plants planted into selected areas are doing well and flowered profusely in 1997; habitat restoration occurring at Castle Hill, in conjunction with *Carex inopinata* habitat restoration.

Priority sites for survey

Opportunistic survey in South Island dryland limestone areas.

Monitoring: objectives and priority sites

Continue monitoring to determine population dynamics and rate of encroachment of exotic grasses at Castle Hill Basin; Prebble Hill for population trends and potential effect of the reduction of browsing animals as a result of RCD release.

Research questions

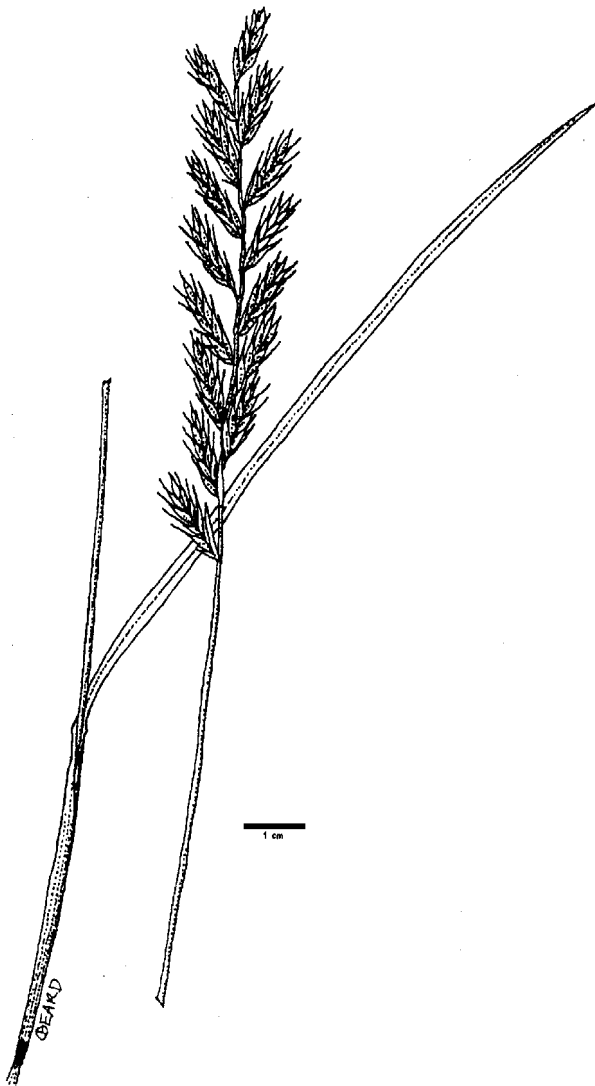
What are the optimal habitat requirements? What browsing regime controls exotic grasses and protects *A. c.* subsp. *optatum*?

Management needs

Advocacy with recreational users of Castle Hill to make them aware of the grass, and to prevent grazing of the habitat; secure legal land protection; weed control at sites; establish in cultivation for research, advocacy, and insurance purposes.

Selected references

- Connor, H.E.; Molloy, B.P.J.; Dawson, M.I. 1993. *Australopyrum* (Triticeae: Gramineae) in New Zealand. *New Zealand Journal of Botany* 31: 1-10.
- Molloy, B.P.J. 1994 Observations on the ecology and conservation of *Australopyrum calcis* (Triticeae: Gramineae) in New Zealand. *New Zealand Journal of Botany* 32: 37-51.



Botrychium aff. lunaria

Family: Ophioglossaceae

Endemic to: Australasia.

Common name: Moonwort.

Ranking: A, Vulnerable.

In cultivation: No.

Descriptor: Diminutive, summer-green, alpine fern.

Conservancy: NM, (CA).

Habitat: Largely confined to alpine turflands in sinkholes.

Threats: Weed encroachment (*Hieracium pilosella* and *Trifolium repens* (white clover)); browsing and trampling from goats and hares; collectors.

Work undertaken to date

Has been surveyed yearly at three known sites since 1993; censused and monitored since 1993 (photo points, counts of sporangia, and frond pinnae); effects of *Hieracium pilosella* spread being monitored for one population.

Priority sites for survey

Mt. Arthur/Twins basins; further sites on Mt. Owen massif Torlesse (historical record).

Monitoring: objectives and priority sites

Ongoing to follow population trends, resilience to damage, and recruitment at Hoary Head and Mt Owen.

Research questions

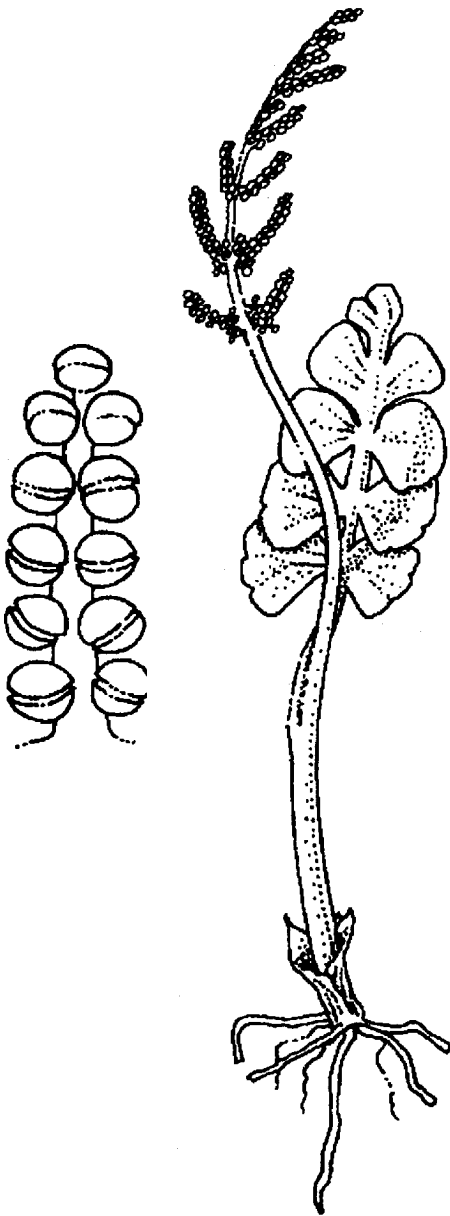
How is *B. aff. lunaria* cultivated and propagated? Does it have a mycorrhizal association? What is the taxonomic relationship with the Australian and European species? How can *Hieracium* be controlled?

Management needs

Hieracium pilosella and clover control at sites; increased goat and hare control; advocacy to mitigate collection.

Selected references

- Braggins, J.E. 1980. Some studies on the New Zealand species of *Botrychium* Sw. (Ophioglossaceae). *New Zealand Journal of Botany* 18:353-366.
- Druce, A.P. 1981. *Botrychium lunaria* on Hoary Head, N. W. Nelson. *Canterbury Botanical Society Journal* 15: 39-42.
- Druce, A.P. 1984. Another locality for *Botrychium lunaria*: Billies Knob, north-west Nelson. *Canterbury Botanical Society Journal* 18: 20-21.



Carex inopinata Cook

Family:	Cyperaceae	
Endemic to:	Eastern South Island.	
Common name:		
Ranking:	A, Endangered.	In cultivation: Yes.
Descriptor:	Small, swarding sedge.	
Conservancy:	NM, CA, (OT).	
Habitat:	Dry, shaded, high fertility habitat including alluvium, limestone, and schist.	
Threats:	Weed encroachment; habitat loss (fire, recreational use of land, including vandalism, successional changes at Kowhai Point); browsing by hares and rabbits, and stock grazing.	

Work undertaken to date

habitat restoration being carried out at Kowhai Point Scenic Reserve (Wairau Valley), and Lance MacCaskill Nature Reserve; limited survey; monitoring at Kowhai Point (Wairau); monitoring and population enhancement trials at Castle Hill which have determined habitat requirements. Early trial had limited success but efforts are continuing in the Castle Hill Basin, including the Conservation Area, and on freehold land; brief, local recovery plan exists based on habitat restoration; experimental study of habitat requirements and growth response to different light levels.

Priority sites for survey

Bendigo site needs a thorough survey for appropriate habitats for *C. inopinata* before vegetation successional changes alter habitat; near Hogs Back, Castle Hill Basin (type locality); alluvial terraces in mid Wairau Valley and tributaries.

Monitoring: objectives and priority sites

Continue monitoring of population dynamics and threats at Kowhai Point site; monitoring success of population enhancement at Castle Hill.

Research questions

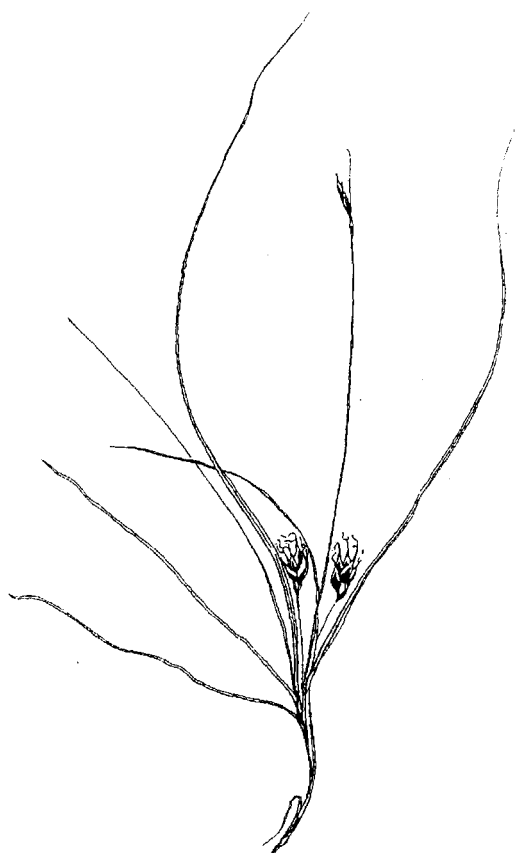
What is the genetic composition/variability of each population? What are the population dynamics and reproductive ecology? What is the best browsing regime to maintain habitat at Castle Hill? What is the role of disturbance in maintaining viable populations?

Management needs

On-going weed control required at reserve and translocation sites; habitat restoration at Castle Hill; secure legal land protection of similar habitat near Kowhai Point and carry out translocation trials; hare and rabbit control at sites; advocacy to mitigate stock grazing.

Selected references

Morgan, M.D.; Norton, D.A. 1992. Growth response to light of *Carex inopinata* Cook, an endangered New Zealand sedge. *New Zealand Journal of Botany* 30: 429-433.



Carmichaelia muritai (A.W.Purdie) Heenan

- Family:** Fabaceae
Endemic to: Grassmere Ecological District.
Common name: Coastal tree broom, Clifford Bay broom.
Ranking: A, Endangered. **In cultivation:** Yes.
Descriptor: A coastal tree broom.
Conservancy: NM.
Habitat: Low, coastal forest on a dry, loess escarpment.
Threats: Weed encroachment (especially grass encroachment on seedling habitat); browsing and trampling by goats; almost total loss of habitat due to coastal cliff slumping.

Work undertaken to date

Has been translocated to nearby recreation reserve and to an inland site at Haldon Hills; research on seed ecology; monitoring of population dynamics, translocation success, and threats; population enhancement on site; habitat restoration; weed control, especially for *Lycium ferocissum* (boxthorn); goat control; taxonomic review of genus *Chordospartium* now places it in the *Carmichaelia* genus; a South Island Native Broom Recovery Plan has been launched.

Priority sites for survey

Coastal gully systems at White Bluffs and Clifford Bay.

