Tunbridge buttercup

Ranunculus prasinus

Flora Recovery Plan 2006 - 2010

Australian Government

Tasmania

ACKNOWLEDGEMENTS

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Cover photo by Hans and Annie Wapstra.

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Abbreviations:

DEH	Commonwealth Department of Environment and Heritage
DPIW	Department of Primary Industries and Water, Tasmania
DPIWE	Department of Primary Industries, Water and Environment, Tasmania
EPBC Act	*Environment Protection and Biodiversity Conservation Act* 1999
NRM Region	Natural Resource Management Region
TSP Act	*Threatened Species Protection Act* 1995
TSS	Threatened Species Section (formerly Threatened Species Unit), DPIW

Taxonomy follows Buchanan (2005) except where otherwise noted.

The listing status of the threatened species referred to in this recovery plan was correct at the time of publication.

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SUMMARY

Current Species Status

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*..... Endangered
Tasmanian *Threatened Species Protection Act 1995*..... endangered

Ranunculus prasinus Menadue (1985) is endemic to Tasmania and is known from 6 populations occurring within an area of approximately 220 square kilometres extending from Tunbridge to Campbell Town in the central Midlands region. In total, the species occupies an area of little more than 5 hectares. There is a continuing decline inferred because all known populations are on private land and are at future risk from agricultural activities.

Habitat Requirements, Threats and Limiting Factors

Ranunculus prasinus is a small perennial mat-forming herb that reproduces from seed and spreads from underground rhizomes. It is generally found on the margins of wetlands surrounded by native grasslands in a region with some of the lowest average annual rainfall figures for Tasmania. Suitable habitat for the species is extremely limited as wetland sites are rare in low rainfall regions and the majority of Tasmanian native grassland has been lost since European settlement. All known populations are on private land managed for sheep grazing. The species is at risk from continued loss of habitat due to introduction of exotic pasture species (pasture improvement), cropping or changed water relations due to draining or dam developments. While the species tolerates light grazing, it is at risk of being eliminated with prolonged heavy stocking rates. The smaller populations in particular, are at risk from compaction from vehicles, trampling by animals and invasion by woody weeds.

Overall Recovery Objective

Improve protection of known populations and decrease the likelihood of species extinction, through conservation covenants or management agreements.

Specific Objectives

1. Increase the number of populations through protection of known populations, survey and establishment of an *ex situ* population.

2. For the known populations, ensure numbers remain above 1000 in non-drought years and for the proposed *ex situ* population or new populations, work towards achieving numbers above 1000 in non-drought years within 5 years of establishment or discovery by application of an appropriate level of grazing and soil disturbance.

3. Develop mechanisms involving the community and landowners to manage and better protect populations in the long term.

Performance Criteria

1. No decline in the area occupied in each of the known populations in non-drought years due to land clearance which is considered a key threatening process by the *EPBC* Act, over the duration of the plan (determined by monitoring).

2. Discussions held with landowner/managers regarding options to secure populations in perpetuity from a change in land use that would be detrimental to the species.

3. Survey of potential habitat identified by current vegetation and grassland mapping projects to be completed by the end of year 1 unless drought conditions apply.

4. Survey of any further potential habitat identified by new or ongoing vegetation and grassland mapping projects to be completed by year1, year 2 and year 3 unless drought conditions apply.

5. By the end of year 1 (non-drought conditions permitting, if not, by the end of year 1 or year 2), establishment of nursery stock plants propagated vegetatively from at least 10 plants per population, sampled from across the area occupied by each population.

6. Annual propagation of at least 5 plants from each stock plant once established.

7. Following propagation from stock plants, annual planting at the Township Lagoon Nature Reserve or another suitable site of at least 5 separate patches on the margin of the lagoon in autumn or winter, each patch containing at least one plant propagated from each stock plant.

8. Maintenance of existing grazing and soil disturbance regimes in populations with > 1000 plants in non-drought years, to ensure that plant numbers do not decline, determined by monitoring in non-drought years.

9. In populations with typically < 1000 plants in non-drought years, increase in plant numbers to >1000 by the end of 2010 (or for the *ex situ* population, demonstrable increase towards this figure in years following establishment), following application of altered grazing regime or soil disturbance levels and determined by monitoring in non-drought years.

