Department of
Parks and Wildlife

Interim Recovery Plan No. **375**

# *Stylidium applanatum*

## Interim Recovery Plan
**2017–2022**

**Department of Parks and Wildlife, Western Australia**

March 2017

## List of Acronyms

The following acronyms are used in this plan:

| | |
|---|---|
| BGPA | Botanic Gardens and Parks Authority |
| CITES | Convention on International Trade in Endangered Species |
| CR | Critically Endangered |
| DAA | Department of Aboriginal Affairs |
| DEC | Department of Environment and Conservation |
| DPaW | Department of Parks and Wildlife |
| DRF | Declared Rare Flora |
| EPBC | Environment Protection and Biodiversity Conservation |
| IBRA | Interim Biogeographic Regionalisation for Australia |
| IRP | Interim Recovery Plan |
| IUCN | International Union for Conservation of Nature |
| NRM | Natural Resource Management |
| PICA | Public Information and Corporate Affairs |
| SCB | Species and Communities Branch |
| SWALSC | South West Aboriginal Land and Sea Council |
| SWTFRT | Southern Wheatbelt Threatened Flora Recovery Team |
| TFSC | Threatened Flora Seed Centre |
| TPFL | Threatened and Priority Flora Database |
| UNEP-WCMC | United Nations Environment Program World Conservation Monitoring Centre |
| WA | Western Australia |

# Foreword

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Parks and Wildlife Corporate Policy Statement No. 35 (DPaW 2015*a*) and Department of Parks and Wildlife Corporate Guideline No. 35 (DPaW 2015*b*). Plans outline the recovery actions that are required to urgently address those threatening processes most affecting the ongoing survival of threatened flora, fauna and ecological communities, and begin the recovery process.

Parks and Wildlife is committed to ensuring that threatened flora are conserved through the preparation and implementation of Recovery Plans (RPs) or IRPs, and by ensuring that conservation action commences as soon as possible and, in the case of Critically Endangered (CR) flora, always within one year of endorsement of that rank by the Minister.

This plan will operate from March 2017 to February 2022 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still listed as threatened in Western Australia, this plan will be reviewed after five years and the need for further recovery actions assessed.

This plan was given regional approval on 28 February 2017 and was approved by the Director of Science and Conservation on 22 March 2017. The provision of funds identified in this plan is dependent on budgetary and other constraints affecting the Department of Parks and Wildlife, as well as the need to address other priorities.

Information in this plan was accurate at March 2017.

**Plan preparation:** This plan was prepared by:

| | |
|---|---|
| Robyn Luu | Project Officer, Department of Parks and Wildlife Species and Communities Branch, Locked Bag 104, Bentley Delivery Centre, Western Australia 6983. |
| Juliet Wege | Senior Research Scientist, Western Australian Herbarium, Department of Parks and Wildlife, Locked Bag 104, Bentley Delivery Centre, WA 6983. |
| Marie Edgley | Conservation Officer (Flora), Department of Parks and Wildlife Wheatbelt Region |
| Andrew Brown | Threatened Flora Coordinator, Parks and Wildlife Species and Communities Branch, Locked Bag 104, Bentley Delivery Centre, Western Australia 6983. |

**Acknowledgments:** The following people provided assistance and advice in the preparation of this plan:

| | |
|---|---|
| Brett Beecham | Regional Ecologist, Department of Parks and Wildlife, Wheatbelt Region |
| Andrew Crawford | Principal Technical Officer, Threatened Flora Seed Centre, Department of Parks and Wildlife Science and Conservation Division |
| Peter Lacey | Nature Conservation Program Leader, Department of Parks and Wildlife Wheatbelt Region |
| Natasha Moore | Flora Conservation Officer, Department of Parks and Wildlife Central Wheatbelt District |
| Amanda Shade | Assistant Curator (Nursery), Botanic Gardens and Parks Authority |

Thanks also to the staff of the Western Australian Herbarium for providing access to Herbarium databases and specimen information, and other Parks and Wildlife staff for assistance in developing this plan.

Cover photograph by Juliet Wege.

