National Recovery Plan for the Chariot Wheels *Maireana cheelii*

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Australian Government

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This is a Recovery Plan prepared under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999, with the assistance of funding provided by the Australian Government.

This Recovery Plan has been developed with the involvement and cooperation of a range of stakeholders, but individual stakeholders have not necessarily committed to undertaking specific actions. The attainment of objectives and the provision of funds may be subject to budgetary and other constraints affecting the parties involved. Proposed actions may be subject to modification over the life of the plan due to changes in knowledge.

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Cover photograph: Chariot Wheels *Maireana cheeli* by Norm Stimson (Enviro Images).

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Summary

The Chariot Wheels *Maireana cheelii* is a small, tufted perennial shrub belonging to the saltbush family Chenopodiaceae. The species was once widely distributed across the inland plains of south-eastern Australia, occurring from south-western Queensland through western New South Wales to north-western Victoria. However, conversion of much of its former range to agriculture has resulted in an extensive decline in range and abundance. The species is now extinct in Queensland and northern NSW, and survives only in southern NSW and Victoria, where there are about 17 populations containing perhaps 700,000 plants. Most of these populations occur on private land or along roadsides, where they are threatened by continued degradation and destruction of habitat from weed invasion, grazing, cropping, clearing and increasing salinity.

The Chariot Wheels is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999. It is also listed as Threatened under the Victorian *Flora and Fauna Guarantee Act* 1988 and Vulnerable under the New South Wales *Threatened Species Conservation Act* 1995. This national Recovery Plan for the Chariot Wheels details the species' distribution and biology, conservation status, threats, and recovery objectives and actions necessary to ensure its long-term survival.

Species Information

Description

The Chariot Wheels *Maireana cheelii* is a small, tufted perennial shrub growing to 20 cm tall, from the saltbush family Chenopodiaceae. It has slender, woolly, erect branches arising from a swollen taproot and fleshy, linear, alternate leaves 5–9cm long. The Chariot Wheels flowers and fruits in the spring, producing tiny green flowers about 1 mm wide in the leaf axils. The distinctive fruit has five fan-shaped, spreading woolly wings arranged in a circular fashion, the fruiting perianth to 6 mm in diameter, to which the common name of 'Chariot Wheels' refers (description from Walsh 1996). Very little is known of the biology and ecology of the species.

distinctive wooly, 'spoked' fruits of Chariot Wheels
photo by Norm Stimson (Enviro Images)

plant growing on sparsely vegetated clay scald
photo by Jamie Mavromihalis

Distribution

The Chariot Wheels was once widely distributed on the inland plains of south-eastern Australia, from south-western Queensland through western New South Wales to north-western Victoria (Figure 1). The species was recorded in south-western Queensland in 1936, at two locations

close to Eulo on the Paroo River plain and on a private pastoral property (Nockatunga) about 125 km west of Thargomindah, in the Mulga Lands IBRA bioregion (sensu DEH 2000). No record of the species has been made at either location since 1936, and it is likely that Chariot Wheels is extinct in Queensland. In New South Wales, *M. cheelii* once occurred near Wanaaring in the far north, in the Mulga Lands bioregion, but is now extinct in the region. Remaining populations occur in the western Riverina IBRA bioregion, mostly between Hay and Deniliquin but extending as far west as Moulamein. The eastern extent of its distribution is unclear but it is likely to occur across to the Newell Highway between Jerilderie and Morundah. In Victoria, it occurs in the north-west of the State, within an area broadly bounded by Mitiamo in the east, Swan Hill in the north and Minyip in the south, in the Riverina & Murray Darling Depression IBRA bioregions. Maps showing the current distribution of Chariot Wheels are available from the Department of Sustainability and Environment (for Victoria) and the Department of Environment and Climate Change (for New South Wales).

