Department of
Sustainability and
Environment

National Recovery Plan for the Dwarf Yellow Heads *Trichanthodium baracchianum*

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Australian Government

Victoria
The Place To Be

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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: *Trichanthodium baracchianum* by Oberon Carter

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Summary

The Dwarf Yellow Heads *Trichanthodium baracchianum* is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 and Threatened under the Victorian *Flora and Fauna Guarantee Act* 1988. The species is endemic to north-western Victoria, where there an estimated 13,000 plants occurring in eight wild populations. Major threats to populations include weed invasion, grazing, rising salinity and gypsum mining. This national Recovery Plan for *T. baracchianum* 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 Dwarf Yellow Heads *Trichanthodium baracchianum* (formerly *Gnephosis baracchianum*) is a small annual herb growing to 10 cm in height, with linear to narrowly elliptic, semi-succulent, glabrous (occasionally woolly) leaves 5–12 mm long and 1–2 mm wide. There is a short mucro at the leaf tip and the petiole has woolly hairs. The inflorescence is 4–7 mm long and 5–11 mm wide, compound, dense and consists of 8–50 capitula, with the involucre about one-half the length of the capitula. There is one floret per capitulum, with 4–7 bracts, cypselas are 1.3–1.5 mm in length, and the pappus forms a serrated ring 0.3–0.4 mm in length. Flowering occurs form September to November (description from Short 1990; Walsh & Entwisle 1999).

Little is known of the biology or ecology of this species. Short (1990) determined lower rates of cross-pollination in *T. baracchianum* than in other *Trichanthodium* species, with the reduction in pollen production reflected in the smaller anther size, while the smaller, barely protruding anther appendages were indicative of a greater degree of inbreeding.

Distribution

Trichanthodium baracchianum is endemic to north-western Victoria, where it is highly restricted to the Antwerp and Jeparit region, and near the town of Mitre (Walsh & Entwisle 1999), in the Murray Darling Depression IBRA Bioregion (EA 2000).

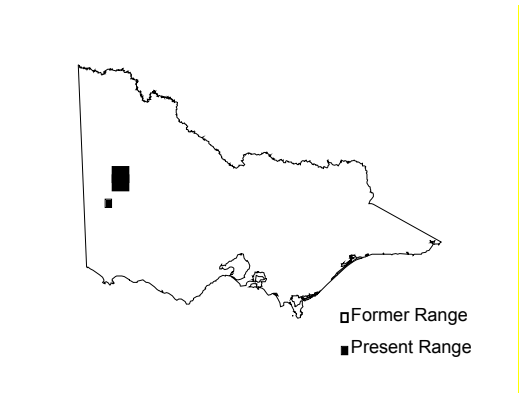

Figure 1. Distribution of *Trichanthodium baracchianum* in Victoria

Maps showing the detailed distribution of *Acacia caerulescens* are available from the Department of Sustainability and Environment Flora Information System (DSE-FIS). The FIS is a state-wide repository for flora grid and site distribution data, photographs and text descriptions. This information is available on request in a variety of formats for natural resource management purposes.

Population Information

Eight populations of *T. baracchianum*, containing about 13,000 plants, are known, from the following locations:

Public Land

Mitre Lake Reserve: >1,000 plants (S. Kelly & A. Pritchard DSE pers obs. 2004).

Oliver's Lake Reserve (or Lake Duchembegarra): >1,000 plants (S. Kelly DSE 2005 pers. obs.).

Private Land

Lake Wich-I-pei: About 2,500 plants (2002).

Banu-Bonyit Channel: About 1,000 plants (1983).

West Rd 1: About 1,000 plants (1983).

West Rd 2: about 5,000 plants (O. Carter & J. Downe pers. obs. 2002).

Tullyvea East Channel: About 1,000 plants (1983); only two plants seen in 2002 (S. Kelly DSE pers. obs).

Gypsum Pit Rd: about 1,000 plants (O. Carter & J. Downe pers. obs. 2002).