10. Establishment of a Recovery Team when funding is procured to implement this plan or parts thereof.

11. Update listing statement and spatial and population data as required and circulate this information to the wider botanical community and general public in the appropriate form i.e. update TSS databases, circulate updated information to the Tasmanian Flora Network and update the DPIW threatened species website as necessary, provide data to relevant State and Commonwealth agencies, and include threatened species sites on the LIST (Land Information Systems Tasmania) to alert potential landowners as to possible restrictions by the end of year 1.

12. Specimens of each population lodged with the Tasmanian Herbarium by the end of year 1.

13. Annual requests made to volunteer networks (e.g. Wildcare, Threatened Species Network etc.) to encourage active involvement in the Recovery process.

14. Maintenance of the TSS database (ie: new populations, population decline and threshold conditions) to trigger management intervention.

15. Reassessment of the conservation status on an annual basis, storage of revised assessments in the TSS conservation status assessment database, and preparation of nominations for a change in status for State and Commonwealth legislation if a change in status is indicated.

16. Updated Recovery Plan by the end of 2010.

Actions Needed

1. Pursue options with landowners/managers and planning authorities to protect populations against possible changes in land use that would be detrimental to the species.

2. Establish an *ex situ* population in the Township Lagoon Nature Conservation Area or another suitable site.

3. Survey for new populations.

4. Regular monitoring including monitoring disturbance levels relative to population size in known populations.

5. Advise and help landowners/managers to manage habitat in order to maintain or increase population size through appropriate grazing to reduce competition and appropriate soil disturbance to maintain or increase recruitment.

6. Develop mechanisms involving the community to manage and better protect wild and *ex situ* populations in the long term.

Estimated Cost of Recovery

Actions	Cost estimate	Timeframe	NRM region
1. Protection from change in land use	15,000	Year 1-5	N
2. Establishment of an *ex situ* population	9,000	Year 1-5	N or S
3. Survey for new populations	5,000	Year 1-5	N, S
4. Monitoring	10,000	Year 1-5	N (S if new site found or established)
5. Habitat management	12,000	Year 1-5	N (S if new site found or established)
6. Long term management	13,000	Year 1-5	State
Total	$62,000	Year 1-5	

BACKGROUND INFORMATION

Description

Ranunculus prasinus is commonly known as Tunbridge buttercup. It is a small perennial mat-forming herb. The leaves of *Ranunculus prasinus* form a rosette at the base and usually arise in threes from each node. They are grass-green and have a sparse covering of long soft hairs. The leaf stalks are generally 15 to 30 mm long (up to 45 mm long in shady conditions) although, if growing in wetlands, they can be up to 160 mm long.

The solitary yellow flowers are 10-12 mm in diameter on a stalk longer than the leaves, generally 25 to 35 mm long, sometimes up to 55 mm long, or up to 90 mm long if growing in wetlands. The flowers are composed of 5 to 6 oval-shaped sepals and 5 to 8 oval-shaped petals, which narrow at the base forming a claw. The nectary, located above the claw, is shaped like a shallow pocket with its width greater than or equal to its depth. The achenes (dry fruits) form globular heads 4 to 5 mm in diameter. Each achene is 1.8 to 2 mm long, semi-rounded in outline and beaked.

Ranunculus prasinus can be distinguished from other *Ranunculus* species using a combination of several characters including its pale yellow hairless sepals, which contrast with the golden yellow petals, and thinner grass-green leaves. Other similar species have a covering of course hairs on the sepals and fleshier, glossy, dark green leaves.

Taxonomic Status

Ranunculus prasinus was described by Menadue in 1985. *Ranunculus* is a genus in the Ranunculaceae, a family represented by 10 genera in Australia, 6 of which occur in Tasmania. Tasmania has 27 species of *Ranunculus*, 8 of which (including *Ranunculus prasinus*), are endemic to the State and 9 which are introduced (Buchanan 2002). Another species, while not endemic, is known only from Tasmania within Australia. Currently, there are 6 *Ranunculus* species (including *Ranunculus prasinus*), which are listed on the Tasmanian *Threatened Species Protection Act 1995.* Two of these (including *Ranunculus prasinus*) are Tasmanian endemics.

Distribution

Ranunculus prasinus is endemic to Tasmania. It has been recorded from only 7 sites within an area of 220 square kilometres extending from Tunbridge to Campbell Town in the central Midlands region. In total, the species occupies an area of little more than 5 hectares.

The species occurs in the Northern Midlands IBRA bioregion (Environment Australia 2000) and the Northern NRM (Natural Resource Management) region.