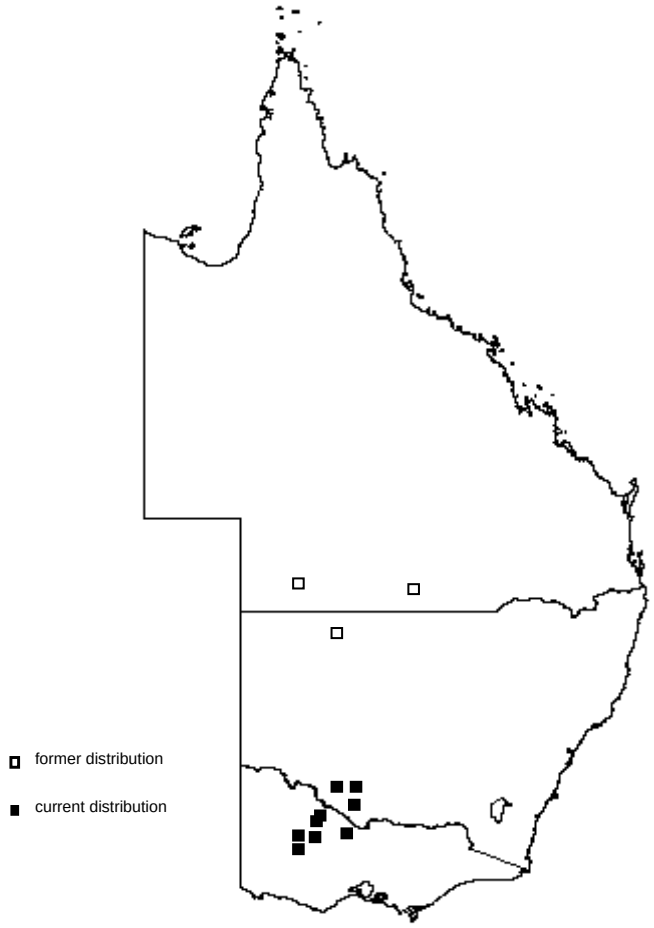

Figure 1. Former and current distribution of Chariot Wheels

Habitat

The Chariot Wheels is usually found in chenopod shrubland and grassland communities on heavy clay soils, dominated by various native shrubs, grasses and herbs, notably Hairy Bluebush *Maireana pentagona*, Bottle Bluebush *Maireana excavata,* Nitre-bush *Nitraria billardierei*, *Austrostipa nodosa, A. scabra*, *Erodium crinitum*, *Rhodanthe corymbiflorum*, *Hyalosperma semisterile* and *H. glutinosa*. In NSW the species appears to favour heavier grey clay soils that support Bladder Saltbush *Atriplex vesicaria* communities. Chariot Wheels typically occupies sparsely vegetated sites, with a high proportion of bare ground, often as a result of over-grazing and subsequent wind erosion. It often occurs in low-lying sites that

become waterlogged during the winter months, and may be slightly saline. It is likely that a loss of habitat and the lack of competition from other species due to the occupation of a relatively hostile environmental niche are factors influencing the current distribution of the species. Recovery actions include mapping of habitat that is critical to survival of Chariot Wheels.

Population Information

Chariot Wheels has been recorded from about 30 sites in Victoria and NSW since 1950, almost all on roadsides or on private land, with few records in reserves. Since 2000, plants have been recorded in about 15 populations, with most plants occurring in just six populations, five in Victoria and one in New South Wales (Table 1), with four on private property and two along roadsides. No substantial populations exist in reserves. In suitable habitat, the species can be numerically abundant, with perhaps 700,000 plants in the six largest populations. It is likely that more populations exist, particularly on roadsides and private properties.