Monitoring: objectives and priority sites

Ongoing to determine population dynamics and recruitment rates at Muritai Scientific Reserve, Clifford Bay.

Research questions

What are the micro-climate requirements of *C. muritai*? What was the likely historic range of *C. muritai*?

Management needs

Hand-weeding trials around flowering individuals; goat control; secure legal land protection; carry out further translocations; habitat restoration in Muritai Scenic Reserve.

Selected references

- Heenan, P.B. 1998. An emended circumscription of *Carmichaelia*, with new combinations, a key, and notes on hybrids. *New Zealand journal of Botany* 36: 53-63.
- Williams, P.A.; Norton, D.A.; Nicholas, J.M. 1996. Germination and seedling growth of an endangered native broom, *Chordospartium inuritai* A. W. Purdie (Fabaceae), found in Marlborough, South Island, New Zealand. *New Zealand Journal of Botany* 34: 199-204.

Christella* aff. *dentata

Family: Thelypteridaceae
Endemic to: Far North.
Common name: Northland soft fern.
Ranking: A, Endangered. **In cultivation:** Yes.
Descriptor: Soft, creeping fern (this taxon).
Conservancy: NL.
Habitat: An opportunist.
Threats: Flooding at one site; weed encroachment; trampling by cattle.

Work undertaken to date

Legal land protection secured (QEII) at most sites; masters thesis on taxonomy; survey; opportunistic monitoring; consultation with P. J. Bostock (CSIRO, Queensland) indicates that there are three New Zealand taxa currently included within *C. dentata* s.l. Their relationship to other named entities in *Christella* remains unclear.

Priority sites for survey

Aupouri Ecological District.

Monitoring: objectives and priority sites

Continue monitoring at Foleys Bush Covenant (QEII) to determine trends and effect of weeds.

Research questions

What is the taxonomic status of the *Christella* complex in New Zealand?

Management needs

Translocation within Aupouri/Te Paki Ecological District; weed spraying at Foleys Bush; cattle control.

Selected references

Brownsey, P.J.; Smith-Dodsworth, J.C. 1989. *New Zealand Ferns and Allied Plants*. David Bateman Ltd, Auckland.

***Clianthus puniceus* (G.Don) Sol. ex Lindl.**

- Family:** Fabaceae
- Endemic to:** Mainly eastern North Island.
- Common name:** Kowhai ngutukaka, kaka beak, lobster claw, parrot's beak.
- Ranking:** A, Endangered. **In cultivation:** Yes.
- Descriptor:** Much-branched shrub with predominantly red flowers and pinnate leaves.
- Conservancy:** AU, EC/HB, (NL, WK, BP).
- Habitat:** Lowlands, in open, or seral/disturbed sites of tertiary substrates.
- Threats:** Catastrophic events; natural succession; weed encroachment on Moturemu Island; browsing by introduced mammals and snails, slugs, and possibly rodents.

Work undertaken to date

Published recovery plan; audit of Recovery Plan carried out; research on taxonomy and typification; basic ecology; population genetics; germination trials; planting trials at Waikaremoana; re-introduced to Northland, Bay of Islands, and Whangarei; Moturemu Island provenance in cultivation for replanting and permanent collection at Auckland Regional Council Botanic Gardens; consultation with local iwi has resulted in plantings at Whangaparaoa; ecology reviewed; new population recently found near Mangahauini Stream has brought to seven the known sites in the East Coast/Hawke's Bay Conservancy; pollination biology recently examined.

Priority sites for survey

Historical sites; opportunistic survey.

Monitoring: objectives and priority sites

Ongoing monitoring of the Moturemu population at Kaipara to determine population trends; monitor success of any population enhancement in Kaipara, East Coast, and Te Urewera.

Research questions

What is the structure and genetics of individual populations? What are the reproductive requirements and ecology of the species (e.g. pollination, seed dispersal, seed viability, planting techniques, site selection, and site creation)? Are there two taxa? What is the taxonomic status of *Clianthus puniceus* var. *maximus*? What is the persistence and the role of the seed bank? How are browsers best controlled?

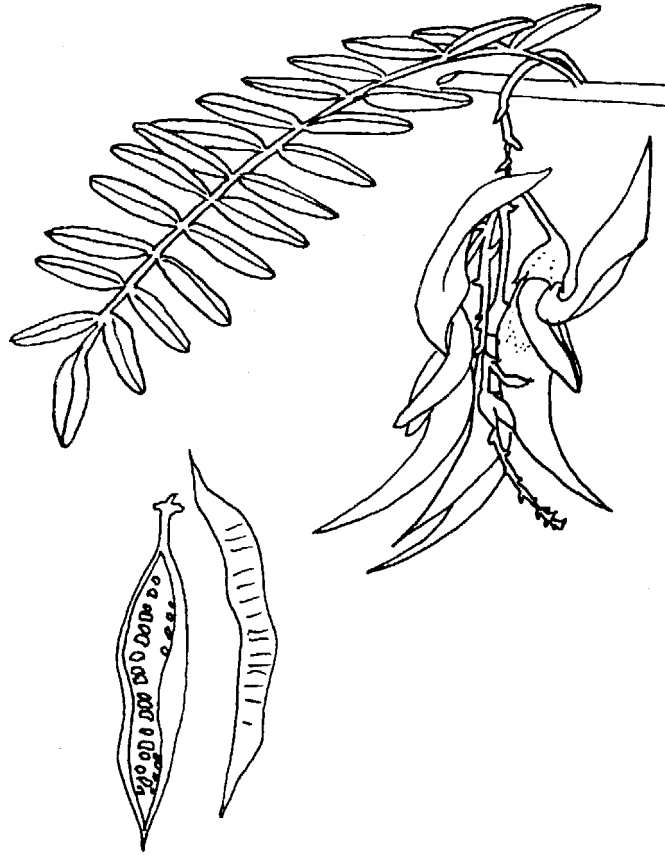
Management needs

Urgent weed control on Moturemu Island to prevent shading out; population enhancement at Kaipara, East Coast, and Te Urewera; seed collection each year from Te Urewera populations for planting and seed storage trials; re-introduction and maintenance at Moturemu Island.

Selected references

- Heenan, P.B. 1995. The typification of *Clianthus puniceus* (Fabaceae - Galageae). *New Zealand Journal of Botany* :33: 561-562.
- Heenan, P.B. 1998. The pollination system and stigmatic cuticle of *Clianthus puniceus* (Fabaceae). *New Zealand Journal of Botany* 36: 311-314.

Shaw, W.B.; Burns, B.R. 1997. The ecology and conservation of the endangered endemic shrub kowhai ngutukaka, *Clianthus puniceus* in New Zealand. *Biological Conservation* 81: 233-245.



Coprosma sp. "v" (of Eagle 1982)

Family: Rubiaceae

Endemic to: Eastern New Zealand.

Common name: -

Ranking: A, Vulnerable.

In cultivation: Yes.

Descriptor: A loosely divaricating, small tree with small, spoon-shaped leaves, violet, pendulous fruit, and orange inner-bark.

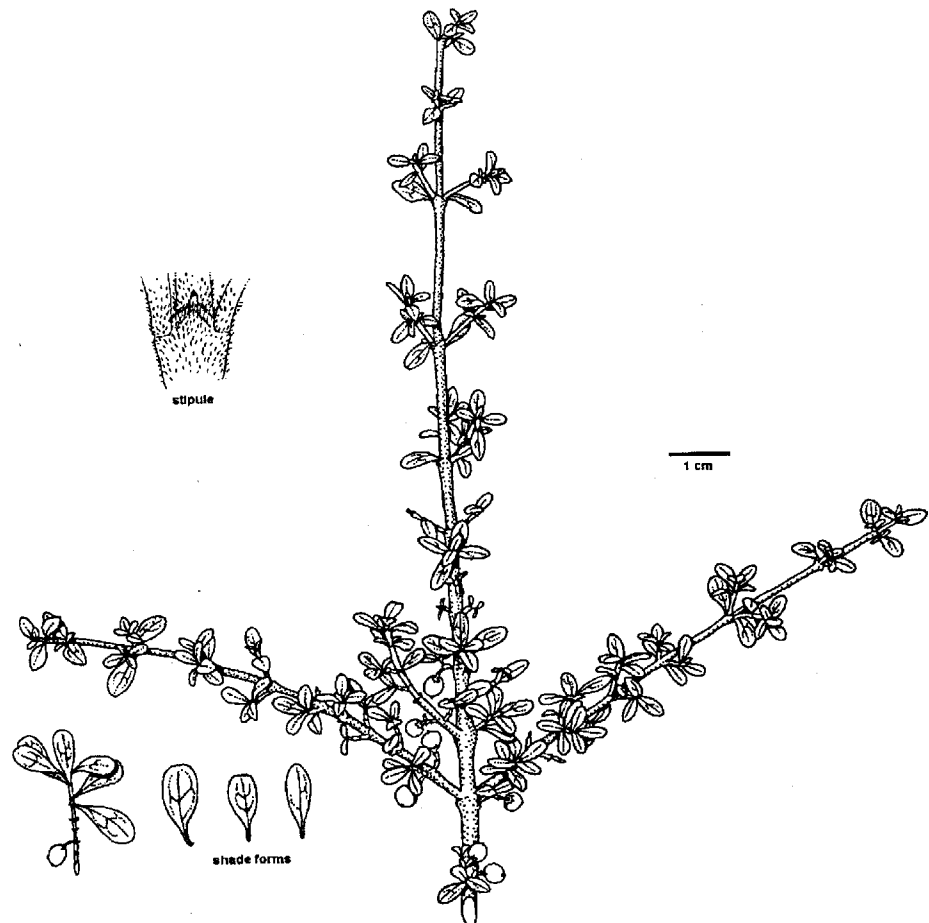
Conservancy: EC/HB, WL, CA.

Habitat: Light gaps in lowland, swampy, alluvial, seasonally wet kahikatea forest margins.

Threats: Habitat destruction as a result of land clearance and drainage; cattle browse/rubbing; lack of legal land protection; lack of regeneration resulting from habitat degradation (including weed encroachment).

Work undertaken to date

Taxonomic research and paper describing species undergoing journal submission; moderate survey effort in eastern Wairarapa; extensive survey in Canterbury; some monitoring underway at Wellington Conservancy; distribution map and population-specific management programmes prepared for Wellington Conservancy; North Canterbury alluvial foothills surveyed.



Priority sites for survey

Catlins and western Southland, southern Hawke's Bay, north Wairarapa (Alfredton), East Coast Conservancy around Gisborne.

Monitoring: objectives and priority sites

Continue monitoring to determine population dynamics and the relationship to hydrology at Carter Scenic Reserve; monitor success of any habitat manipulation at Carter Scenic Reserve; continue regular inspections in Wellington to determine trends in size and spatial extent of populations.

Research questions

How are lowland, podocarp-dominated alluvial forests effectively managed to maintain their indigenous biodiversity? Is there a browsing/spray regime that controls exotic grasses and protects *C. sp. "v"*? What is the ecology of *C. sp. "v"*?

Management needs

Secure legal land protection at all sites and protect from livestock; habitat restoration at Carter Scenic Reserve using research by management; annual seed collection from the most threatened populations to establish in cultivation for research, advocacy, and insurance purposes.

Selected references

- Eagle, A. 1982. *Eagle's Trees and Shrubs of New Zealand: Second Series*. William Collins Publishers Ltd, Auckland.
- Rogers, G.; Barkla, J.; Rance, B.; Simpson, N. 1999. Recent discoveries of rare small-leaved shrubs and trees from Otago and Southland. *New Zealand Botanical Society newsletter 54*: 8-13.
- Sawyer, J.W.D., Townsend, A.J., Beadel, S.M.; de Lange, P.J.; Shaw, W.B. 1998. *Plants of National Conservation Concern in Wellington Conservancy*. Wellington Conservancy, Department of Conservation, Wellington.
- Wilson, H.D.; Galloway, T. 1993. *Small-leaved Shrubs of New Zealand*. Manuka Press, Christchurch.