Population Estimate

There are 6 extant *Ranunculus prasinus* populations representing 5 locations. The total number of plants is estimated to be approximately 45,000 with more than 14,400 in the largest population. The estimation of the number of plants is based on the number of rosettes, and does not take into account plants that are joined by underground rhizomes. For the two new recently detected populations, the number of individuals given is a rough estimate. These will be surveyed in more detail in the near future. However, in species that form dense populations through vegetative reproduction, as does *Ranunculus prasinus,* the number of populations and the area occupied is a better indicator of risk than the actual number of plants. It is unlikely that many more populations will be discovered due to the limited occurrence of suitable habitat and dedicated surveys for the species in these areas.

Population Table

Pop. No.	Locality Tenure	NRM region	1:25 000 mapsheet	Year last seen	Area (ha)	Number of plants	Specific threats/requirements
1	**Tunbridge Tier Rd, Midland Highway junction** Private land	N	Tunbridge	2000	0.00145	>14,400	Threatened by land clearance and degradation of habitat. Despite high numbers, this population occupies a very small area and is at particular risk from stochastic events. Need to encourage recruitment over a wider area.
2	**White Lagoon, between Tunbridge and Ross** Private land	N	Tunbridge	1999	0.025	5,000	Threatened by land clearance and degradation of habitat and at risk from stochastic events because of the relatively low area occupied.
3	**Near Lagoon, between Tunbridge and Ross** Private land	N	Ellinthorp	1999	2	5,000	Threatened by land clearance and degradation of habitat.
4	**Stoyles Valley, Ross district** Private land	N	Ross	1999	0.025	<500	Threatened by land clearance and degradation of habitat and at risk from stochastic events because of the relatively low area occupied. Recruitment needs to be encouraged as this population has relatively few individuals.
5	**Near Macquarie River, west of Campbell Town** Private land	N	Jacobs	1998	2	5,000	Threatened by land clearance and degradation of habitat.

NEW POPULATIONS

Recently found populations vegetation conservation assessments

6	**East of Gavins Tier** Private Land	N	Tunbridge	2004	1	5,000	Threatened by land clearance and degradation of habitat
7	**Down's Creek** Private Land	N	Ross	2005	0.01	10,000	Threatened by land clearance and degradation of habitat

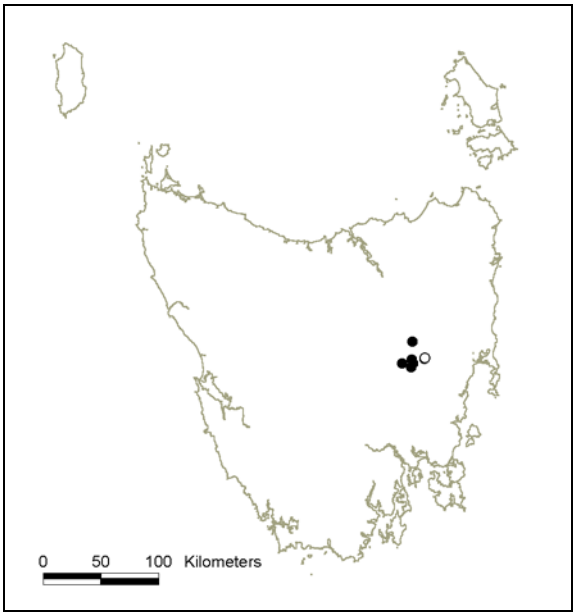

Figure 1. Distribution of *Ranunculus prasinus* in Tasmania.
(● = extant, ○ = presumed extinct)

Habitat

Ranunculus prasinus occurs on the margins of wetlands in the area where herbfield merges into tussock grassland dominated by tussock grass (*Poa labillardierei)* in a region that has some of the lowest average annual rainfall figures for Tasmania. When the wetlands dry, the species expands onto the wetland floor area. All sites are flat or gently sloping and occur at 200 to 260 metres in altitude. Soils are heavy clays and are alkaline, varying from 7.0 to 8.5 in pH.