Table 1. Population information for Chariot Wheels

Location/site	Year & pop. size	Manager	Threats	Comments
Victoria				
Korrak Korrak Grassland	2004: ~100,000 plants	private property – Trust for Nature	• weed invasion (L) • erosion (L) • altered hydrology (L)	
Mitiamo	2003: ~50,000 plants	private property – Trust for Nature	• weed invasion (L) • grazing by stock (L)	
Budgerum	2003: ~200,000 plants	private property	• grazing by stock (H) • disturbance/destruction (stock, ploughing) (H) • weed invasion (M)	
Birchip	2003: ~50,000 plants	private property	• grazing by stock (H) • disturbance/destruction (stock, ploughing) (H) • weed invasion (M)	
East Hill Rd, Morton Plains: road reserve & rail reserve	2002: 10 – 50,000 plants	Shire of Buloke	• disturbance/destruction (ploughing, roadworks) (H) • grazing by stock (H) • weed invasion (M)	
Echuca-Serpentine Rd, Patho West: road reserve	2003: ~2,000 plants	Ganawarra Shire	• disturbance/destruction (ploughing, roadworks) (H) • grazing by stock (H) • weed invasion (M)	plants in area of approx. 30m X 2m; only very approx. estimate of pop nos; in 2000, about half of pop. was destroyed by roadworks.
Yassom Swamp Flora and Fauna Reserve	1981: ~375 plants 2004: ~150 plants	Parks Victoria	• recreational vehicle damage (H) • grazing by stock (M) • weed invasion (L)	
Bael Bael State Forest	1981: ~100 plants	DSE	• weed invasion (H) • grazing by stock (H)	site not visited since 1981; uncertain if plants persist
Mystic Park State Forest	1981: ~50 plants	DSE	• weed invasion (H) • grazing by stock (H)	site not visited since 1981; uncertain if plants persist
Terrick Terrick East Grassland Reserve	1998: 'few dozen' plants 2004: no plants seen	Parks Victoria	• grazing by stock (M) • weed invasion (M) • erosion (L)	despite no plants seen in 2003, it is likely that a small stand of still persists
New South Wales				
East-West Road, between Deniliquin and Hay: road reserve	2003: ~250,000 plants	Hay Shire	• disturbance/destruction (ploughing, roadworks) (H) • grazing by stock (M) • weed invasion (M)	species recorded at 5 sites along this road; one site counted & estimate made for other 4 sites; population extends onto private property
junction of Tchelery Rd and Maude-Moulamein Rd: road reserve	2000: 'small' pop.	Hay Shire	• disturbance/destruction (ploughing, roadworks) (H) • grazing by stock (M)	no pop. estimate; *M. cheelii* likely to occur on nearby roadsides with suitable

			• weed invasion (M)	habitat
Deniliquin- Moulamein Rd ~35 km nth of Deniliquin	2005: small nos present at several locations	Canargo Shire	• grazing by stock (M) • weed invasion (M) • roadworks (M)	some plants in Baratta Travelling Stock Route
Cobb Highway between Deniliquin and Hay	1965: plants present 2000: plants present	Canargo & Hay Shires	• grazing by stock (H) • weed invasion (M) • disturbance (soil pugging) (M)	pop. size unknown; likely to be other pops. along road and possibly adj. private land.
Black Swamp	1997: 'small' pop. 2001: no plants seen	Canargo & Hay Shires	• grazing by stock (H) • weed invasion (M) • disturbance (soil pugging) (M)	on travelling stock route between Deniliquin and Hay; 5 ha fenced to exclude stock; unsure if *M. cheelii* still occurs there
Tchelery Experimental Enclosure	2000: 'small' pop.	?	• altered fire regimes (L) • revegetation programs (L)	
Gordons Point, 6km west of Hay	1950: plants present 2000: no plants seen	Hay Shire	• weed invasion (M) • altered fire regimes (M)	site thickly overgrown; unsure if *M. cheelii* still occurs there
Paradise Experimental Enclosure	1951: plants present 2000: no plants seen	?	• altered fire regimes (H) • grazing by stock (M) • weed invasion (L)	site thickly overgrown; unsure if *M. cheelii* still occurs there; potentially suitable habitat nearby
Murray Downs (private property)	2006: ~100 plants	private	• unknown	occur in cottonbush open shrubland

There are at least 12 other records of the species on roadsides in Victoria, although there is no current information on population persistence, size or threats, as these were either not visited or could not be located during preparation of this Recovery Plan. Some of these populations have undoubtedly been lost, but others may still persist. A recovery action is to investigate these sites in order to determine the status of the species and what management actions are required. Locations requiring further survey include:

- Avon Plains Rd, Avon Plains (Shire of Northern Grampians)
- Berrwillock O'Keefe Rd, Birchip, just south of road (Shire of Buloke)
- Dumosa-Birchip Rd, east of Dunns Rd, Narraport (Shire of Buloke)
- Edwards Rd, Morton Plains (Shire of Buloke)
- Naughton Rd, Morton Plains (Shire of Buloke)
- Lalbert-Kerang Rd, Korrak Korrak (Shire of Gannawarra)
- Noonans Rd, NW of Narraport (Shire of Buloke)
- South Boundary Rd, just east of Connellan Rd, Warmur (Shire of Buloke)
- Swampy Rd, Watchem (Shire of Buloke)
- Three Chain Rd, west of Birchip (Shire of Buloke)
- Towma Rd, just east of Connellan Rd, Warmur (Shire of Buloke)
- Warracknabeal-Birchip Rd, just west of Combs Rd, Birchip (Shire of Buloke)