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# Summary


| | | | |
|---|---|---|---|
| **Scientific name:** | *Stylidium applanatum* | **NRM region:** | Avon |
| **Common name:** | Flat-leaved Triggerplant | **IBRA region:** | Avon Wheatbelt |
| **Family:** | Stylidiaceae | **IBRA subregion:** | Avon Wheatbelt P2 |
| **Flowering period:** | late September and October | **Recovery team:** | Southern Wheatbelt Threatened Flora Recovery Team |
| **DPaW region:** | Wheatbelt | | |
| **Shire:** | Corrigin | | |

**Distribution and habitat:** *Stylidium applanatum* is restricted to a single location south-south-east of Corrigin, growing on red-brown loam or yellow-brown clay on lateritic ridges and hill slopes. The species is found in open habitat in *Eucalyptus macrocarpa* and *E. pluricaulis* shrubland with *Banksia cirsioides*, *Allocasuarina campestris*, *Gastrolobium spinulosum*, *Petrophile glauca*, *Stylidium caricifolium* and *S. eriopodum* (Wege 2007). The area of occupancy and extent of occurrence is less than 1km$^2$.

**Habitat critical to the survival of the species, and important populations:** It is considered that all known habitat for the wild population of *Stylidium applanatum* is critical to the survival of the species, and that the wild population is an important population. Habitat critical to the survival of *S. applanatum* includes the area of occupancy of the population and areas of similar habitat surrounding the population (these providing potential habitat for population expansion and for pollinators). It may also include additional occurrences of similar habitat that may contain undiscovered populations of the species or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

**Conservation status:** *Stylidium applanatum* was listed as specially protected under the Western Australian *Wildlife Conservation Act 1950* on 2 December 2014. It is ranked as Critically Endangered (CR) in Western Australia under International Union for Conservation of Nature (IUCN) 2001 criteria B1ab(iii)+ 2ab(iii) due to its extent of occurrence estimated to be less than 100km$^2$; it being known from a single location; there being a continuing decline in its area of occupancy and the quality of its habitat and its area of occupancy estimated to be less than 10km$^2$. The species is not listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

**Threats:** The main threats to the species are gravel extraction, road maintenance, altered hydrology, altered fire regimes, weeds, grazing, poor recruitment and drought.

**Existing recovery actions**: The following recovery actions have been or are currently being implemented and have been considered in the preparation of this plan:

1. Parks and Wildlife, with the assistance of the Southern Wheatbelt Threatened Flora Recovery Team, is overseeing the implementation of recovery actions for *Stylidium applanatum*.
2. The landholder has been notified of the location and threatened status of the species.
3. Declared Rare Flora (DRF) markers have been installed at Subpopulation 1a.
4. *Stylidium applanatum* has been opportunistically surveyed for in areas of suitable habitat with no new populations located.
5. Approximately five hundred seeds collected from *Stylidium applanatum* are stored in the Threatened Flora Seed Centre (TFSC) at –18°C. The seeds have yet to be processed. A further 55 seeds are stored at the Millennium Seed Bank in Kew.

**Plan objective**: The objective of this plan is to abate identified threats and maintain or enhance extant populations to ensure the long-term conservation of the species in the wild.

### Recovery criteria

Recovery will be considered successful if one or more of the following take place over the term of the plan.

- The known population has remained extant and the number of mature plants within the population has remained within a 10% range or has increased by >10% from 800 to 880 or more or
- New populations have been found, increasing the number of known populations from one to two or more with no net loss of mature plants or
- The area of occupancy has increased by >10% with no net loss of mature plants.

Recovery will be considered unsuccessful if one or more of the following take place over the term of the plan.

- The known population has been lost or
- The number of mature plants has decreased >10% from 800 to 720 or less or
- The area of occupancy has decreased by >10%.

### Recovery actions

| | |
|---|---|
| 1. | Coordinate recovery actions |
| 2. | Monitor population |
| 3. | Fence Subpopulation 1a |
| 4. | Liaise with the land owner, land managers and Aboriginal communities |
| 5. | Rehabilitate eroded area |
| 6. | Collect and store seed |
| 7. | Undertake weed control |
| 8. | Protect plants from herbivory |
| 9. | Develop and implement translocations |
| 10. | Undertake regeneration trials |
| 11. | Develop and implement a fire management strategy |
| 12. | Obtain biological and ecological information |
| 13. | Undertake surveys |
| 14. | Ensure long-term protection of habitat |
| 15. | Map habitat critical to the survival of *Stylidium applanatum* |
| 16. | Promote awareness |
| 17. | Review this plan and assess the need for further recovery actions |

# 1. Background

## History

*Stylidium applanatum* is a species of highly restricted distribution that was first collected south-south-east of Corrigin in 1995 and formally named by Juliet Wege in 2007 as part of a strategic taxonomy initiative targeting taxa of conservation concern (Wege 2007).