Cortaderia turbaria Connor

Family:	Poaceae	
Endemic to:	Chatham Islands.	
Common name:	Chatham Island toetoe.	
Ranking:	A, Critical.	In cultivation: Yes.
Descriptor:	A small (< 2 m when in flower), tussock-forming grass with hairy culms.	
Conservancy:	WL.	
Habitat:	Swamp, river edges, and canopy clearings in forest and shrubland.	
Threats:	Widely fragmented, very small populations make it susceptible to catastrophic events; minimal legal land protection; weed encroachment (grasses, sedges and nettles (<i>Urtica australis</i>)) prevents seedling establishment; grazing (in some areas only); potential hydro-electric dam at a major site.	

Work undertaken to date

Translocation and population enhancement underway; monitoring of existing sites on Chatham Islands.

Priority sites for survey

Most likely habitats surveyed.

Monitoring: objectives and priority sites

Continue monitoring at Harold Pierce Scenic Reserve to observe regeneration and successional changes; monitor success of translocations and population enhancements.

Research questions

What are the germination and establishment requirements for *C. turbaria* in the wild? What is the ecology of populations on disturbed sites? What are the vegetation succession interactions?

Management needs

Advocacy with Chatham Island landowners and locals regarding the removal of other New Zealand native *Cortaderia* species and replacing with *C. turbaria*; protecting key sites with wild populations by cultivating to make plants available to the Chatham Islands public; continue translocation and population enhancement at each site; upgrade habitats, e.g., control *Urtica australis*.

Selected references

Given, D.R ; Williams, P.A. 1985. *Conservation of Chatham Island Flora and Vegetation*. Botany Division, DSIR, Christchurch, New Zealand.

Cunoniaceae gen. indet.

- Family:** Cunoniaceae
Endemic to: Te Urewera.
Common name: Xit.
Ranking: A, Critical. **In cultivation:** Yes.
Descriptor: A small-leaved, woody, heavily branched, sub-shrub.
Conservancy: EC/HB.
Habitat: Old slip face in beech forest.
Threats: Only one plant currently known in the wild and therefore susceptible to catastrophic events; lack of regeneration and reproduction.

Work undertaken to date

Survey and monitoring of only known plant; in limited cultivation from a known provenance.

Priority sites for survey

Maungapohatu, Central Urewera.

Monitoring: objectives and priority sites

Research questions

What is the taxonomic status of Cunoniaceae gen. indet?

Management needs

Management response is dependent upon taxonomic status being resolved. Possible management may be to establish in cultivation for research, advocacy, and insurance purposes; and population enhancement at the current site.

Selected references

Shaw, W.B.; Beadel, S.M.; Ecroyd, C.E. 1989. A new plant record from Te Urewera National Park. *New Zealand Botanical Society Newsletter* 15: 11-12.



***Dactylanthus taylorii* Hook.f.**

- Family:** Balanophoraceae (the only species in the *Dactylanthus* genus).
- Endemic to:** North Island.
- Common name:** Pua reinga, dactylanthus, pua o to reinga, wood rose.
- Ranking:** A, Endangered. **In cultivation:** No.
- Descriptor:** A root parasite of trees and shrubs, which produces a woodrose.
- Conservancy:** AU, WK, BP, EC/HB, TT, WG, (WL).
- Habitat:** Occurs in damp but well drained sites of regenerating or secondary forest, and outer margins of montane forest.
- Threats:** Collectors; physical destruction of habitat; browse by introduced mammals (possums, rodents); loss of principal pollinators and seed dispersers; trampling.

Work undertaken to date

Published recovery plan; research on basic ecology and reproduction; survey and monitoring (North Island); protection (caging, possum control) of known populations; *D. taylorii* Recovery Group set up; successful attempt at artificial propagation.

Priority sites for survey

Continue opportunistic survey, and survey at historic sites (including the type locality).

Monitoring: objectives and priority sites

Monitor population trends at a range of sites, especially Te Araroa (East Coast), Mt Pirongia (Waikato), Wanganui, and the Central North Island.

Research questions

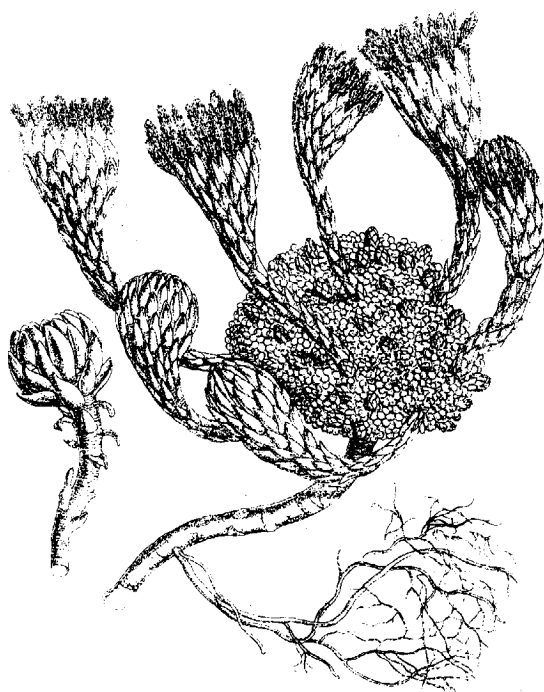
How can *D. taylorii* be propagated? What is the genetic diversity in populations of *D. taylorii*? What is the general ecology of *D. taylorii*? What is the best method of protecting *D. taylorii* from possums?

Management needs

Advocacy to mitigate collection of wood rose and to promote public interest and involvement and encourage its protection on private land; advocate for the listing of *D. taylorii* in CITES to prohibit the export of wood rose; continue to protect *D. taylorii* from possums and rats on land administered by the Department; establish *D. taylorii* on at least one island free of kiore and possums; establish *D. taylorii* plants in cultivation for transfer purposes, research, public education, and to establish a seed bank.

Selected references

- Ecroyd, C.E. 1995. *Dactylanthus taylorii* Recovery Plan. *Threatened Species Recovery Plan Series No. 16*. Department of Conservation, Wellington.
- Ecroyd, C.E. 1996. The ecology of *Dactylanthus taylorii* and threats to its survival. *New Zealand Journal of Ecology* 20:81-100.
- Green, S. 1998. In search of the rare wood rose. *The Evening Post, Wednesday, July 15*. P 7.
- Springer, G.R. 1994. *Dactylanthus taylorii*: the early years. *New Zealand Botanical Society Newsletter* 38: 10-12.



Davallia aff. tasmanii

- Family:** Davalliaceae
Endemic to: Maungataniwba Ecological District.
Common name: Haresfoot fern.
Ranking: A, Rare. **In cultivation:** Yes.
Descriptor: A sterile, creeping haresfoot fern.
Conservancy: NL.
Habitat: Known from a single bluff site in Puked Forest, where it is reproducing asexually.
Threats: It appears to be a single clonal mass, and there is no sexual reproduction; only one population at one site so susceptible to catastrophic events; collectors; prone to mechanical damage as a result of trampling.

Work undertaken to date

Taxonomic and ecological study; monitoring for population trends; survey in Puketi Forest - no further populations located; site is legally protected.

Priority sites for survey

Monitoring: objectives and priority sites

Monitoring population trends.

Research questions

Management needs

Translocation to suitable sites in Puketi Forest; advocacy to mitigate collection.

Selected references

- Kato, M. 1985. A systematic of the genera of the fern family *Davalliaceae*. *Journal of the Faculty of Science for the University of Tokyo* 13: 553-572.
- Shaw, T. 1994. Population census, habitat assessment and management of the endangered fern, *Davallia puketi*. *Conservation Advisory Science Notes No. 118*. Department of Conservation, Wellington.

***Hebe bishopiana* (Petrie) Hatch**

- Family:** Scrophulariaceae
Endemic to: Waitakere Ranges.
Common name: Waitakere rock hebe, Bishop's hebe.
Ranking: A, Vulnerable. **In cultivation:** Yes.
Descriptor: Semi-erect, sprawling shrub.
Conservancy: AU.
Habitat: Lowland forest within gorges, streamsides and on damp seepages within rock outcrops.
Threats: Weed encroachment (mist flower (*Ageratina riparia*) and pampas grasses (*Cortaderia* spp.)); inappropriate weed control and spraying alongside roads.

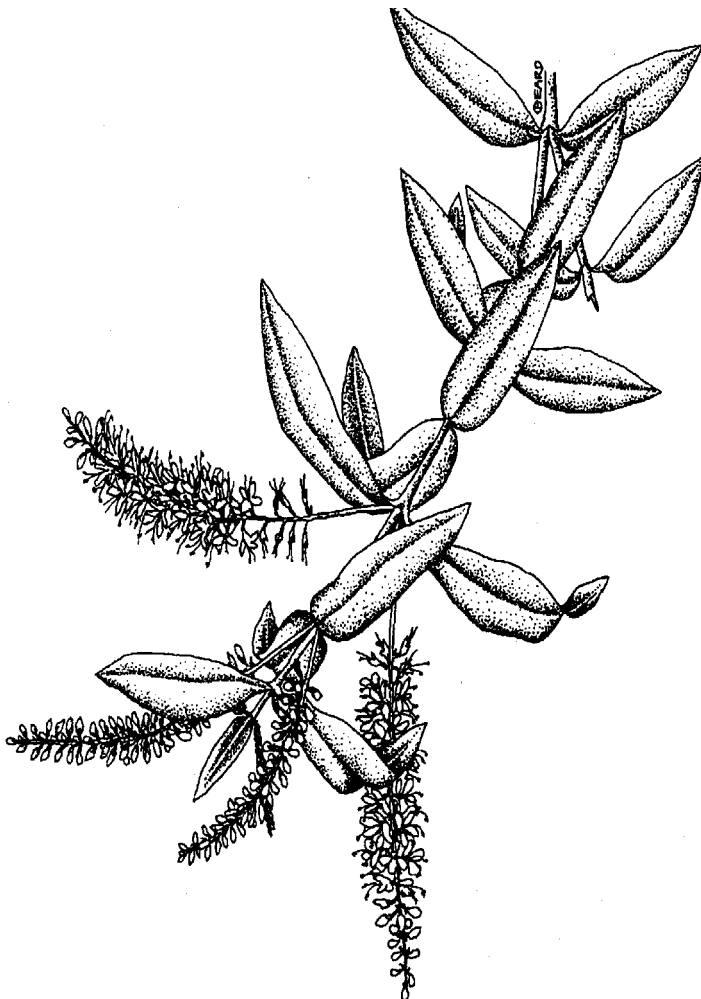
Work undertaken to date

Taxonomic review; survey, and distribution is known; advocacy has occurred with the owners of private sites.

Priority sites for survey

Monitoring: objectives and priority sites

Monitor large populations in relation to weed encroachment (pampas grasses, mistflower) at Lower Piha Gorge, Karamatura Gorge, along track to Mt Donald McLean.



Research questions

How can mist flower be controlled?

Management needs

Weed control of pampas grasses and mist flower; advocacy to prevent inappropriate weed control; population enhancement at sites.

Selected references

de Lange, P.J. 1996. *Hebe bishopiana* (Scrophulariaceae) - an endemic species of the Waitakere Ranges, West Auckland; New Zealand. *New Zealand Journal of Botany* 34: 187-194.