Habitat

All currently known populations of *T. baracchianum* occur within the Lowan Salt Lake valley, where much of the floor of this valley contains salt lakes or swamps, including Lake Hindmarsh in the north (Blackburn *et al*. 1967). Habitat is located on periphery of saline flats on the fringe of salt lakes in samphire vegetation communities. The species is often found on disturbed ground with *Sarcocornia* and in the higher parts dominated by *Halosarcia pergranulata* and *Halosarcia pruinosa* (Short 1990). Elevated areas are often anthropogenic in origin, such as on the edges of dams. It is suspected that the soil in those areas is slightly less saline than in surrounding, lower lying areas. This species was reported to form very dense patches on raised areas of 'puffy' gypseous clay around the bases of *Halosarcia* bushes (N. Scarlett La Trobe University pers. comm.). However, recent surveys found *T. baracchianum* to be virtually absent from areas of 'puffy' gypseous clay, while abundant on higher ground between *Halosarcia* bushes in association with the grasses *Austrostipa* and *Critesion*. As those grasses formed dense patches however, *T. barachianum* tended to be much less abundant. The specific soil, light and nutrient requirements of this species require further investigation to determine a range of suitable habitat, and to determine management prescriptions that would enable persistence of those habitat conditions. Recovery actions include survey and mapping of habitat that will lead to the identification of habitat critical to the survival of the species.

Threats

Trichanthodium baracchianum was almost certainly more widespread and abundant within the region where it currently occurs, but populations have been fragmented and depleted historically by land clearance for agriculture. Undoubtedly many populations have been lost; two records from 1986/7 are from the within the Rural City of Horsham, but have not been recently confirmed. Remaining populations are at great risk from a range of current and potential threats, including:

Grazing/Trampling: While it is unlikely that this species is selectively grazed, it may be vulnerable to trampling and soil disturbance by domestic stock and rabbits. Significant alteration of current grazing regimes may detrimentally affect the abundance of this species. Further work is required to determine its response to grazing.

Weed invasion: This species appears to have a fixed tolerance to salinisation, and where soils are less saline, abundance may be limited by competition from associated species including the grasses *Austrostipa* spp. and *Critesion* spp.

Rising salinity: Rising saline ground waters from land-use changes in the Wimmera area in recent years, including irrigation and removal of deep-rooted perennial vegetation, is likely to have severely marginalised the availability of suitable habitat, contributing to the decline of *T. baracchianum*.

Cropping: Cropping occurs within 10 m of some sites where *T. baracchianum* grows, and any expansion of those cropping areas and the irrigation associated with that land use may threaten populations.

Dam works: Any physical disturbance, such as by heavy machinery, to the edges of dams, severely threatens populations. It is unknown how long those dams have existed, or whether there are plans to alter them.

Specific threats to sites are:

- Mitre Lake: salinisation, competitive species.
- Oliver's Lake: salinisation, competitive species.
- Lake Wich-I-pei: rabbits, rubbish dumping.
- Banu-Bonyit Channel: gypsum mining.
- West Rd: dam works, grazing/trampling, cropping.
- Tullyvea East Channel: salinisation, cropping, rabbits, weeds. Much of this area has been heavily worked and gypsum extraction is currently taking place (D. Venn DSE, pers comm).

Recovery Information

Overall Objective

The **overall objective** of recovery is to minimise the probability of extinction of *Trichanthodium baracchianum* in the wild and to increase the probability of important populations becoming self-sustaining in the long term.

Within the life span of this Recovery Plan, the **specific objectives** of recovery for *Trichanthodium baracchianum* are to:

- Acquire accurate information for conservation status assessments.
- Identify habitat that is critical, common or potential.
- Ensure that all populations and their habitat are protected and managed appropriately.
- Manage threats to populations.
- Identify key biological functions.
- Determine the growth rates and viability of populations.
- Establish populations in cultivation.
- Build community support for conservation.

Program Implementation

The Recovery Plan will run for five years from the time of implementation and will be managed by the Department of Sustainability and Environment. A Threatened Flora Recovery Team, consisting of scientists, land managers and field naturalists will be established to oversee threatened flora recovery in Victoria in general. Technical, scientific, habitat management or education components of the Recovery Plan will be referred to specialist sub-committees on research, *in situ* management, community education and cultivation. Regional Recovery Teams will be responsible for preparing work plans and monitoring progress toward recovery.

Program Evaluation

The Recovery Team will be responsible for annual assessments of progress towards recovery. This Recovery Plan will be reviewed within five years of the date of adoption.