Decline and Threats

Perennial saltbush and grassy/herb dominated native vegetation communities once covered vast areas of the inland plains from northern Victoria through inland NSW to southern Queensland. However, these have been severely depleted due to agriculture, especially cropping, and grazing. Even where native vegetation communities remain, these have often been heavily modified through grazing pressure, with an increased abundance of grasses, that is likely to have adversely impacted Chariot Wheels (Porteners & Robertson 2003). Consequently it likely that Chariot Wheels was once much more extensively distributed and abundant throughout this region. The species is apparently extinct in the northern part of its former range, and survives only in a number of highly fragmented and tenuous locations in the southern part of its range.

Almost all of the remaining sites where Chariot Wheels occurs are under substantial threat (see Table 1). Most of these sites contain small isolated populations within degraded and weedy

vegetation, and remaining populations are highly fragmented. The species is not adequately reserved, with very few, small populations in nature reserves, although two large populations in Victoria are on private land protected by conservation covenant and managed for nature conservation. Clearance of habitat, weed invasion, damage from road and utilities installation and maintenance, lack of regeneration, fragmentation and isolation of most remaining stands and disruption of ecological processes necessary for regeneration are the main threats. These threats are discussed in greater detail below:

Damage/destruction of habitat
Disturbance to or destruction of populations and habitats along roadsides and on private land is a major ongoing threat. Road works, construction and maintenance of fire breaks and installation or maintenance of services along roadsides threaten roadside remnants containing the species and has damaged or destroyed several stands. Ploughing for cropping or pasture grass establishment destroys habitat and plants.

Weed invasion
Weed invasion is considered a threat on private property and along roadsides. Many sites where Chariot Wheels occurs are small and surrounded by agricultural land, from which pasture grasses and other weed species readily invade. Problematic weed species include pasture grasses such as *Avena* sp. and *Vulpia* sp. Weed invasion in degraded sites, notably narrow roadsides, is likely to be inhibiting regeneration of new individuals.

Grazing
Grazing by stock is considered a serious threat, especially as large numbers of *M. cheelii* are located on private land (although two properties are currently managed for nature conservation). As well as directly removing plants, grazing compacts soil, increases weed spread and inhibits regeneration, particularly in drought years. Opportunistic grazing by stock on roadsides (where the populations are located) is also considered a threat. Grazing during peak flowering and seeding periods in spring and summer may affect rates of recruitment and establishment, while heavy grazing eliminates adult plants from the site. Grazing may also lead to altered local hydrology through soil plugging and changes in water flow at some sites. Some seasonal light grazing may be beneficial in keeping habitat open and reducing competition from grasses, but suitable levels and timing are not known.

Salinity
Dryland salinity has already affected large areas of inland south-eastern Australia. Chariot Wheels is generally found in low-lying areas that are often the first areas to be affected by rising salinity. The species apparently has some tolerance to low salinity conditions, although may be adversely affected by increasing salinity, which may inhibit germination (Dimech et al. 2001).

Recovery Information

Existing Conservation Measures

A number of initiatives are underway to protect and enhance populations of Chariot Wheels, including:

- Two biologically significant private properties containing many highly threatened grassland species including Chariot Wheels have been acquired by Trust for Nature (Victoria), and nature conservation is now a high priority for management of these properties.
- Survey and monitoring of several populations in northern Victoria and New South Wales.
- Significant vegetation signs placed on some roadside populations in Victoria.
- Information on the species and its conservation supplied to landholders with populations on their property in Victoria.
- Sheep have been removed from one reserve.
- Two reserves have been fenced and gated to prevent vehicles entering the reserve.
- A demographic study of Chariot Wheels has commenced at three sites in northern Victoria, to investigate reproductive biology, disturbance ecology and habitat characteristics.