The single known population is located in an old gravel scrape area. A survey undertaken in October 2013 by a Department of Parks and Wildlife volunteer Bert Hort, estimated 800 mature plants. The population is impacted by altered hydrology, erosion and drought.

## Description

*Stylidium applanatum* is a distinctive triggerplant that can be distinguished from other species by the following combination of characters: a non-stilted, perennial habit with contracted, shallowly-buried stems and a flat (i.e. adpressed to the soil surface) rosette of oblanceolate and glabrous leaves; scapes with scattered sterile bracts; a clavate to oblong hypanthium; yellow, laterally-paired corolla lobes with blunt, maroon-tipped throat appendages; and a column 9.5 to 12 mm long. It is the only perennial triggerplant in the Avon Wheatbelt with broad leaves arranged in a flat leaf rosette.

Molecular phylogenetic data (Wege *et al*., unpublished data) supports this species as belonging to sect. Saxifragoidea Mildbr., but its precise systematic affinities are unclear. It has been confused with *Stylidium glabrifolium*, a poorly known species from near New Norcia which has a similarly flat leaf rosette. However, *S. glabrifolium* can be readily distinguished by its smaller flowers (shorter hypanthium, shorter calyx lobes and much shorter column) and different throat appendage morphology (six oblong appendages with entire, bi- or trifurcate tips). *Stylidium applanatum* is also similar to *S. korijekup*, a poorly known species from the Whicher scarp with a more distinctly geophytic habit (stems cormaceous and deeply buried), ovate leaves with cordate bases and long petioles, and oblong throat appendages (Wege 2007).

*Stylidium applanatum* is named for its leaf rosette which is adpressed to the soil surface (Wege 2007).

## Illustrations and/or further information

Wege, J.A. (2007) New species and new circumscriptions in *Stylidium* (Stylidiaceae). *Nuytsia* 17: 415–432; Western Australian Herbarium (1998–) *FloraBase—the Western Australian Flora*. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/.

## Distribution and habitat

*Stylidium applanatum* is restricted to a single location south-south-east of Corrigin, growing on red-brown loam or yellow-brown clay on lateritic ridges and hill slopes. The species is found in open habitat in *Eucalyptus macrocarpa* and *E. pluricaulis* shrubland with *Banksia cirsioides*, *Allocasuarina*

*campestris*, *Gastrolobium spinulosum*, *Petrophile glauca*, *Stylidium caricifolium* and *S. eriopodum* (Wege 2007). The area of occupancy and extent of occurrence is less than 1km$^2$.

**Table 1. Summary of population land vesting, purpose and manager**

| TPFL population number & location | Parks and Wildlife Region | Shire | Vesting | Purpose | Manager |
|---|---|---|---|---|---|
| 1a. SSE of Corrigin | Wheatbelt Region | Corrigin | Private property | Freehold | Landowners |
| 1b. SSE of Corrigin | Wheatbelt Region | Corrigin | LGA | Road reserve | Shire of Corrigin |

# Biology and ecology

*Stylidium applanatum* has a contracted, woody stem that is shallowly buried, with perennating buds situated at or near the soil surface (i.e. it is a hemicryptophyte). Its basal leaf rosette is presumed to brown-off during the summer months as the plant enters dormancy, possibly with the exception of a cluster of small, bract-like leaves in the centre of the rosette which are likely to function in protecting the perennating buds. Individuals tend to group together in small patches (seed is small and would disperse by simply dropping to the ground once the capsules open) and are assumed to live for a number of years (precise life history data is lacking).

The species either does not flower or flowers poorly when rainfall is below average[1]. This was evident in 2007 when *c.* 75% of plants at the known population failed to produce scapes or did not set fruit. A further inspection during drought conditions in mid-October 2012 failed to locate any flowering plants. Immature scapes were observed in a few individuals but these had withered in the absence of adequate rainfall. Relatively few plants were seen at this time and it is likely that many individuals were dormant. This notion is supported by survey data from October 2013, a year of above average rainfall, when 800 healthy plants were observed. This suggests that plants can cope with a drought year through extended dormancy; however, it is not known how plants are impacted by successive years of drought.