Recovery Actions and Performance Criteria

Action	Description	Performance Criteria
Specific objective 1		
Acquire accurate information for conservation status assessments		
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**	• Determination or update of conservation status for inclusion on state and national threatened species lists. • Updated records on all State databases (FIS, VrotPop and Herbaria). • Targeted populations mapped.
Specific objective 2		
Identify habitat that is critical, common or potential		
2.1	Accurately survey known habitat and collect floristic and environmental information describing community ecology and condition. **Responsibility: DSE**	• Completion of requirements for essential life history stages, recruitment and dispersal identified at known sites. • Critical habitat mapped.
2.2	Identify and survey potential habitat, using ecological, historical and anecdotal information indicating habitat preference. **Responsibility: DSE**	• Sites of potential habitat identified and surveyed.
Specific objective 3		
Ensure that all populations and their habitat are legally protected		
3.1	Initiate private land management agreements in consultation with private land owners under the *Victorian Conservation Trust Act* 1972, *The Conservation, Forests and Lands Act* 1987 and the *Wildlife Act* 1975 at sites. **Responsibility: DSE**	• Establish a private land protected area network for threatened taxa at Lake Wich-I-pei, Banu-Bonyit Channel, West Rd and Tullyvea East Channel. • Provide appropriate incetnitives/assistance where required.

Action	Description	Performance Criteria
Specific objective 4		
Manage threats to populations		
4.1	Identify disturbance regimes to maintain habitat. **Responsibility: DSE**	• Preparation of management prescriptions for grazing, or other appropriate process, within a portion of one site. • Trial hand spraying of competitive exotic grasses while *T. baracchianum* is dormant (Dec-May); monitor changes in *T. baracchianum* abundance and distribution before & after trial.
4.2	Control threats from pest plants and animals using careful hand removal of weeds (but only if deemed necessary), fencing sites or caging plants. **Responsibility: DSE**	• Measurable seedling recruitment, and a measurable reduction in plant mortality at Lake Wich-I-pei, Banu-Bonyit Channel, West Rd and Tullyvea East Channel. • Fence saline shrubland containing *T. baracchianum* from cropped paddock at Tullyvea East Channel to arrest reversion of cropped paddock to grazing.
Specific objective 5		
Identify key biological functions		
5.1	Evaluate current reproductive/regenerative status by determining seed bank status and longevity, fecundity and recruitment levels. **Responsibility: DSE**	• Seed bank/regenerative potential quantified for targeted populations.
5.2	Determine seed germination requirements by conducting laboratory and field trials aimed to identify key stimuli. **Responsibility: DSE**	• Stimuli for recruitment/regeneration identified. • Management strategies identified to maintain, enhance or restore regenerative processes.
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 and morphological data. **Responsibility: DSE**	• Techniques for monitoring developed and implemented.
6.2	Collate, analyse and report on census data and compare with management histories. **Responsibility: DSE**	• Growth rates determined and Population Viability Analysis completed for targeted populations.

Action	Description	Performance Criteria
Specific objective 7		
Establish populations in cultivation		
7.1	Establish cultivated plants *ex situ* for inclusion in living collections to safeguard against any unforeseen destruction of wild populations. **Responsibility: DSE, RBG**	• Development of effective propagation and cultivation techniques. • At least 100 mature plants in cultivation.
7.2	Establish a seed bank and determine seed viability. **Responsibility: DSE**	• Seed from targeted populations in long term storage. Seed collection would probably require whole plants to be removed (as they are so small), however sparse collection should have negligible impact on larger populations. Seed collectors should be careful not to trample plants.
7.3	Maintain a database of threatened plants in cultivation including records of provenance, numbers, cultivation technique and other relevant information. **Responsibility: DSE**	• Threatened flora database established.
Specific objective 8		
Build community support for conservation		
8.1	Identify opportunities for community involvement in the conservation of *T. baracchianum*. **Responsibility: DSE**	• Presentations to community nature conservation groups.

ABBREVIATIONS

DSE: Department of Sustainability and Environment, Victoria

RBG: Royal Botanic Gardens, Melbourne

Management Practices

The philosophy of the strategy for recovery is habitat conservation, restoration and management combined with an understanding of the ecological and biological requirements of *T. baracchianum*. The emphasis is on using knowledge to better implement *in situ* management techniques that protect populations and promote regeneration and recruitment. To achieve this, recovery actions are primarily structured to (i) acquire baseline data, (ii) assess habitat condition including ecological and biological function, (iii) protect populations to maintain or improve population growth and (iv) to engage the community in recovery actions.