Ranunculus prasinus occurs in combination with native mat-forming species typical of brackish ground, such as round-leaf wilsonia (*Wilsonia rotundifolia)*, milky beauty heads (*Calocephalus lacteus)*, and swamp weed (*Selliera radicans)*. Introduced rosette species commonly occur with Tunbridge buttercup, most notably buck's-horn plantain (*Plantago coronopus)*, hawkbit (*Leontodon taraxacoides)* and spear thistle (*Cirsium vulgare).*

Life History and Ecology

Ranunculus prasinus is a small perennial mat-forming herb that reproduces from seed and spreads from underground rhizomes. Regeneration appears to be largely vegetative. The species flowers from October to March and appears to readily set viable seed (Menadue and Crowden 1985). Germination requirements are unknown. The seed has a relatively large achene and is beaked, possibly aiding dispersal by birds or animals. The presence of a nectary at the base of the petals and the bright yellow colour of flowers indicate that the species is likely to be pollinated by insects. The family Ranunculaceae is one of the few families known in which pollination by rain can occur (Percival 1965).

Ranunculus prasinus does not appear to be selectively grazed. It is a species that may benefit from grazing by the reduction of the biomass of competitive species such as *Poa labillardierei*. Its spread into vegetation dominated by grasses is limited, and this may reflect the increased competition for resources, particularly moisture. Recruitment appears to be aided by soil disturbance as *Ranunculus prasinus* has been observed to become dominant on small tracks formed by stock and irregular use of farm vehicles.

Threats, Limiting Factors and Management Issues

Ranunculus prasinus is known from only a few populations. While the number of plants can be high, the area occupied by populations is generally very small and prone to being destroyed by chance events such as compaction from vehicles, trampling by animals and invasion by woody weeds.

Ranunculus prasinus is threatened by land clearance, a threatening process listed on the *Environment Protection and Biodiversity Conservation Act 1999*. All populations are on private land managed for sheep grazing. A large amount of grassland habitat has been lost due to pasture improvement or cropping, and a future change in land use poses a significant threat to the species. While the species tolerates light grazing, under heavy stocking rates, it is browsed back to the rootstock and could be eliminated from a site if heavy grazing is continued. The construction of dams is often associated with sheep grazing, which can threaten *Ranunculus prasinus* populations and habitat, as *Ranunculus prasinus* occurs on the edge of wetlands, water relations are important for the species. Seasonal inundation is not a problem, though the risk of permanent flooding or draining is a major threat to all populations, especially as the region is subject to low rainfall and landowners may wish to store water to better cope with frequent drought. Changes in the water catchment of areas in which the species occurs are also a potential threat.

Reservation Status

Ranunculus prasinus is not reserved.

Reasons for Listing and Habitat Critical

Ranunculus prasinus met the criteria for listing as endangered (e) on the **Tasmanian *Threatened Species Protection Act 1995*** because:

Rule B Extent of occurrence estimated to be less than 5000km^2 or area of occupancy estimated to be less than 500km^2 and

1. Known to exist at no more than five locations
2. Continuing decline inferred, observed or projected in:
    - (a) extent of occurrence
    - (b) area of occupancy
    - (c) area, extent and/or quality of habitat
    - (d) number of locations
    - (e) number of mature individuals

Ranunculus prasinus is listed as Endangered (EN) category under the **Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.***

Ranunculus prasinus met the IUCN (World Conservation Union) Red List guidelines (2001) because:

Rule B In geographic range

1. Extent of occurrence estimated to be less than 5000km^2 and
   a. known to exist at no more than five locations
   b. continuing decline observed, inferred or projected in:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) area, extent and/or quality of habitat
      (iv) number of locations
      (v) number of mature individuals
2. Area of occupancy estimated to be less than 500km^2 and
   a. known to exist at no more than five locations
   b. continuing decline observed, inferred or projected in:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) area, extent and/or quality of habitat
      (iv) number of locations
      (v) number of mature individuals

A **continuing decline** is inferred because all known populations are on private land and are at future risk from agricultural activities.

Habitat considered critical to the survival of the species comprises

- the area occupied by all six known populations in order to maintain genetic diversity
- associated wetlands and their margins in order to maintain habitat
- the Township Lagoon Nature Reserve as a securely reserved location for the potential establishment of an *ex situ* population

The Township Lagoon Nature Reserve occurs within two kilometres of the currently known extent of the occurrence of *Ranunculus prasinus* and occurs in the Southern NRM region.

Existing Conservation Measures

A Recovery Plan for *Ranunculus prasinus* was prepared in 1991 (Gilfedder 1991) and partially implemented. DPIW has commenced a Non-forest Vegetation Project that may help to secure populations through the development of property management plans.