***Hebe breviracemosa* (W.R.B.Oliv.) Cockayne et Allan**

- Family:** Scrophulariaceae
Endemic to: Kermadec Islands.
Common name: Kermadec koromiko.
Ranking: A, Critical. **In cultivation:** Yes.
Descriptor: Shrub reaching 2 m, leaf bud without sinus.
Conservancy: AU.
Habitat: Occurs in open bluff habitat, in understorey with filtered light - is shade tolerant.
Threats: Susceptible to fungal disease (*Septoria exotica*) in cultivation; low recruitment possibly as a result of rat predation of seeds; poor seed set; poor habitat quality; hybridises in cultivation with other *Hebe* species.

Work undertaken to date

Some population enhancement involving the planting out of seedlings on the Kermadecs; the original plant has been caged (1995) with chicken wire to see if seedling germination can occur in the absence of rats; recent survey has located 50 new plants (including seedlings).

Priority sites for survey

Survey of all likely cliff refugia to ascertain if further plants occur.

Monitoring: objectives and priority sites

Monitor success of any population enhancement attempts.

Research questions

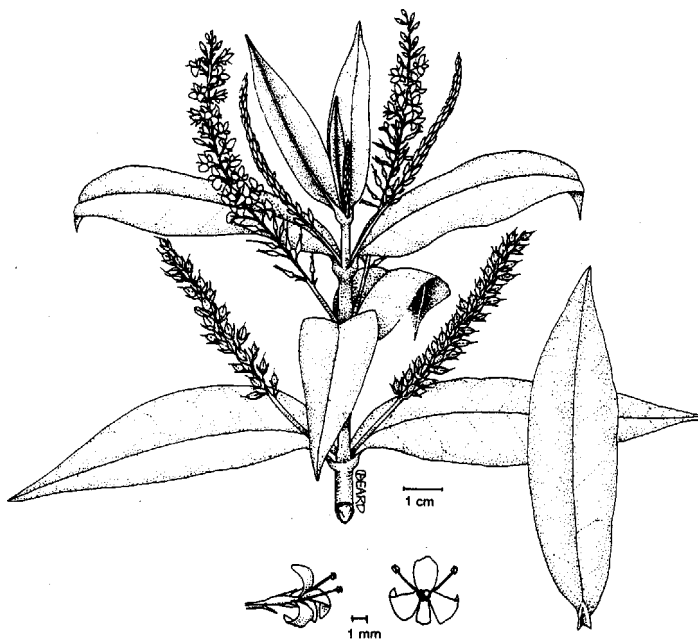
Does predation of seedlings by rats occur?

Management needs

Control fungal disease and hybridism in cultivation; establish in cultivation for research, advocacy, and insurance purposes; continue population enhancement.

Selected references

- de Lange, P.J.; Stanley, R. 1999. Kermadec koromiko (*Hebe breviracemosa*) back from the brink. *Plant Talk* 16: 30-31.
- Sykes, W.R.; West, C.J. 1996. New records and other information on the vascular flora of the Kermadec Islands. *New Zealand Journal of Botany* 34: 447-462.



***Helichrysum dimorphum* Cockayne**

- Family:** Asteraceae
Endemic to: Eastern South Island.
Common name: -
Ranking: A, Endangered. **In cultivation:** Yes.
Descriptor: A scrambling daisy with two leaf forms.
Conservancy: CA, (SL).
Habitat: Grey scrub on dry bluffs, stream margins, and seepage areas.
Threats: Fire; grazing; weed encroachment (exotic brooms); change of land use resulting in habitat loss.

Work undertaken to date

Research on ecology; habitat restoration planting; monitoring of wild populations; population enhancement and translocation; as a result of tenure review all known sites on Flock Hill are likely to be managed by DOC.

Priority sites for survey

The lower Waimakariri Gorge, the lower parts of Iron Creek and Landsdowne Creek, and downstream of the junction of Thomas River and Cave Stream; Waikaia River (Piano Flat).

Monitoring: objectives and priority sites

Continue monitoring success of population enhancement at Puffers Stream, Whale Hill, and the Waimakariri Gorge.

Research questions

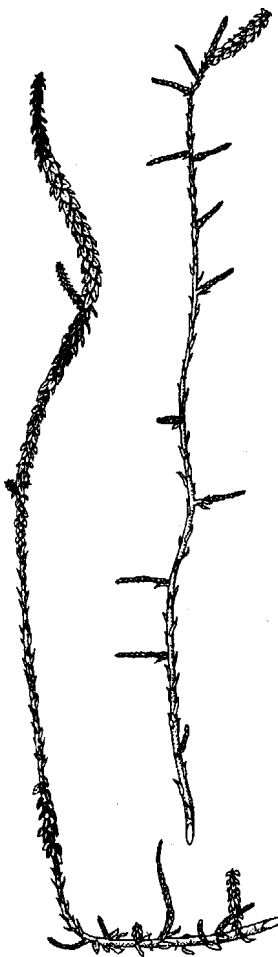
What is the germination success and seedling establishment in the wild? What is the affect on *H. dimorphum* of differing nutrient and water regimes? How does *H. dimorphum* respond to different levels of competition? What is the age structure of the populations? What is the intra- and inter-population genetic variation and gene flow? What soil types are suitable for *H. dimorphum*? How does *H. dimorphum* respond to different levels of competition relating to vegetation composition, age, height, and cover?

Management needs

Habitat restoration and population enhancement for the smaller populations at Slovens Creek, Whale Hill, and the Waimakariri Gorge; weed (exotic broom) control at sites.

Selected references

- Given, D.; Pavlik, B. 1994. *Helichrysum dimorphum*: obscure, unique, and endangered. *Forest and Bird* 272: 39-41.
- Haase, P.; Breitwieser, L; Ward, J.M. 1993. Genetic relationships of *Helichrysum dimorphum* (Inuleae-Compositae (Asteraceae)) with *H. filicaule*, *H. depressum*, and *Raoulia glabra* as resolved by isozyme analysis. *New Zealand Journal of Botany* 31: 59-64.



***Lepidium banksii* Kirk**

Family:	Brassicaceae	
Endemic to:	Nelson and Marlborough.	
Common name:	Coastal peppercress, nau.	
Ranking:	A, Critical.	In cultivation: Yes.
Descriptor:	A semi-succulent coastal cress.	
Conservancy:	NM.	
Habitat:	Confined to the coastal strand along rocky and sandy shorelines, usually in association with seabird colonies.	
Threats:	Browse (insects, possums, goats, rabbits, etc.); rooting by pigs; fungal disease (<i>Albugo candida</i>); loss of coastal bird breeding colonies; loss of natural coastal areas.	

Work undertaken to date

Coastal Cress/Nau Recovery Plan has been published; Coastal Cress Recovery Group set up; survey along the northern coastline of Abel Tasman National Park, islands in Waimea and Moutere Inlets, and Nelson Boulder Bank; populations enhanced along Abel Tasman coast and Waimea Inlet; rabbit eradication from Moutere Inlet islands; translocation to new sites in both inlets and on the two islands in Abel Tasman National Park; nature reserve created for Waimea Inlet population; monitoring set up for populations.

Priority sites for survey

General survey needed along southern Abel Tasman National Park coast and Waimea Inlet for new populations and possible translocation sites.

Monitoring: objectives and priority sites

Population dynamics; follow up to determine success of translocations, and optimum habitat requirements.

Research questions

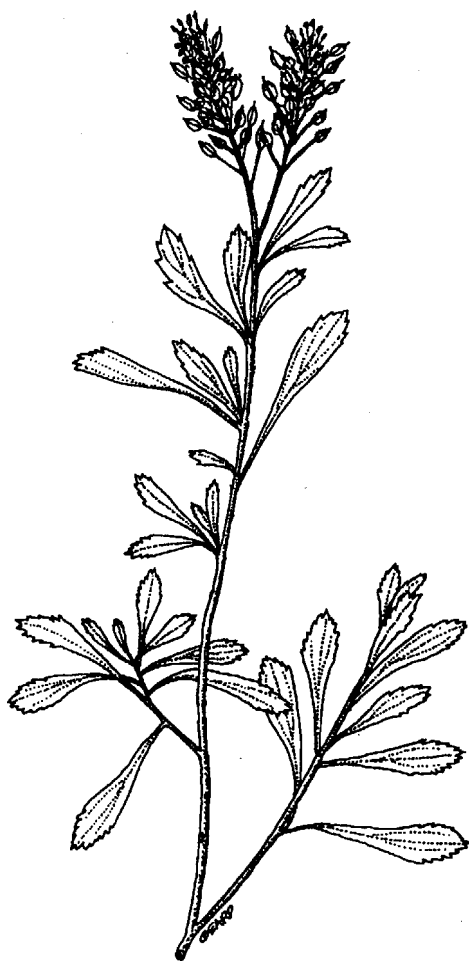
What are the fertility and moisture requirements for *L. banksii*?
How taxonomically distinct is *L. banksii* from the *L. obtusatum* complex?

Management needs

Animal control; disease control; survey to find suitable sites for translocation; undertake translocations; spread seed in suitable rocky, coastal sites.

Selected references

- de Lange, P.J.; Norton, D.A. 1996. To what New Zealand plant does the vernacular "scurvy grass" refer? *New Zealand Journal of Botany* 34: 417-420.
- Garnock Jones, P.J.; Norton, D.A. 1995. *Lepidium naufragorum* (Brassicaceae), a new species from Westland, and notes on other New Zealand coastal *Lepidium*. *New Zealand Journal of Botany* 33:43-51.
- Norton, D.A.; de Lange, P.J. 1999. *National Coastal Cress/Nau Recovery Plan*. Department of Conservation, Wellington.
- Norton, D.A.; de Lange, P.J.; Garnock Jones, P.J.; Given, D. 1997. The role of seabirds and seals in the survival of coastal plants: lessons from New Zealand *Lepidium* (Brassicaceae). *Biodiversity and Conservation* 6: 765-785.



***Lepidium sisymbrioides* subsp. *kawarau* (Petrie) Thell.**

Family: Brassicaceae

Endemic to: Kawarau Gorge.

Common name: Kawarau Gorge peppercress.

Ranking: A, Vulnerable.

In cultivation: Yes.

Descriptor: A grey-green, tap-rooted, perennial cress, the only dioecious species recorded in the Brassicaceae.

Conservancy: OT.

Habitat: Occurs on schist, bluffs, and rock outcrops.

Threats: Fungal disease (*Albugo candida*); lack of legal land protection; livestock browsing; low numbers of both sexes, especially females, may affect population viability.

Work undertaken to date

Survey; research on ecology, including germination, growth, reproduction, and population structure (Landcare Research); monitoring; an Inland Cress Recovery Plan has been funded.

Priority sites for survey

Nevis bluff, Kawarau Gorge, and Mt Difficulty (Otago).

Monitoring: objectives and priority sites

Monitor population trends at Kawarau Gorge.