Recovery Objectives

The overall objective of recovery is to minimise the probability of extinction of the Chariot Wheels in the wild and to increase the probability of populations becoming self-sustaining in the long term. Within the duration of this Recovery Plan, the specific objectives for the recovery of the Chariot Wheels are to:

1. Determine distribution, abundance and population structure
2. Determine habitat requirements
3. Ensure that important populations and their habitat are protected and managed.
4. Manage threats to populations
5. Identify key biological functions
6. Determine growth rates and viability of populations
7. Build community support for conservation

Program Implementation and Evaluation

This Recovery Plan guides recovery actions for the Chariot Wheels and will be implemented and managed by the Department of Sustainability and Environment (for Victoria) and the Department of Environment and Climate Change (for NSW), supported by other agencies, educational institutions, regional natural resource management authorities and community groups as appropriate. Technical, scientific, habitat management or education components of the Recovery Plan will be referred to specialist groups on research, *in situ* management, community education and cultivation as required. Contact will be maintained between the State agencies on recovery issues concerning conservation of the Chariot Wheels. The Recovery Plan will run for a maximum of five years from the date of its adoption under the EPBC Act, and will be reviewed and revised within five years of the date of its adoption.

Recovery actions and performance criteria

Action	Description	Performance Criteria
Specific Objective 1: Determine distribution, abundance and population structure		
1.1	Acquire baseline population data by conducting detailed field and desk top surveys including (a) identification of the area and extent of populations; (b) estimates of the number, size and structure of populations and (c) inference or estimation of population change. **Responsibility: DSE/DECC**	• Determination or update of conservation status for inclusion on state and national threatened species lists. • Populations accurately mapped. • Survey important populations in NSW and Victoria where population size and threats are not currently known and/or where *M. cheelii* was not observed during last known survey.
Specific Objective 2: Determine habitat requirements		
2.1	Accurately survey (in late winter to early spring) known habitat and collect floristic and environmental information relevant to community ecology and condition (access permitting). **Responsibility: DSE/DECC**	• Requirements for completion of essential life history stages, recruitment and dispersal identified at known sites. • Critical habitat mapped.
2.2	Identify potential sites that might support important populations, using ecological, bioclimatic, radiometric data sets and other existing spatial data (access permitting), and survey the modelled habitat. **Responsibility: DSE/DECC**	• Predictive model for potential habitat developed and tested. Can be used to determine a potential habitat envelope.
Specific Objective 3: Ensure that important populations and their habitat are protected and managed		
3.1	• Protect populations on public land. **Responsibility: DSE/DECC/LG**	• Important populations on public land have effective statutory protection.
3.2	• Protect populations on private land. **Responsibility: DSE/DECC**	• Relevant private property owners in Victoria contacted and discussions initiated regarding future management of *M. cheelii* on each property. • Joint/voluntary management agreements negotiated on private land using provisions within Victorian and NSW State legislation. • Examine the viability of creating and maintaining an ongoing land stewardship payment system to private landholders, where *M. cheelii* is located on private properties. Explore conservation options such as fencing incentives for the protection of remnants, offered by some management bodies (eg. CMA)

Specific Objective 4: Manage threats to populations		
4.1	• Identify disturbance regimes required to maintain habitat. **Responsibility: DSE/DECC**	• Key findings of the DSE (ESAI Project) Threatened Species study of *M. cheelii* in Victoria analysed and incorporated into management of sites if applicable. • Further research conducted into required disturbance regimes.
4.2	• Control the threat of pest plants. **Responsibility: DSE/DECC/CMA/LG/PV**	• Gates at the Yassom Swamp Reserve locked to prevent vehicle access to site. • Weed monitoring by Trust for Nature Trust at the Korrak Korrak Grassland and Glassons property. • Weed invasion monitored on private property and at roadside populations. Weed control strategies implemented when required.
4.3	• Control threat of inappropriate biomass removal/accidental damage. **Responsibility: DSE/DECC/PV/LG**	• Population locations incorporated into planning overlays and management plans of relevant Local Governments and Shires. • Significant vegetation signs erected at roadside populations. • An interpretive sign erected at the entrance to the Yassom Swamp Reserve, detailing the importance of the vegetation at the site. Include updated contact information.
4.4	• Control threats from agriculture (land clearance and stock grazing). **Responsibility: DSE/PV/TfN/LG/DECC**	• Grazing management plans established in conjunction with Parks Victoria and DSE, aimed at conserving the species and biodiversity in general at Yassom Swamp Reserve and Terrick Terrick East Grassland Reserve. • Korrak Korrak Grassland and the Glassons property management plans implemented by Trust for Nature. Future monitoring both sites. • Discussions initiated with local governments & relevant landholders in regard to the conservation of *M. cheelii* along roadsides and on private property in NSW and Victoria. Joint/voluntary management agreements negotiated within NSW and Victorian legislation and landholders. • Catchment management authorities aware of *M. cheelii* to ensure the requirements of the species considered in developments.