A Recovery Plan for *Ranunculus prasinus* was prepared in 1991 (Gilfedder 1991) and has been partially implemented. *Ex situ* plantings were undertaken at the Township Lagoon Nature Reserve near Tunbridge in 1997 in an attempt to establish the species in a secure reserve free from detrimental changes in land use. One thousand plants propagated by the Royal Tasmanian Botanical Gardens were planted but have since succumbed to a period of prolonged drought. In the future successful translocation will be dependent on staggered attempts to overcome seasonal problems as well as selection of suitable habitat. Two of the populations have been fenced to exclude stock, while DPIW's Non-Forest Vegetation Program is in the process of developing management plans for properties that support *Ranunculus prasinus*.

RECOVERY PLAN

Recovery Objectives, Performance Criteria and Actions Needed

The **overall objective** of the Recovery Plan is to improve protection of known populations and decrease the likelihood of species extinction, through conservation covenants or management agreements.

Specific objectives are:

1. Increase the number of populations through protection of known populations, survey and establishment of an *ex situ* population.

2. For the known populations, ensure numbers remain above 1000 in non-drought years and for the proposed *ex situ* population or new populations, work towards achieving numbers above 1000 in non-drought years within 5 years of establishment or discovery by application of an appropriate level of grazing and soil disturbance.

3. Develop mechanisms involving the community and specifically landowners, to manage and better protect populations in the long term.

The **criteria** for achieving the objectives constitute a quantifiable decrease in the risk of extinction over 5 years of Recovery Plan implementation. They are:

1. No decline in the area occupied in each of the known populations in non-drought years due to land clearance as defined by the EPBC Act over the duration of the plan (determined by monitoring). ***Specific objective 1***

2. Discussions held with landowner/managers regarding options to secure populations in perpetuity from a change in land use that would be detrimental to the species. ***Specific objective 1***

3. Survey of potential habitat identified by current vegetation and grassland mapping projects to be completed by year 1 unless drought conditions apply. ***Specific objective 1***

4. Survey of any further potential habitat identified by new or ongoing vegetation and grassland mapping projects to be completed by year 1, year 2, year 3 and year 4 unless drought conditions apply. ***Specific objective 1***

5. By the end of year 1 (non-drought conditions permitting, if not, by the end of year 1 or year 2), establishment of nursery stock plants propagated vegetatively from at least 10 plants per population, sampled from across the area occupied by each population. ***Specific objective 1***.

6. Annual propagation of at least 5 plants from each stock plant once established. ***Specific objective 1***

7. Following propagation from stock plants, annual planting at the Township Lagoon Nature Reserve or another suitable site of at least 5 separate patches on the margin of the lagoon in autumn or winter, each patch containing at least one plant propagated from each stock plant. ***Specific objective 1***

8. Maintenance of existing grazing and soil disturbance regimes in populations with > 1000 plants in non-drought years, to ensure that plant numbers do not decline, determined by monitoring in non-drought years. ***Specific objective 2***

9. In populations with typically < 1000 plants in non-drought years, increase in plant numbers to >1000 by the end of 2010 (or for the *ex situ* population, demonstrable increase towards this figure in years following establishment), following application of altered grazing regime or soil disturbance levels and determined by monitoring in non-drought years. ***Specific objective 2***

10. Establishment of a Recovery Team when funding is procured to implement this plan or parts thereof. ***Specific objective 3***

11. Update listing statement and spatial and population data as required and circulate this information to the wider botanical community and general public in the appropriate form i.e. update TSS databases, circulate updated information to the Tasmanian Flora Network and update the DPIW threatened species website as necessary, provide data to relevant State and Commonwealth agencies, and include threatened species sites on the LIST (Land Information Systems Tasmania) to alert potential landowners as to possible restrictions by the end of year 1. ***Specific objective 3***

12. Specimens of each population lodged with the Tasmanian Herbarium by the end of year 1. ***Specific objective 3***

13. Annual requests made to volunteer networks (e.g. Wildcare, Threatened Species Network etc.) to encourage active involvement in the Recovery process. ***Specific objective 3***

14. Maintenance of the TSS database (ie: new populations, population decline and threshold conditions) to trigger management intervention ***Specific objective 3***

15. Reassessment of the conservation status on an annual basis, storage of revised assessments in the TSS conservation status assessment database, and preparation of nominations for a change in status for State and Commonwealth legislation if a change in status is indicated. ***Specific objective 3***

16. Updated Recovery Plan by the end of 2010. ***Specific objective 3***

The **actions** required for achieving the objectives are:

1. Pursue options with landowners/managers and planning authorities to protect populations against possible changes in land use that would be detrimental to the species. ***Specific objective 1. Performance criteria 1, 2.***