Research questions

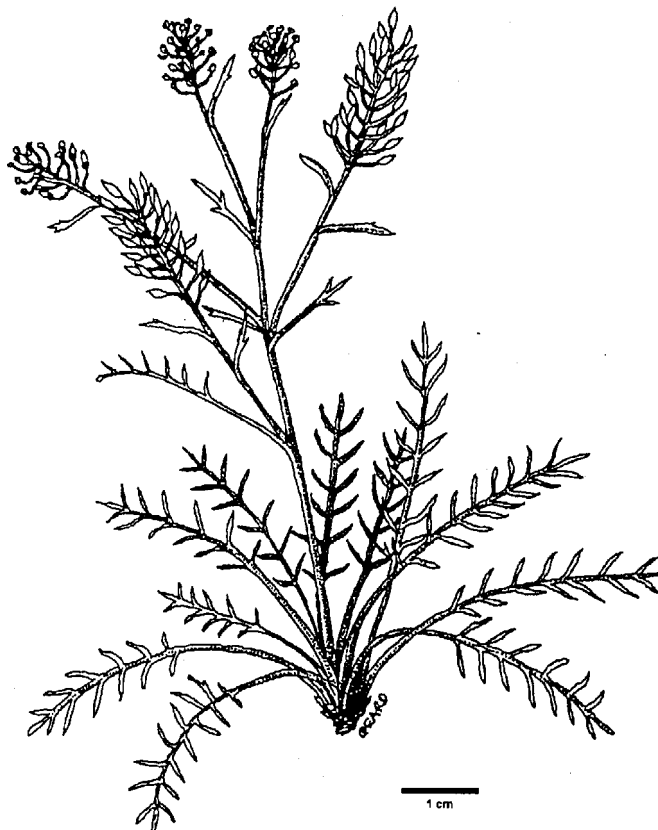
Is soil degradation a cause of decline in *L. s.* subsp. *kawarau* populations? What are the effects of weather conditions on seed maturation and post-dispersal seed and seedling predation? What are the effects of competition and climate on establishment?

Management needs

Disease control; secure legal land protection; advocacy to mitigate livestock browsing.

Selected references

Allen, R.B. 1998. Germination, growth, reproduction, and population structure of three subspecies of *Lepidium sisymbrioides* (Brassicaceae) with respect to taxon rarity. *New Zealand Journal of Botany* 36:439-452.



***Lepidium sisymbrioides* subsp. matau (Petrie) Thell.**

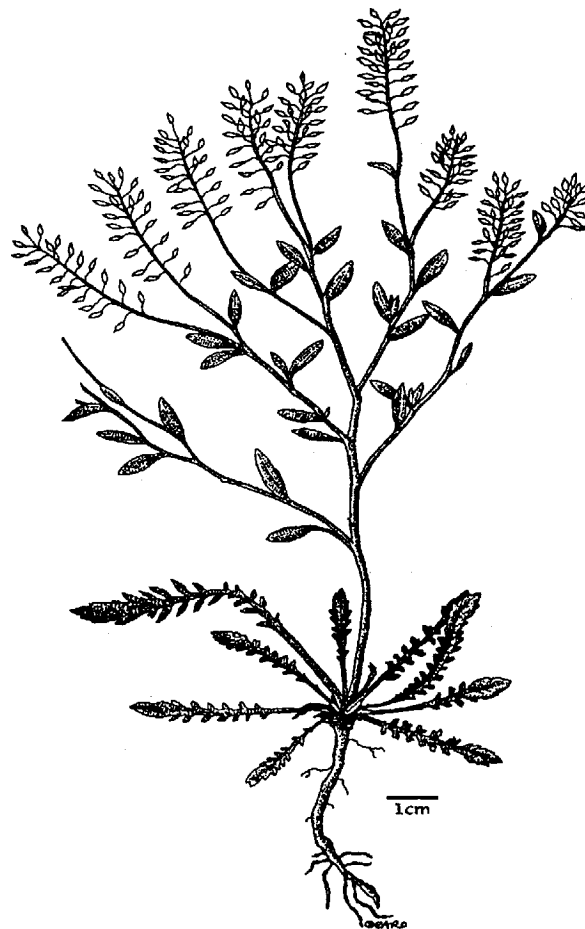
- Family:** Brassicaceae
Endemic to: Maniototo basin.
Common name: Maniototo peppergrass
Ranking: A, Critical. **In cultivation:** Yes.
Descriptor: A dark brown, tap-rooted, compact, perennial cress, the only dioecious species recorded in the Brassicaceae.
Conservancy: OT.
Habitat: Saline soils, and gravelly hillslopes.
Threats: Physical destruction of habitat (irrigation and ploughing); trampling; browse; weed encroachment; lack of legal land protection.

Work undertaken to date

Research on ecology, including germination, growth, reproduction, and population structure; translocations between Galloway sites; monitoring population dynamics; an Inland Cress Recovery Plan is in preparation.

Priority sites for survey

Survey and record Wardle site; survey Olig property when access is permitted.



Monitoring: objectives and priority sites

Continue monitoring success of translocation and population enhancement; monitor marked plants to determine survival in the face of rank growth and intensive grazing.

Research questions

What are the seedling establishment requirements of *L. s.* subsp. *matau*? How are weeds best controlled in saline soils? Is soil degradation a cause of decline in *L. s.* subsp. *matau*? What are the effects of weather conditions on seed maturation and post-dispersal seed and seedling predation? What are the effects of competition and climate on establishment?

Management needs

Population enhancement in the wild; translocation to suitable sites currently absent from; animal control to mitigate trampling and browse; secure legal land protection; find a safe method to remove rank exotic vegetation.

Selected references

- Allen, R.B. 1998. Reproductive ecology of *Lepidium sisymbrioides* subsp. *matau*. *Science for Conservation* 83. Department of Conservation, Wellington.
- Allen, R.B. 1998. Germination, growth, reproduction, and population structure of three subspecies of *Lepidium sisymbrioides* (Brassicaceae) with respect to taxon rarity. *New Zealand Journal of Botany* 36: 439-452.
- Allen, R.B.; McIntosh, P.D. 1997. Guidelines for conservation of salt pans in Central Otago. *Science for Conservation* 49. Department of Conservation, Wellington.
- Hewitt, A.E.; Balks, M.R. 1988. *Review of some halophyte habitats, Central Otago*. Unpublished report, New Zealand Soil Bureau, D.S.I.R., Dunedin.
- Johnson, P.N. 1976. *Central Otago salt pan vegetation - a proposal for two reserves in the Maniototo basin*. Unpublished report, Botany Division, DSIR, Dunedin.
- Partridge, T.R. 1981. *Rare and endangered habitats of New Zealand: inland saline habitats*. Unpublished report, Botany Division, DSIR, Lincoln.

***Leptinella nana* (D.G.Lloyd) D.G.Lloyd et C.J.Webb**

- Family:** Asteraceae
Endemic to: Central New Zealand.
Common name: Pygmy button daisy.
Ranking: A, Endangered. **In cultivation:** Yes.
Descriptor: A moss-like, mat-forming daisy.
Conservancy: WL, NM, CA.
Habitat: Dry, open, loess banks: forested, alluvial terrace depressions subject to frequent river flooding.
Threats: Disruption of processes which maintain open habitats; change in moisture regimes; small population sizes make it vulnerable to catastrophic events; foot traffic; weed encroachment (introduced grasses).

Work undertaken to date

Leptinella nana Recovery Plan in draft; *L. nana* Recovery Group set up, monitoring of Mount Pleasant and Rai Valley populations; some research on ecology and reproductive ecology; population management plan prepared for Wellington Conservancy; fencing, habitat restoration and weeding at Rai Valley; assessment of herbicides to control grass invasion.

Priority sites for survey

Lyttelton Scenic Reserve and Mt Cavendish; general habitats on Port Hills; survey for suitable translocation habitats in the Rai Valley: opportunistic survey.

Monitoring: objectives and priority sites

Monitor effects of population enhancement; monitor the three populations to ensure that necessary disturbance is continuing, and at an appropriate magnitude and frequency to maintain habitat; continue monitoring survival of known populations.

Research questions

What is the effect of disturbance (caused by walkways) on *L. nana*? What are the long-term patterns of persistence and re-colonisation? What are the critical processes which maintain suitable habitat? What are the responses of *L. nana* to combinations of competition and soil characteristics? What is the reproductive system in *L. nana*, and what is the gene flow within populations?

Management needs

Establish in cultivation for research, advocacy, population management, and insurance purposes; population enhancement; if no plants are found at Lyttelton Scenic Reserve, areas of suitable habitat can be used for establishing extra populations; translocate populations once suitable habitat has been located; advocacy to mitigate damage caused by foot traffic; weed control at sites.

Selected references

- Carson, J.A.; Leung, D.W.M. 1994. In vitro flowering and propagation of *Leptinella nana* L., an endangered plant. *New Zealand Journal of Botany* 32: 79-83.
- Lloyd, D.G. 1972. A revision of the New Zealand, Subantarctic, and South American species of *Cotula*, Section *Leptinella*. *New Zealand Journal of Botany* 10:277-372.
- Lloyd, D.G. 1987. The reinstatement of *Leptinella* at generic rank, and the status of the 'Cotuleae' (Asteraceae, Anthemideae). *New Zealand journal of Botany* 25: 99-105.
- Moss, T.C. 1985. Observations on *Cotula nana* Lloyd. *Wellington Botanical Society Bulletin* 42: G4-G7.

***Melicytus drucei* Molloy et B.D.Clarkson**

Family: Violaceae

Endemic to: Egmont National Park.

Common name: -

Ranking: A, Vulnerable.

In cultivation: Yes.

Descriptor: A small, tightly divaricating shrub, with small, dark, sparse leaves that are lightly flecked.

Conservancy: WG.

Habitat: Montane swamp edges.

Threats: Browse by possums, hares, and goats; collecting.

Work undertaken to date

Possum and goat control; monitoring for recovery from possum browse; exclosure plots for possum and hares; taxonomy and ecology studied - *M. drucei* is a good indicator species of habitat health as it responds readily to removal of browse; reproductive ecology is being studied by Landcare Research, Lincoln.

Priority sites for survey

Monitoring: objectives and priority sites

Continue to monitor response to management.

Research questions

What are the germination and recruitment requirements of the seed in the wild?
Is fruit set sexual or asexual?

Management needs

Continue control of goats, possums, and hares; advocacy to mitigate collection; establish plants in cultivation for research, advocacy, and insurance purposes.

Selected references

- Clarkson, B.D.; Molloy, B.P.J.; Barkla, J. 1996. Ecology and conservation of an unnamed shrub *Melicytus* known only from Egmont National Park. *Landcare Research Contract Report* LC 9596/137.
- Molloy, B.P.J.; Clarkson, B.D. 1996. A new, rare species of *Melicytus* (Violaceae) from New Zealand. *New Zealand Journal of Botany* 34: 431-440.

***Metrosideros bartlettii* J.W.Dawson**

Family: Myrtaceae
Endemic to: Te Pahi Ecological district.
Common name: Bartlett's rata.
Ranking: A, Endangered. **In cultivation:** Yes.
Descriptor: Large tree with tissue paper-like white bark, pilose, bright green, twisted leaves (young foliage is yellowish), with an acute tip at the leaf apex, and white flowers.

Conservancy: NL

Habitat: Occurs in mixed broadleaf forest, mostly in remnants in gully bottoms.

Threats: Lack of legal land protection; disturbance by pigs, browse by possums, horses, and cattle; fire; lack of seedling establishment (trampling, seedlings get established on tree ferns that get knocked over, lack of trees to perch on); lack of bird pollination; hybridism with northern rata (*Metrosideros robusta*) confirmed, possible hybrids involving pohutukawa (*Metrosideros excelsa*) have yet to be confirmed genetically.

Work undertaken to date

Population enhancement; new sites located; accessible trees collared against browse; research on reproductive ecology (indicating lack of bird pollination); DNA study into hybridism and genetic variability.

Priority sites for survey

Survey Te Pahi Ecological District; during survey tag/mark/map each plant.

Monitoring: objectives and priority sites

Continue to monitor floral ecology; monitor response (seedling recruitment) to animal exclusion.