4.5	• Investigate and assess the threat of dryland salinity. **Responsibility: DSE/DECC**	• Information incorporated into national, state and regional salinity planning for example CMA and state government salinity strategies.
Specific Objective 5: Identify key biological functions		
5.1	Evaluate reproductive status. **Responsibility: DSE/DECC**	• Document age of reproductive maturity.
5.2	Determine seed longevity and viability. **Responsibility: DSE/DECC**	• Test seed longevity and viability via germination trials using seed collected on site and older seed stored in the seed bank at the herbarium.
5.3	Determine seed germination and establishment requirements by conducting laboratory and field trials aimed to identify key stimuli. **Responsibility: DSE/DECC**	• Stimuli for recruitment/regeneration identified. • Management strategies identified to maintain, enhance or restore regenerative processes fundamental to reproduction and survival.
Specific Objective 6: Determine the growth rates and viability of populations		
6.1	Measure population trends and responses against recovery actions by collecting demographic information including recruitment and mortality, timing of life history stages and morphological data. Compare responses to different management histories. **Responsibility: DSE/DECC**	• Annual census data collected and reported on.
Specific Objective 7: Build community support for conservation		
7.1	Identify opportunities for community involvement in the conservation of Chariot Wheels. **Responsibility: DSE/DECC**	• Community nature conservation, Landcare groups, land owners and land managers aware of the species and support its conservation.

Abbreviations: CMA = Catchment Mgt Authority; DECC = Department of Environment and Climate Change (NSW); DSE = Department of Sustainability and Environment (Victoria); LG = Local Government; PV = Parks Victoria; TfN = Trust for Nature (Victoria)

Affected interests

The Chariot Wheels occurs on a variety of public and private land tenures. Consequently, management responsibility lies within the jurisdiction of a range of land management authorities, local governments, Trust for Nature (Victoria), Parks Victoria and private landowners. The majority of land managers have been contacted and have approved actions outlined in this Recovery Plan, subject to available funding. Some landholders have been contacted with the remaining landholders to be contacted upon implementation of this plan.

Role and interests of indigenous people

Indigenous communities on whose traditional lands the Chariot Wheels occurs are being advised, through the relevant regional Indigenous facilitator, of this Recovery Plan. Indigenous communities will be invited to be involved in the implementation of the Recovery Plan.

Benefits to other species/ecological communities

The Recovery Plan includes a number of potential biodiversity benefits for other species and vegetation communities in Victoria. Principally, this will be through the protection and management of habitat. The adoption of broad-scale management techniques and collection of baseline data will also benefit a number of other plant species growing in association with *M. cheelii*, particularly those species with similar life forms and/or flowering responses. Potential biodiversity benefits include the conservation of Natural Temperate Grasslands in the Riverina, a threatened community nominated for listing under the EPBC Act, and several threatened plant species associated with this community including *Swainsona murrayana*, *S. plagiotropis*, *S. sericea*, *Sclerolaena napiformis*, *Leptorhynchos scaber* and *L. orientalis*. The Plains-wanderer *Pedionomus torquatus*, a threatened bird of Riverina grasslands, will also benefit from any conservation measures designed to protect these communities. The Recovery Plan will also provide an important public education role as threatened flora have the potential to act as 'flagship species' for highlighting broader nature conservation and biodiversity issues such as land clearing, grazing, weed invasions and habitat degradation.