On-ground site management will aim to mitigate threatening processes and thereby ensure against extinction. Major threats requiring management include accidental destruction, competition from pest plants, inappropriate fire regimes and grazing by pest animals. A range of strategies will be necessary to alleviate these threats including weed control, fire management, fencing, and control of pest animals.

Broadscale 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 *T. baracchianum* 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.

In addition to the above, *ex situ* conservation measures will be required and will include seed storage and plant cultivation. Cultivating *ex situ* populations will also aim to increase the amount of seed available for reintroduction to sites.

Community participation in recovery actions will be sought, particularly in regard to recovery team membership and implementation of on-ground works.

To reduce the likelihood of unforseen development activities negatively impacting upon *T. baracchianum*, the threatened flora team should provide information on distribution, ecology and/or habitat to relevant land managers. Such increased awareness should allow new populations to be found if they exist, and improve the likelihood of adequate searches being made during Environmental Impact Assessments.

Affected Interests

Parks Victoria manage the two reserves on which populations of *T. baracchianum* occur. Populations on private land occur within the Shire of Hindmarsh, and actions associated with the recovery of *T. baracchianum* may affect existing industry and land owners. The Banu-Bonyit Channel site is managed by 'Aitkens Scotsleigh Gypsum'. Upon implementation of this recovery plan, an appointed project officer may contact these managers.

Role and interests of indigenous people

Indigenous communities on whose traditional lands *T. baracchianum* occurs will be advised, through the relevant DSE Regional Indigenous Facilitator, of the preparation of this Recovery Plan and invited to provide comments if so desired. 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 *Trichanthodium baracchianum*, particularly those species with similar life forms and/or flowering responses.

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

There will be minimal social and economic impact with implementation of this plan on public land sites, where any protection measures required will occur with minimal impact on current recreational and commercial activities. Social and economic impacts may be incurred upon the implementation of this Recovery Plan on private land sites where habitat protection activities are carried out. However, as recovery implementation will first depend on the outcomes of negotiating options for site protection and management with landholders, possible social and economic impacts can not yet be reliably determined.

Acknowledgments

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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	**Conservation status**									
1.1	Collect baseline data	1	100%	DSE,	$6,000	$0	$0	$0	$0	**$6,000**
2	**Habitat requirements**									
2.1	Survey known habitat	1	100%	DSE	$10,000	$0	$0	$0	$0	**$10,000**
2.2	Identify, survey potential habitat	1	75%	DSE	$10,000	$0	$0	$0	$0	**$10,000**
3	**Legal protection of habitat**									
3.1	Protect private land habitat	1	50%	DSE	$0	$10,000	$10,000	$0	$0	**$20,000**
4	**Manage threats**									
4.1	Identify disturbance regimes	2	75%	DSE,	$0	$10,000	$0	$0	$0	**$10,000**
4.2	Control threats	1	75%	DSE	$0	$20,000	$10,000	$0	$0	**$30,000**
5	**Identify key biol. functions**									
5.1	Evaluate reproductive status	2	75%	DSE	$5,000	$0	$0	$0	$0	**$5,000**
5.2	Seed germination	2	75%	DSE	$5,000	$10,000	$0	$0	$0	**$15,000**
6	**Growth rates, pop. viability**									
6.1	Conduct censusing	3	100%	DSE	$15,000	$15,000	$15,000	$15,000	$15,000	**$75,000**
6.2	Collate, analyse and report	3	100%	DSE	$0	$0	$0	$0	$10,000	**$10,000**
7	**Establish pops. in cultivation**									
7.1	Establish cultivated plants	2	50%	DSE, RBG	$0	$0	$15,000	$15,000	$15,000$	**$30,000**
7.2	Establish a seed bank	2	50%	DSE	$0	$0	$4,000	$4,000	$0	**$8,000**
8	**Education, communication**									
8.1	Community extension	2	100%	DSE	$6,000	$6,000	$6,000	$6,000	$6,000	**$30,000**
	TOTALS				**$57,000**	**$71,000**	**$60,000**	**$40,000**	**$31,000**	**$259,000**