The survey in October 2013 found that only a small proportion (*c.* 20%) of the population flowered despite the good seasonal conditions (Wege and Moore 2014). In other triggerplant species with a geophytic or hemicryptophytic habit (e.g. *Stylidium carnosum*, *S. korijekup*, *S. yilgarnense*), fire is known to stimulate resprouting and/or flowering; however, fire response data is lacking for *S. applanatum*. Its stem stock is very shallowly-buried and therefore a hot fire has the potential to damage or kill individuals (Wege and Moore 2014). In July 2015, most of the remnant vegetation at the *S. applanatum* site was observed to have been recently burnt, possibly due to an escaped stubble burn from the adjacent paddock. It was estimated that *c.* 80% of the vegetation burnt very hot with the fire affecting the shrub and canopy layers, while the remainder of the vegetation was burnt in the understorey only (i.e. with some trees and shrubs undamaged). Small pockets of vegetation in which *S. applanatum* is most abundant remained unburnt and mature plants were observed during a cursory examination of these areas in September 2015. It is unclear whether any individuals of *S. applanatum* were affected by the fire. No resprouting individuals or seedlings were seen in the burnt areas at this time. A detailed survey in 2016 is required to better document the impact of this fire on *S. applanatum*.

[1] Mean annual and winter (June to August) rainfall for Corrigin is 371.8mm and 166.9mm. 2007: annual rainfall 258mm, winter rainfall 128.4mm; 2012: annual rainfall 237.8mm, winter rainfall 88.8mm; 2013: annual 444.2mm, winter rainfall 168.9mm (data from www.bom.gov.au).

Triggerplants rely on insects for cross-pollination, transferring pollen between flowers and individuals by means of a rapid moving floral column. A single species of bee fly (Lomatiinae) was observed pollinating *Stylidium applanatum* in October 2014; however, further research is required to ascertain the identity of this bee fly, whether other pollinating insects are present, and the abundance and effectiveness of the pollinator pool.

# Conservation status

*Stylidium applanatum* was listed as specially protected under the Western Australian *Wildlife Conservation Act 1950* on 2 December 2014. It is ranked as Critically Endangered (CR) in Western Australia under International Union for Conservation of Nature (IUCN) 2001 criteria B1ab(iii)+ 2ab(iii) due to its extent of occurrence estimated to be less than 100km$^2$; its area of occupancy estimated to be less than 10km$^2$, it being known from a single location, and there being a continuing decline in its area of occupancy and the quality of its habitat. The species is not listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

# Threats

- **Gravel extraction.** An active gravel scrape occurs 300 to 400m from the *Stylidium* population and the landowners are planning to extract a further 15 to 20 truckloads of gravel. This may result in accidental destruction of the plants by vehicles accessing the area.
- **Road maintenance.** Subpopulation 1b is located on a road reserve and threats include grading, chemical spraying, construction of drainage channels and slashing of roadside vegetation (which also promotes weeds).
- **Erosion.** In Subpopulation 1a an increase in surface water runoff due to clearing for a gravel pit has resulted in erosion.
- **Altered fire regimes.** Fire may be needed to stimulate flowering and recruitment in *Stylidium applanatum*. However, a hot fire has the potential to damage or kill plants given the stem stock is shallowly-buried and frequent burning would deplete the soil seed store. Fire is likely to facilitate weed invasion and when it occurs should be followed up with appropriate weed control.
- **Weed invasion.** Weeds suppress early plant growth by competing with the species and its associated native vegetation for soil moisture, nutrients and light. They also exacerbate grazing pressure and increase the fire hazard due to the high fuel loads produced annually by many weed species.
- **Grazing,** Grazing by rabbits (*Oryctolagus cuniculus*) and kangaroos is a threat to *Stylidium applanatum*. Rabbits may also impact on the population through soil warren construction and increased nutrient levels through their droppings. Grazing may also have an impact on the establishment of seedlings thereby limiting natural recruitment.
- **Poor recruitment.** The species appears to require fire to recruit and a lack of fire may result in little or no recruitment. However, if fire is frequent, occurs at the wrong time of the year, or is followed by a drought, the population may be severely impacted.
- **Drought.** This is a threat to the species and may result in plant deaths or poor recruitment. Drought may also delay surveys for additional populations as plants are unlikely to flower and are more difficult to detect.