Social and economic impacts

The implementation of this Recovery Plan is unlikely to cause significant adverse social and economic impacts. Two private properties with significant populations are owned and managed by the Trust for Nature. Protection of other important populations on private land will be achieved through negotiation with landowners, supported by incentives available under NRM programs.

Management Practices

On-ground site management will aim to mitigate threatening processes and thereby insure against extinction. Major threats requiring management include accidental destruction, competition from pest plants, a lack of knowledge regarding habitat maintenance and inappropriate grazing by pest animals. A range of strategies will be necessary to alleviate these threats including research, weed control, fire management, fencing, and control of pest animals. Broad-scale protection measures applicable to all populations include legal protection of sites, habitat retention and liaison with land managers including private landholders. In addition, searches of known and potential habitat should continue to better define the distributions and size of populations.

The Recovery Plan also advocates strategies to fill some of the major gaps in our knowledge to date. These include an understanding of the mechanisms underlying recruitment and regeneration. Successful *in situ* population management will be founded on understanding the relationships between *M. cheelii* and associated flora, and its response to environmental processes. These are directly linked to biological function and are thus vital to recovery. Demographic censusing will be necessary to gather life history information and to monitor the success of particular management actions. Community participation in recovery actions will be sought, particularly in regard to recovery team membership and implementation of on-ground works.

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Priority, Feasibility and Estimated Costs of Recovery Actions

Action	*Description*	*Priority*	*Feasibility*	*Responsibility*	*Cost estimate*					
					Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	**Distribution, abundance**									
1.1	Collect population data	1	100%	DSE DECC	**$7,500**	**$7,500**	**$7,500**	**$7,500**	**$7,500**	**$37,500**
2	**Habitat requirements**									
2.1	Survey known habitat	1	100%	DSE DECC	**$10,000**	**$10,000**	**$0**	**$0**	**$0**	**$20,000**
2.2	Identify survey potential habitat	2	75%	DSE DECC	**$**	**$10,000**	**$10,000**	**$0**	**$0**	**$20,000**
3	**Protection of habitat**									
3.1	Protect public land habitat	1	75%	DSE DECC LG	**$10,000**	**$7,500**	**$0**	**$0**	**$0**	**$17,500**
3.2	Protect private land habitat	1	50%	DSE DECC	**$0**	**$10,000**	**$7,500**	**$0**	**$0**	**$17,500**
4	**Manage threats**									
4.1	Identify disturbance regimes	2	75%	DSE DECC	**$10,000**	**$10,000**	**$5,000**	**$0**	**$0**	**$25,000**
4.2	Control threat of pest plants	1	75%	DSE DECC PV LG CMA	**$15,000**	**$10,000**	**$10,000**	**$5,000**	**$5,000**	**$45,000**
4.3	Control biomass removal	1	75%	DSE DECC PV LG	**$10,000**	**$5,000**	**$5,000**	**$5,000**	**$5,000**	**$30,000**
4.4	Control threats from agriculture	1	75%	DSE DECC PV LG TFN	**$15,000**	**$10,000**	**$10,000**	**$5,000**	**$5,000**	**$45,000**
4.5	Assess threat of salinity	2	75%	DSE DECC LG CMA	**$0**	**$10,000**	**$0**	**$0**	**$0**	**$10,000**
5	**Biology, ecology**									
5.1	Evaluate reproductive status	2	100%	DSE DECC	**$0**	**$0**	**$10,000**	**$7,500**	**$7,500**	**$25,000**
5.2	Determine seed longevity viability	2	100%	DSE DECC	**$0**	**$0**	**$0**	**$7,500**	**7,500**	**$15,000**
5.3	Determine germination reqs	2	100%	DSE DECC	**$0**	**$0**	**$10,000**	**$10,000**	**$7,500**	**$27,500**
6	**Growth rates, pop. viability**									
6.1	Measure population trends	3	100%	DSE DECC	**$0**	**$0**	**$7,500**	**$7,500**	**$7,500**	**$22,500**
7	**Community support**									
7.1	Community extension	3	100%	DSE DECC	**$4,000**	**$4,000**	**$4,000**	**$4,000**	**$4,000**	**$20,000**
				Total	**$64,000.00**	**$94,000.00**	**$86,500.00**	**$59,000.00**	**$56,500.00**	**$377,500.00**