2. Establish an *ex situ* population in the Township Lagoon Nature Conservation Area or another suitable site. ***Specific objective 1. Performance criteria 5, 6, 7.***

3. Survey for new populations. ***Specific objective 1. Performance criteria 3, 4.***

4. Monitor disturbance levels relative to population size in known populations. ***Specific objectives 1, 2, 3. Performance criteria 1, 8, 9.***

5. Advise and help landowners/managers to manage habitat in order to maintain or increase population size through appropriate grazing to reduce competition and appropriate soil disturbance to maintain or increase recruitment. ***Specific objective 2. Performance criteria 8, 9, 11.***

6. Develop mechanisms involving the community to manage and better protect wild and *ex situ* populations in the long term. ***Specific objective 3. Performance criteria 1, 10, 11, 12, 13, 14, 15, 16.***

Strategy for Recovery and Progress Evaluation

The *Ranunculus prasinus* Recovery Plan will run for 5 years and is based on strategies to increase the number of populations, improve the reservation status of the species, reduce stochastic risks to known populations and to develop mechanisms to manage and better protect populations in the long term.

This plan has been prepared in consultation with various representatives of the Threatened Species Section and Vegetation Section of the Biodiversity Conservation Branch of the Department of Primary Industries and Water, and the Tasmanian Flora Network, a network of professional botanists and active volunteers concerned with threatened flora issues in Tasmania. The Natural Resource Management program will play a leading role in enabling the implementation of this plan. DPIW's Non-forest Vegetation Project may be an important mechanism to secure populations through the development of property management plans.

A Recovery Team will be established once funding to implement this plan or parts of the plan is secured. Each year following establishment, the Recovery Team will monitor and evaluate progress against recovery criteria outlined in this plan and report to relevant sponsor organisations. Significant developments will be communicated to the general public through Listing Statement updates, websites, relevant newsletters and reports.

This plan is consistent with the aims of the *Threatened Species Strategy for Tasmania* (DPIWE 2000) and *Tasmania's Nature Conservation Strategy* (DPIWE 2002) and the *Recovery Plan for Tasmanian Native Grassland Communities 2006–2010* (TSS 2006).

Affected Interests and Social and Economic Impacts

Ranunculus prasinus has legal protection as a listed threatened species at the State and Commonwealth level and occurs in threatened non-forest communities (threatened grassland and wetland) protected by State and Commonwealth Government policies to prevent further clearing of threatened vegetation communities.

All known populations of the species occur on private land and the implementation of any management agreements or conservation covenants will only occur with the approval and collaboration of landowners. The implementation of this Recovery Plan is unlikely to cause significant adverse social and economic impacts on any other parties.

The Aboriginal community is currently being consulted to determine whether there are any Aboriginal issues or interests identified in this Recovery Plan. If no role is identified for indigenous communities in the recovery of this species, opportunities may exist through cultural interpretation and awareness of this species.

Biodiversity Benefits

Biodiversity benefits are maintenance of diversity in a rare ecosystem that is threatened with further reduction in size and diversity; and the prevention of this species from becoming extinct. The conservation of the species will also protect co-occurring State listed species such as *Calocephalus lacteus* and *Wilsonia rotundifolia* and is in keeping with the objectives of the Recovery Plan for Tasmania's Native Grasslands 2006-2010

RECOVERY ACTIONS

1. Protection from change in land use

All known populations of ***Ranunculus prasinus*** are on private land and are at future risk of destruction by land clearance through pasture development, cropping, damming, draining or roading. To prevent the inadvertent destruction of populations, current landowners, managers and planning authorities need to be made aware of their responsibilities under the Tasmanian *Threatened Species Protection Act 1995,* if not already informed.

All populations of ***Ranunculus prasinus*** are on land managed for sheep grazing. This management is beneficial to the species by reducing competition from other species and providing recruitment opportunities through soil disturbance. Mechanisms to maintain current land use need to be pursued with landowners with various options and associated incentives explored.

The Recovery Plan for Tasmanian Native Grasslands 2006–2010 identifies the following protection mechanisms to secure significant native grasslands for protection:

- Private land purchase
- Public land management
- Conservation Covenants
- Develop management agreements

For ***Ranunuclus prasinus*** specifically one option is a voluntary management agreement with the State Government. These are usually for a fixed term e.g. five or ten years and specify management obligations that are binding both on landowners and on the Department of Primary Industries and Water. A more recent initiative is the development of property management plans through the Non-Forest Native Vegetation Conservation Program.