Research questions

What is the reproductive ecology of *M. bartlettii*? How can seed set be improved? How much outcrossing is occurring in each population? Is hybridism occurring with *M. excelsa*?

Management needs

Secure legal land protection; fence catchment to exclude animals;- monitor collars to ensure *M. bartlettii* does not outgrow them.

Selected references

Dawson, J.W. 1985. *Metrosideros bartlettii* (Myrtaceae) a new species from North Cape, New Zealand. *New Zealand journal of Botany* 23: 607-610.

***Muehlenbeckia astonii* Petrie**

- Family:** Polygonaceae
- Endemic to:** Eastern and central New Zealand.
- Common name:** Shrubby tororaro.
- Ranking:** A, Endangered. **In cultivation:** Yes.
- Descriptor:** Much-branched, deciduous shrub up to 3 m.
- Conservancy:** WL, NM, CA.
- Habitat:** Dry grey scrub communities of coastal to lowland sites, in moderate to high-fertility soils.
- Threats:** Habitat fragmentation and degradation, including human land use practices; recruitment failure as a result of single sex populations and hybridism; browsing and trampling; lack of legal land protection; weed encroachment, including smothering by vines and marram grass (*Ammophila arenaria*).

Work undertaken to date

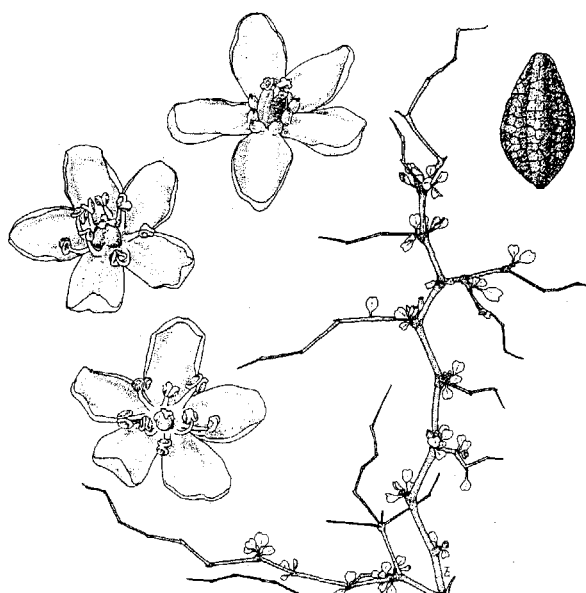
Extensive survey, monitoring; review of ecology and threats; restoration planting at Honeycomb rock, Kaitorete Scientific Reserve and Balmoral Reserve, North Canterbury; population enhancement at Cape Campbell; research being conducted on regeneration requirements; management plan prepared for all populations in Wellington Conservancy; draft *M. astonii* Recovery Plan prepared by the Department; *M. astonii* Recovery Group set up.

Priority sites for survey

Waikari, Waiiau Ecological District; North Canterbury hills.

Monitoring: objectives and priority sites

Monitor population enhancement and measure seedling recruitment following fencing of populations at Sinclair Head, Eastern Wairarapa coast; recruitment at Kaitorete Spit in response to vegetation management especially lack of grazing;



monitor response to management at Cape Campbell; monitor the successfulness of the restoration of *M. astonii* to the wild.

Research questions

How is the habitat of *M. astonii* restored to secure viable populations?

Management needs

Habitat restoration; re-leasing at Cape Campbell; secure genetic remnants to prevent further genetic loss and establish population enhancement of existing populations so they are viable; in Canterbury fencing is required to exclude stock from Kaitorete Scientific Reserve, and entire dune system; population enhancement; establish ex situ collections for the Balmoral (Hurunui) provenance and undertake translocation to a nearby site in the wild without the serious (exotic) broom problem; animal control; seizure legal land protection of *M. astonii* throughout the country; weed control at sites.

Selected references

- de Lange, P.J. (comp.) 1999. *Shrubby Tororaro (Muelilenbeckia astonii) Recovery Plan*. Department of Conservation, Wellington.
- de Lange, P.J.; Pitt, F. 1998. Typification of *Muelilenbeckia astonii* Petrie. *New Zealand Journal of Botany* 36: 305-306.
- de Lange, P.J.; Silbery, T. 1993. Saving the shrubby tororaro (*Muelilenbeckia astonii* Petrie) - an urban approach to threatened plant conservation. In: *People, Plants and Conservation. Botanical Gardens into the 21st Century*. Pp. 11-19. Royal New Zealand Institute of Horticulture, Wellington.
- Sawyer, JWD 1997. Plant Conservation outside reserves in the lower North Island, New Zealand. In: Hale, P.; Lamb, D. (Eds). *Conservation Outside Nature Reserves*. The University of Queensland, Queensland.

***Myosotis australis* var. *lytteltonensis* Laing et Wall**

Family: Boraginaceae

Endemic to: Banks Peninsula.

Common name: -

Ranking: A, Vulnerable.

In cultivation: Yes.

Descriptor: A robust, multi-headed, white-flowering forget-me-not.

Conservancy: CA.

Habitat: Ledges on steep basalt tops, growing with herbs and shrubs.

Threats: Habitat degradation by goats; weed encroachment (grasses); lack of legal land protection.

Work undertaken to date

Limited survey; survey completed of Wellington South Coast beside quarry; similar forms have been recorded on the South Wellington Coast and Marlborough; *Myosotis* genus being revised by A. Robertson, Massey University.

Priority sites for survey

Historical sites; further sites on the tops around Lyttelton, Purau and other sites referenced in Bank's Peninsula Protected Natural Areas report; continue to resurvey South Wellington Coast.

Monitoring: objectives and priority sites

Monitor population trends and effects of removing grazing at selected populations at Banks Peninsula.

Research questions

What is the taxonomic status of the *M. australis* complex? What are the threats to *M. a.* var. *lytteltonensis*? What are the habitat requirements for *M. a.* var. *lytteltonensis*? What are the population dynamics? What is the viability of *M. a.* var. *lytteltonensis* populations?

Management needs

Goat control; possible weed control; continue legal land protection negotiations and covenanting of sites.

Selected references

***Olearia gardneri* (Hook.f.) Heads**

- Family:** Asteraceae
- Endemic to:** Central and eastern North Island.
- Common name:** Deciduous tree daisy, Gardner's tree daisy.
- Ranking:** A, Endangered. **In cultivation:** Yes.
- Descriptor:** Deciduous shrub or small tree (3 m) with very rough bark on arching, wide-spreading branches, and white, strongly scented flowers.
- Conservancy:** WG, WL, (EC/HB).
- Habitat:** Occurs on edges of forest margins, in gaps, and on river margins.
- Threats:** Recruitment failure as a result of grazing and replacement by grass species; lack of legal land protection; moribund individuals, resulting in reduced seed production; habitat fragmentation and destruction; smothering by old man's beard and muehlenbeckia.

Work undertaken to date

Survey in all North Island conservancies; monitoring; population enhancement and translocation; ecology reviewed; taxonomic revision; physical protection of plants and population specific management plans prepared in Wellington Conservancy; thirteen locally sourced, cutting-grown shrubs planted in Paengaroa Scenic Reserve near Taihape 1996-97; cytology has been investigated.

Priority sites for survey

Taihape (historical site); southern and eastern Hawke's Bay in alluvial, podocarp, frost flat remnants (high fertility sites).

Monitoring: objectives and priority sites

Monitor success of translocations and effect of management; inspect known sites regularly to ensure fences are intact.

Research questions

Does habitat manipulation (e.g. clearing grasses to prepare seed beds) enhance seedling establishment of *O. gardneri*? Germination experiments (in progress).

Management needs

Advocacy to ensure landowners are aware of the presence of the plant on their property, and to mitigate the effects of grazing; weed control at sites; secure legal land protection; translocate to historic sites in Hawke's Bay; population enhancement where necessary; establish in cultivation for research, advocacy, and insurance purposes.

Selected references

- Heads, M. -1998. Biodiversity in the New Zealand divaricating tree daisies: *Olearia* sect. nov. (Compositae). *Botanical Journal of the Linnean Society* 127: 239-285.
- Rogers, G.M. 1995. Regeneration ecology, conservation status and recovery planning for the endangered *Olearia hectorii*. *Landcare Research contract LC9495/60*.
- Rogers, G.M. 1996. Aspects of the ecology and conservation of the threatened tree *Olearia hectorii* in New Zealand. *New Zealand Journal of Botany* 34: 227-240.

***Olearia hectorii* Flook.f.**

- Family:** Asteraceae
Endemic to: Eastern South Island.
Common name: Deciduous tree daisy, Hector's tree daisy.
Ranking: A, Endangered. **In cultivation:** Yes.
Descriptor: Deciduous small tree (up to 9 m) with arching, wide-spreading branches and yellow flowers.
Conservancy: NM, OT, SL, (CA).
Habitat: Alluvial forest and lowland to montane grey scrub on fertile substrates.
Threats: Physical destruction of habitat (fire, farm development); lack of legal land protection; weed encroachment (grasses), lack of regeneration and recruitment as a result of weed encroachment; grazing; disruption of the physical processes providing establishment sites.

Work undertaken to date

Survey in all South Island Conservancies; failed trials for seed germination (Nelson/Marlborough Conservancy); negotiation for, set up, and monitoring of, grazing regime trial (Nelson/Marlborough Conservancy); ecology and conservation status report published; taxonomic revision; survey in Hokonui Hills and the Catlins; population enhancement at two sites, and translocation to three Scenic Reserves (Southland).

Priority sites for survey

Mid Clarence River; Hokonui Hills; Catlins.

Monitoring: objectives and priority sites

Monitor seedling recruitment at Bluff Station; continue monitoring responses to grazing regime trials, Nelson/Marlborough Conservancy.

Research questions

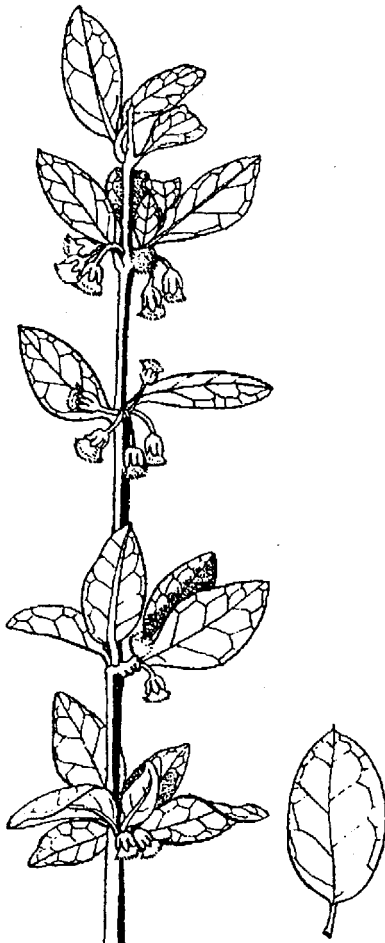
What are the optimal germination conditions of *Olearia hectorii*?

Management needs

Undertake habitat restoration; continue population enhancement and translocation work at the existing sites and initiate additional work at other key sites in Southland; secure legal land protection; establish in cultivation for research, advocacy, and insurance purposes; advocacy with landowners to mitigate effects of grazing.

Selected references

- Heads, M. 1998. Biodiversity in the New Zealand divaricating tree daisies: *Olearia* sect. nov. (Compositae). *Botanical Journal of the Linnean Society*, 127: 239-285.
- Rogers, G.M. 1995. Regeneration ecology, conservation status and recovery planning for the endangered *Olearia hectorii*. *Landcare Research contract LC9495/60*
- Rogers, G.M. 1996. Aspects of the ecology and conservation of the threatened tree *Olearia hectorii* in New Zealand. *New Zealand Journal of Botany* 34: 227-240.
- Rogers, G.; Barkla, J.; Rance, B.; Simpson, N. 1999. Recent discoveries of rare small-leaved shrubs and trees from Otago and Southland. *New Zealand Botanical Society newsletter* 54: 8-13.



***Olearia pachyphylla* Cheeseman**

- Family:** Asteraceae
Endemic to: Greater Bay of Plenty.
Common name: Thick-leaved tree daisy.
Ranking: A, Endangered. **In cultivation:** Yes.
Descriptor: Robust, large-leaved shrub up to 3 m with spreading branches and showy, white flowers.
Conservancy: WK, EC/HB.
Habitat: Coastal and inland shrublands, in damp sites.
Threats: Goats; fire; lack of legal land protection.

Work undertaken to date

Survey of former location at Coromandel, study on ecosystem management.

Priority sites for survey

Opportunistic at Waikawau Bay, Port Charles, Kennedy Bay, Shakespeare Bluff, Sandy Bay (Waikato).

Monitoring: objectives and priority sites

Continue monitoring population dynamics at Opepe to determine the critical life history phase for the regeneration of the species (recently undertaken by Landcare Research).

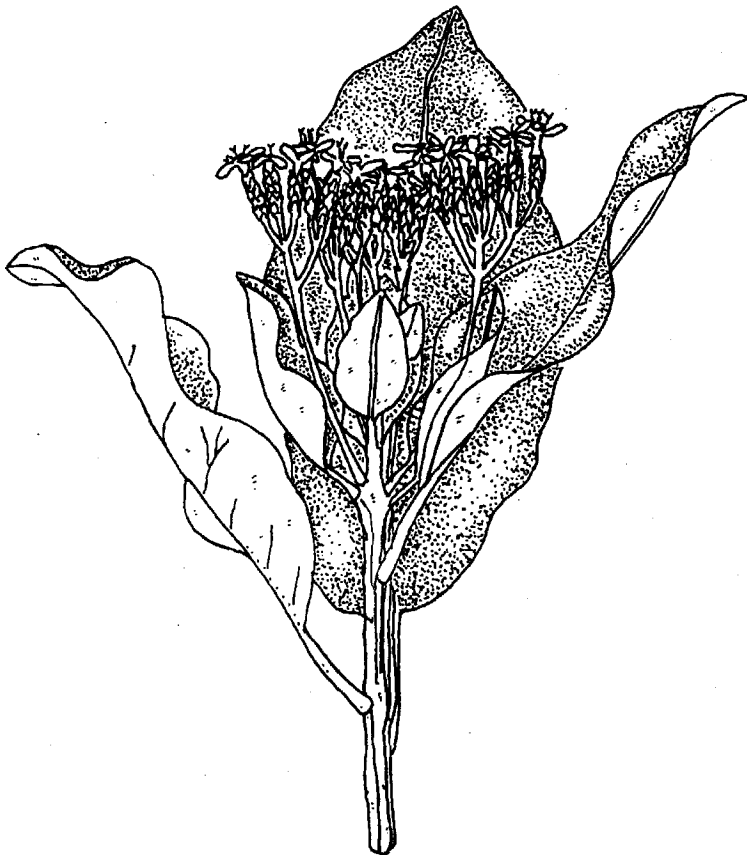
Research questions

What are the germination and seedling establishment requirements for *Olearia pachyphylla*?

Management needs

Advocacy with landowners regarding goat control (Waikato); secure legal land protection.

Selected references



***Pennantia baylisiana* (W.R.B.Oliv.) G.T.S.Baylis**

- Family:** Icacinaceae
Endemic to: Three Kings Island Group.
Common name: -
Ranking: A, Critical. **In cultivation:** Yes.
Descriptor: Small tree with large dark-green, entire, glossy, saddle-shaped leaves.
Conservancy: NL.
Habitat: Presently on scree slope, but specific requirements are unknown.
Threats: Habitat destruction; one female plant known in the wild susceptible to catastrophic events; lack of natural regeneration.

Work undertaken to date

Cytology determined and reproductive status reviewed; monitoring; *Pennantia baylisiana* Recovery Plan in preparation by the Department of Conservation.

Priority sites for survey

Monitoring: objectives and priority sites

Monitor the habitat requirements and over-all condition of the wild plant on Manawa Tawhi (Great Island, Three Kings group).

Research questions

What is the taxonomic basis for the recognition of *P. baylisiana* being distinct from *P. endlicheri*? If they are not conspecific, how do the ecology and habitat requirements of *P. baylisiana* differ from *P. endlicheri*? What are the optimal habitat requirements for *P. baylisiana*?



Management needs

Completion and publication of the *P. baylisiana* Recovery Plan; recommendations to be followed once the plan is approved; advocacy with iwi and the public on management options.

Selected references

- Mole, R.H. 1989. *Pennantia* 'Otari Debut'. *Wellington Botanical Society Bulletin* 45: 54-57.
- Murray, B.G.; de Lange, P.J. 1995. Chromosome numbers in the endemic *Pennantia baylisiana* (W.R.B.Oliv.) G.T.S. Baylis (Icacinaceae) and related species. *New Zealand Journal of Botany* 33: 563-564.
- Wright, A.E. 1989. *Pennantia baylisiana* fruiting on Great Island, Three Kings. *New Zealand Botanical Society Newsletter* 15: 16.

***Pittosporum ellipticum* subsp. *serpentinum* de Lange**

Family: Pittosporaceae

Endemic to: Te Pahi Ecological District.

Common name: -

Ranking: A, Endangered.

In cultivation:

Descriptor: Sprawling, semi-erect, low shrub with small leathery leaves covered in thick orange/red felt.

Conservancy: NL.

Habitat: Bluffs, erosion gullies and semi stabilised scree.

Threats: Lack of recruitment; possum browse; pig rooting; weed encroachment (e.g., pampas grass, hakea).

Work undertaken to date

Survey; attempts at germination/propagation; taxonomy recently resolved.

Priority sites for survey

Monitoring: objectives and. priority sites

Monitor to track population trends.

Research questions

What is causing the lack of recruitment in *P. e.* subsp. *serpentinum* populations?

Management needs

Advocacy with iwi regarding the impact of pigs and weeds; undertake pest and weed (pampas grass and hakea) control.

Selected references

de Lange, P.J. 1998. *Pittosporum ellipticum* subsp. *serpentinum* (Pittosporaceae) - a new ultramafic endemic from the Surville Cliffs, North Cape, New Zealand. *New Zealand Journal of Botany* 36: 389-39?.

***Plantago spathulata* subsp. *picta* (Colenso) Sykes**

Family: Plantaginaceae

Endemic to: East Coast.

Common name: -

Ranking: A, Endangered.

In cultivation: Yes.

Descriptor: A semi-succulent, olive-green, broad-leaved plantain.

Conservancy: EC/HB.

Habitat: Coastal sites occurring on open, erosion-prone mudstone bluffs.

Threats: Browsing and trampling by goats; accelerated erosion resulting in habitat loss.

Work undertaken to date

Survey of coastal bluffs south of Tolaga Bay and at Te Araroa.

Priority sites for survey

East Cape coastal bluffs.

Monitoring: objectives and priority sites

Monitor goat browse on known populations at Te Araroa and south of Tolaga Bay; Whangakeno (East) Island population after removal of kiore.

Research questions

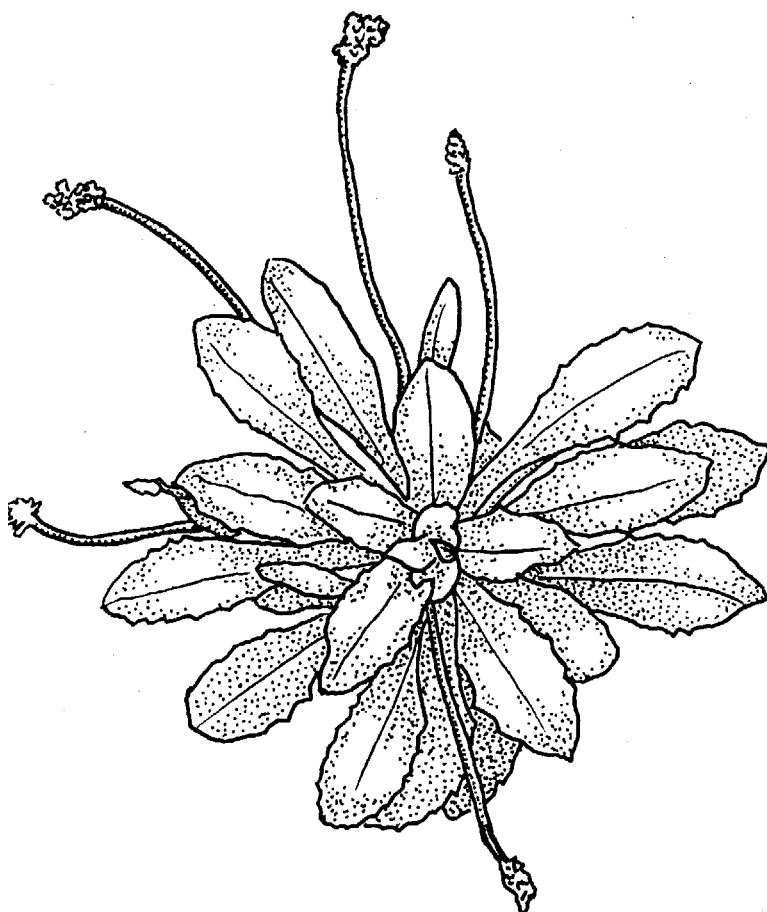
What is the impact of goat browse on *Plantago spathulata* subsp. *picta*?

Management needs

Goat control; secure legal land protection.

Selected references

Wilson, C.M.; Given, D.R. 1989. *Threatened Plants of New Zealand*. DSIR Publishing, Wellington.



***Pterostylis micromega* Hook.f.**

- Family:** Orchidaceae
Endemic to: New Zealand.
Common name: Swamp greenhood.
Ranking: A, Endangered. **In cultivation:** Yes.
Descriptor: Large flowered, green-hood orchid with small, wavy leaves.
Conservancy: WK, TT, WG, EC/H13, WL, (NL, BP, NM).
Habitat: Swamps, mires, and bogs of mesic to early oligotrophic (pH band ~6).
Threats: Habitat degradation (fluctuating water levels as a result of water extraction); weed encroachment (including willows and grasses); collectors; trampling by stock on wetland margins.

Work undertaken to date

Survey and monitoring (Waverley, Tangiwai); unsuccessful surveys at Lake Wairarapa, Kuripapango, Eltham/Ngaere Swamps, and Mangaroa Swamp; located at National Park Wetland, National Park; taxonomic status known and cytological work has been done.

Priority sites for survey

Chatham Islands; Cobb Valley (North West Nelson); rest of Ihupuku (Waverley); Waiouru wetlands, Kuripapango Lakes.

Monitoring: objectives and priority sites

Known sites for population trends and weeds (willow, osmunda, hemp agrimony, lotus, grasses).

Research questions

What is the best disturbance regime required to maintain the populations? How can weeds be effectively controlled to protect threatened wetland plants? What is the distribution, and threats to *P. micromega* in the Tongariro/Taupo Conservancy?

Management needs

Appropriate water regime main-tenance; weed control; advocacy to mitigate the effects of collecting, and stock trampling.