There is currently no general provision to alert new or potential landowners to the presence of protected species on private land. There are some mechanisms available to register this information on the land title to enable it to travel with the title to future owners. This would be beneficial to the species, as it would help prevent the inadvertent destruction of populations with a change of ownership. The mechanisms are either a conservation covenant or creation of a private reserve. These are voluntary conservation agreements between the State Government and the landowner. Conservation covenants can only be modified or revoked with the agreement of the landowner and relevant Minister(s). One type of private reserve, a Private Sanctuary, can be revoked at the request of the landowner. The other type of private reserve, a Private Nature Reserve, can only be revoked with the consent of both Houses of Parliament.

Costs for this action include services to promote and facilitate voluntary conservation agreements between owners of land with occurrences of ***Ranunculus prasinus*** and the Tasmanian Government. The services will be provided through DPIW programs such as the Protected Areas on Private Land Program and the Non-Forest Native Vegetation Conservation Program. Co-ordination costs are additional. Responsibility rests with DPIW.

Cost estimate	Timeframe
$15,000	Year 1-5

2. Establishment of an *ex situ* population

The only sure way of increasing the number of populations is by the establishment of an *ex situ* population. All current populations occur on private land and are subject to potentially detrimental changes in land use.

The establishment of a population in a secure reserve will have the additional benefit of decreasing the risk of extinction.

There are likely to be few undetected populations due to the limited occurrence of suitable habitat and previous targeted surveys for the species. In the final phase of this plan, after a draft version went out for public comment two new populations of *Ranunculus prasinus* were discovered on private land. One was detected through conservation assessment for a dam proposal and the other was detected by a Vegetation Management Officer from the Non-Forest Vegetation Program on another private property.

The Township Lagoon Nature Reserve has suitable habitat and occurs within two kilometres of the currently known extent of occurrence of the species. A previous attempt to establish a population at this site failed due to ongoing drought conditions. Successful translocation will be dependent on staggered attempts to overcome seasonal problems as well as careful selection of suitable habitat on the lagoon edge. There is a possibility that the Township Lagoon Nature Reserve is not suitable because of higher salinity levels than at known occurrences. This will need to be investigated and if necessary an alternative site chosen for the *ex situ* planting.

Plants of *Ranunculus prasinus* will be produced through vegetative propagation as this is known to be relatively easy and quick whereas germination requirements for propagation from seed are unknown. In order to minimise impact on populations, material will only be collected from the wild for the propagation of stock plants. The collection of propagation material from wild populations will require a permit issued under provisions of the TSP Act. These will be used as a source of material for the production of plants to establish the *ex situ* population. Guidelines for the translocation of threatened plants in Australia 2nd Edition (Vallee *et al*, 2004) will be followed for collection of material from the wild and for planting. Establishment will be deemed successful once plantings become self-perpetuating.

Costs for this action include collection of vegetative propagation material from the wild for stock plant production, stock plant maintenance, annual propagation of plants from stock plants, planting costs and co-ordination costs. Propagation will be conducted by the Royal Tasmanian Botanical Gardens or a specialist nursery. Volunteer input will be sought for planting. Monitoring will be covered by action 4 of this plan. Co-ordination responsibility rests with DPIW.

Cost estimate	Timeframe
$9,000	Year 1-5

3. Survey for new populations

While the probability of discovering further populations is low due to the limited occurrence of suitable habitat and previous targeted surveys for the species, various native vegetation projects may indicate further areas that warrant searches for *Ranunculus prasinus*. These include mapping projects by the Tasveg Unit in DPIW, a current native grasslands recovery project, surveys for vegetation values on private or public land through the Protected Areas on Private Land Program and the Non-Forest Vegetation Project etc. (particularly conservation assessment for dam proposals due to the species' habitat).

Costs for this action include travel and survey costs. Volunteer input will be sought. Co-ordination responsibility rests with DPIW.

Cost estimate	Timeframe
$5,000	Year 1-5

4. Monitoring

Monitoring of known populations of *Ranunculus prasinus* is required to determine management requirements. If plant numbers or areas occupied are low or declining, intervention through habitat management options (action 5) will be required to address the deficiency. Monitoring will need to determine possible causes (e.g. competition from other species, grazing regime, degree of soil disturbance, compaction and trampling,

invasion by woody weeds). Monitoring results will need to be interpreted to distinguish between true declines and effects of drought and to determine the degree of decline that should trigger management intervention (see action 6). Monitoring will be required to determine the effects of habitat management (action 5) and also to track the success of *ex situ* plantings (action 2).

Costs for this action include travel and data collection and handling costs as well as co-ordination costs. Volunteer input will be sought. Co-ordination responsibility rests with DPIW.

Cost estimate	Timeframe
$10,000	Year 1-5

5. Habitat management

Habitat management intervention will be negotiated with owners of land with occurrences of *Ranunculus prasinus* and, where appropriate, written management advice will be provided. Conservation covenants and management agreements should be negotiated through the Non-Forest Vegetation Program.

Should monitoring determine that plant numbers or area occupied are low or declining, intervention is required if a cause or a remedy can be identified (action 4). Plant numbers are considered to be low if below 1000 in non-drought years. An area of occupancy of less than 0.02 hectares is considered to be low and should be increased if adjacent habitat is suitable for occupation. The degree of decline that should trigger management intervention will be determined in action 4. Possible intervention includes a change in the grazing regime (increase, decrease or time of grazing) or slashing for roadside occurrences to reduce competition, fencing to control trampling or stock and vehicle access, soil disturbance to increase recruitment opportunities and weeding to control invasion by woody weeds such as gorse. Watering of new plantings may also be required to aid establishment of *ex situ* plantings.

Costs for this action include travel, fencing and herbicide costs, equipment hire for soil disturbance, slashing and weeding, and costs associated with preparation of management advice and co-ordination. Volunteer input will be sought as appropriate. Co-ordination responsibility rests with DPIW.

Cost estimate	Timeframe
$12,000	Year 1-5

6. Long term management

This action involves collation and interpretation of data pertaining to *Ranunculus prasinus* and dissemination to stakeholders in the appropriate form. This is necessary to base management advice, allocation of resources and assessment of the impact of development proposals on the best available information at any time. This action is also required to encourage and allow community participation in and ownership of the Recovery Plan implementation process.

Ongoing data and data interpretation requirements as new information becomes available are***:***

- entry of spatial information from wild and *ex situ* populations into TSS and DPIW GIS systems
- collation of additional information required to assess the conservation status such as population and threat data and inclusion in a TSS database
- regular reassessment of conservation status, storage of revised assessments in a TSS database and preparation of nominations for a change in the conservation status for State and Commonwealth legislation as required
- Entry into TSS database (ie: new populations, population decline and threshold conditions) and regular assessment of the database to determine whether management intervention is required
- maintain *ex situ* population establishment and monitoring data
- lodgement of specimens of each population with the Tasmanian Herbarium in case of future taxonomic treatments

Requirements for the dissemination of information are*:*

- update written management advice on populations to landowners/managers as necessary
- update Listing Statement every 5 years or as new information becomes available and circulate to libraries, the wider botanical community (including the Tasmanian Flora Network) and include on the DPIW website to give access to the general public.
- update the Recovery Plan every 5 years, submit for adoption by the State and Commonwealth, and circulate to libraries, the wider botanical community (including the Tasmanian Flora Network) and include on the DPIW and DEH websites to give access to the general public.
- circulate spatial information to different users in the appropriate form i.e. include polygon or point data as appropriate in the TSS GIS system, include point records in the DPIW GIS system, provide data to relevant State and Commonwealth agencies, include polygon or point data as appropriate on the LIST (Land Information Systems Tasmania)
- inform planning authorities of occurrences and potential habitat to allow inclusion in planning schemes and NRM regional strategies
- investigation of additional processes to alert potential landowners as to possible occurrences of threatened flora species and associated responsibilities

Mechanisms to facilitate community participation and ownership are*:*

- establish a Recovery Team when funding is procured to implement this plan or parts thereof
- make requests to volunteer networks (e.g. Wildcare, Threatened Species Network etc.) to participate in specific recovery actions at least 6 weeks in advance (general requests for participation usually generate little interest)
- request participation in recovery actions by the wider botanical community through the Tasmanian Flora Network
- when necessary, organise permission from landowners/managers to access populations and permits from the TSS for the collection of propagation material or herbarium specimens

Costs for this action include those associated with maintenance of databases and websites, updates and circulation of literature, requests for participation in the Recovery Team and recovery actions including provision of training and supervision when necessary and other co-ordination costs. Responsibility rests with DPIW.

Cost estimate	Timeframe
$13,000	Year 1-5

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