Selected references

- Champion, P.D. 1998. Selective control of weeds in New Zealand wetlands using herbicides. NIWA Client Report DOC80220. National Institute of Water & Atmospheric Research Ltd, Hamilton.
- Clarkson, B.R.; Druce, A.P. 1984. *Flora and vegetation of Kaweka Lakes, Kaweka State Forest Park*. Unpublished report. Botany Division, DSIR.
- St George, I.; Irwin, B.; Hatch, D. 1996. *Field guide to the New Zealand orchids*. New Zealand Orchid Group, Wellington.



***Ranunculus recens* s.l. Kirk**

Family: Ranunculaceae

Endemic to: New Zealand.

Common name: -

Ranking: A, Critical.

In cultivation: Yes.

Descriptor: A light- to dark-green or brown, firmly fleshy, small, rosette buttercup.

Conservancy: WG, NM, OT, SL, (WL).

Habitat: Dune hollows and coastal turf. Inland montane flushes and turfs.

Threats: Weed encroachment; grazing, trampling, and habitat degradation by horses, cattle and sheep; coastal erosion; lack of legal land protection.

Work undertaken to date

Cytology resolved and the taxonomic status in advanced stages of preparation; survey throughout its range; monitoring (Moawhango, Manaia, North-West Nelson); translocation of 40 seedlings to two new areas of the sea cliffs west of Manaia; removal of horses; research undertaken on characterisation of coastal turf communities.

Priority sites for survey

Chatham Island; Southland, Stewart Island and Otago Coast; Nelson (ongoing along Te Taitapu coast); Horowhenua coast.

Monitoring: objectives and priority sites

Continue monitoring population dynamics at Moawhango and Manaia; monitor translocations at the Manaia site; monitor weed encroachment at the Nelson sites; monitor population dynamics of each entity of *R. recens*.

Research questions

What are the optimal requirements for seedling establishment? How are coastal turf communities best managed?

Management needs

Weed control; animal control, including fencing of habitat (Nelson/Marlborough); secure legal land protection; population enhancement.

Selected references

Department of Conservation 1997. *Moawhango Ecology - Native plants at risk*. Department of Conservation, Wanganui Conservancy.

***Sebaea ovata* (Labill.) R.Br.**

- Family:** Gentianaceae
Endemic to: Indigenous to New Zealand and Australia.
Common name: -
Ranking: A, Critical. **In cultivation:** No.
Descriptor: Small, short-lived (8-10 weeks), erect, sparingly branched herb with yellow flowers and yellow-green leaves.
Conservancy: WG, (NL, EC/HB, WL, CA).
Habitat: Coastal and lowland ephemeral wetlands with open ground, including dune hollows.
Threats: Habitat destruction; weed encroachment (pasture grasses, clovers); browse (plume moth caterpillars); cattle trampling.

Work undertaken to date

Monitoring at Whitiua Scientific Reserve; survey at Hokio and Turakirae (none found); population enhancement, weed control, and artificial disturbance of habitats to create seed beds has been attempted at Whitiua Scientific Reserve, Wanganui.

Priority sites for survey

Historical sites.

Monitoring: objectives and priority sites

Monitor population dynamics at Whangaehu River mouth (Whitiua Scientific Reserve); monitor success of restoration efforts.

Research questions

What is the taxonomic relationship between *Sebaea ovata* in New Zealand and Australia? What are the population dynamics of its boom/bust pattern? Does the habitat require disturbance for germination? What is the reproductive ecology? Do plume moth larvae threaten the plants or their seed production?

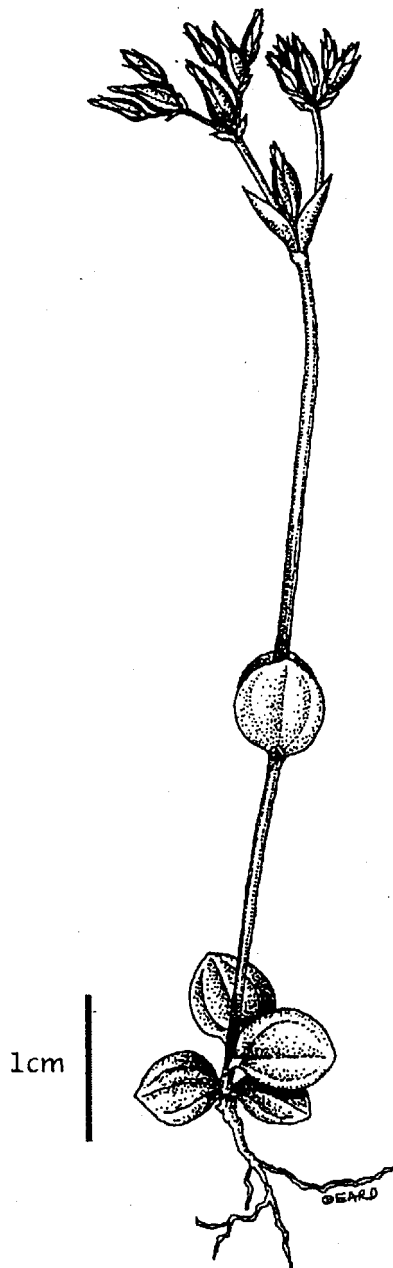
Management needs

Population enhancement by spreading seeds into areas with few or low seedling numbers; artificial disturbance of habitats to create seed beds; restore plants to suitable habitat, including historic sites; establish in cultivation for research, advocacy, population management, and insurance purposes; weed control; cattle control.

Selected references

Champion, P.D. 1998. Selective control of weeds in New Zealand wetlands using herbicides. NIWA Client Report DOC80220. National Institute of Water & Atmospheric Research Ltd, Hamilton.

Ogle, C.C. 1989. *Sebaea ovata* (Gentianaceae) and its habitat near Wanganui. *Wellington Botanical Society Bulletin* 45: 92-99.



***Tecomanthe speciosa* W.R.B.Oliv.**

- Family:** Bignoniaceae
Endemic to: Three Kings Island Group.
Common name: Tecomanthe.
Ranking: A, Critical. **In cultivation:** Yes.
Descriptor: A woody vine with twining stems and large, cream, trumpet flowers.
Conservancy: NL.
Habitat: Presently growing in shallow damp soil, but otherwise unknown. Does require high light conditions to flower.
Threats: Only one plant in the wild susceptible to catastrophic events; lack of reproduction as a result of shading by the canopy.

Work undertaken to date

Tecomanthe speciosa Recovery Plan in preparation by the Department of Conservation; monitoring.

Priority sites for survey

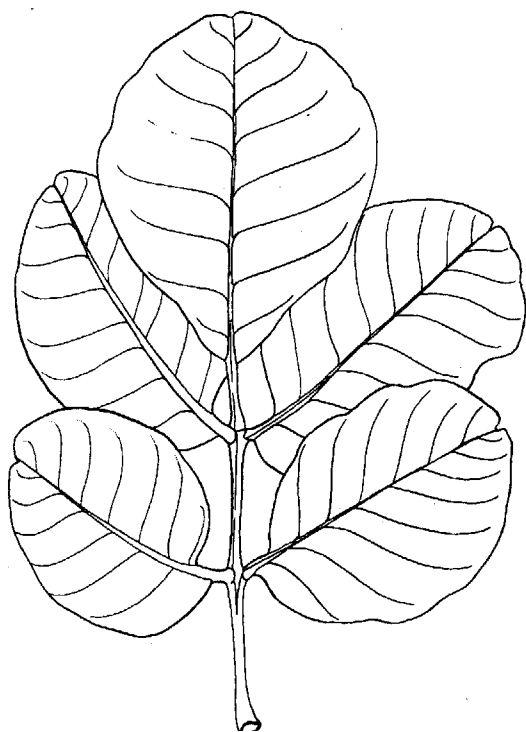
Monitoring: objectives and priority sites

Monitor remaining plant and any population enhancement.

Research questions

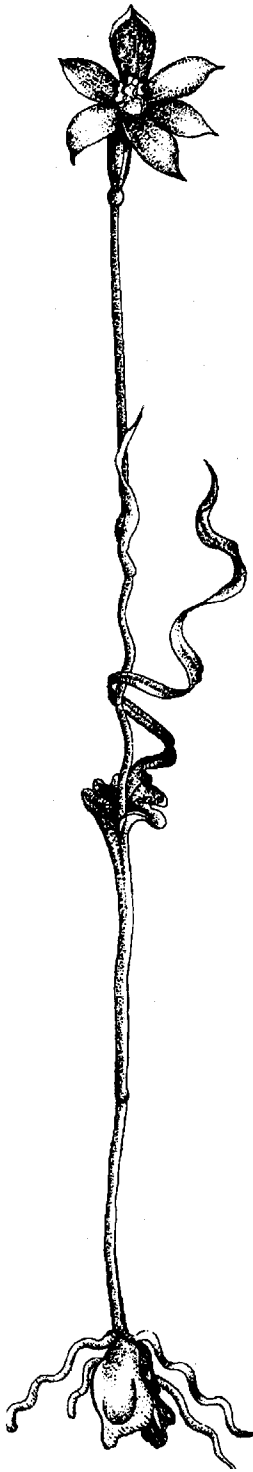
Management needs

Completion and publication of *T. speciosa* Recovery Plan, and restore on Manawa Tawhi (Great Island) according to agreed techniques; advocacy with iwi and public re: management options.



Selected references

- de Lange, P.J. 1996. Critically endangered Three Kings vine (*Tecomanthe speciosa*) flowers after 50 year hiatus. *Species* 26, 27: 27-28.
- Hunter, J.A. 1958. Additional notes on *Tecomanthe speciosa* W.R.B. Oliver (Bignoniaceae) from the Three Kings Islands, New Zealand. *Records of the Auckland Institute and Museum* 5: 41-42.
- Hunter, J.A.; Cooper, R.C. 1962. Variation in *Tecomanthe speciosa* W.R.B. Oliver (Bignoniaceae) from the Three Kings Islands, New Zealand. *Records of the Auckland Institute and Museum* 5: 233-246.
- Hunter, J.A. 1967. A further note on *Tecomanthe speciosa* W.R.B. Oliver (Bignoniaceae). *Records of the Auckland Institute and Museum* 6:169-170.
- Platt, G.; de Lange, P.J. 1995. Conservation strategies for *Tecomanthe speciosa* and *Pennantia baylisiana*. In: *International symposium on conservation of rare and endangered species of fauna and flora conference proceedings*. Guilin, China. Pp. 4-
- Simpson, P.G. 1986. The rehabilitation of endangered plant species on the Three Kings Islands with particular reference to *Tecomanthe speciosa*. In: Wright, A.E.; Beever, R.E. (Eds). *The Offshore Islands of Northern New Zealand. Department of Lands and Survey Information Series No. 16: 187-195.*



***Thelymitra matthewsii* Cheeseman**

Family: Orchidaceae

Endemic to: Indigenous to New Zealand and Australia.

Common name: Spiral sun orchid.

Ranking: A, Critical.

In cultivation: No.

Descriptor: An orchid with a leaf that spirals round the stem, and dark purple flowers with darker stripes.

Conservancy: NL.

Habitat: Favouring open, depleted gumland.

Threats: Collectors; trampling by people; wind erosion of unstable dune habitat. This species is also under threat in Australia.

Work undertaken to date

Opportunistic survey at Te Paki; monitoring of one population by New Zealand Native Orchid Group members.

Priority sites for survey

Te Paki, Te Aupori Peninsula.

Monitoring: objectives and priority sites

Cape Reinga for population dynamics; monitoring at Rubbish Dump Hill site.

Research questions

Management needs

Advocacy to mitigate collection.

Selected references