The intent of this plan is to identify actions that will mitigate immediate threats to *Stylidium applanatum*. Although climate change may have a long-term effect on the species, actions taken directly to prevent its impact are beyond the scope of this plan.

**Table 2. Summary of population information and threats**

| TPFL population number & location | Land status | Year/no. mature plants | | Condition | | Threats |
|---|---|---|---|---|---|---|
| | | | | Plants | Habitat | |
| **1a. SSE of Corrigin** | Private property | 2007<br>2013 | 300<br>800* | Healthy | Good | Gravel/sand extraction, grazing, weeds, fire, hydrological changes |
| **1b. SSE of Corrigin** | Shire road reserve | 1997 | locally frequent | | | Road maintenance |

**Note:** the single known population is considered an important population; * Subpopulations 1a and 1b combined.

# Guide for decision-makers

Section 1 provides details of current and possible future threats. Actions for development and/or land clearing in the immediate vicinity of *Stylidium applanatum* may require assessment.

Actions that result in any of the following may potentially impact the species:

- Damage or destruction of occupied or potential habitat.
- Alteration of the local surface hydrology or drainage.
- Reduction in population size.
- Altered fire regimes.

# Habitat critical to the survival of the species, and important populations

It is considered that all known habitat for the wild population of *Stylidium applanatum* is critical to the survival of the species, and that the wild population is an important population. Habitat critical to the survival of *S. applanatum* includes the area of occupancy of the population and areas of similar habitat surrounding the population (these providing potential habitat for population expansion and for pollinators). It may also include additional occurrences of similar habitat that may contain undiscovered populations of the species or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

# Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Stylidium applanatum* will also benefit the Threatened and Priority flora listed in the table below:

**Table 3. Conservation-listed flora species occurring within 500m of *Stylidium applanatum***

| Species name | Conservation status (WA) | Conservation status (EPBC Act 1999) |
|---|---|---|
| *Guichenotia seorsiflora* | Threatened (CR) | CR |
| *Banksia dallanneyi* subsp. *agricola* | Priority 2 | - |
| *Oxymyrrhine cordata* | Priority 2 | - |
| *Banksia densa* var. *densa* | Priority 3 | - |
| *Banksia rufa* subsp. *obliquiloba* | Priority 3 | - |
| *Brachyloma mogin* | Priority 3 | - |
| *Microcorys cephalantha* | Priority 3 | - |
| *Lechenaultia pulvinaris* | Priority 4 | - |

For a description of conservation codes for Western Australian flora see http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation_code_definitions_ 18092013.pdf

# International obligations

This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity, ratified by Australia in June 1993, and will assist in implementing Australia's responsibilities under that Convention. The species is not listed under Appendix II in the United Nations Environment Program World Conservation Monitoring Centre (UNEP-WCMC) Convention on International Trade in Endangered Species (CITES), and this plan does not affect Australia's obligations under any other international agreements.

# Aboriginal consultation

A search of the Department of Aboriginal Affairs (DAA) Aboriginal Heritage Sites Register revealed no sites of Aboriginal significance adjacent to the known population of *Stylidium applanatum*. However, input and involvement has been sought through the South West Aboriginal Land and Sea Council (SWALSC) and DAA to determine if there are any issues or interests with respect to management for this species. Opportunity for future Aboriginal opportunity for future involvement in the implementation of the plan is included as an action in the plan. Aboriginal involvement in management of land covered by an agreement under the *Conservation and Land Management Act 1984* is also provided for under the joint management arrangements in that Act, and will apply if an agreement is established over any reserved lands on which this species occurs.

# Social and economic impacts

Management of private land containing the single known population of *Stylidium applanatum* may result in some economic impact due to the need for weed and rabbit control and restricting stock access. Gravel extraction, road and firebreak maintenance and other activities in the vicinity of the population will also need to be modified to prevent impact on plants and their associated habitat.

# Affected interests

The implementation of this plan has implications for the private landholder and the Shire of Corrigin, as the known population occurs on lands that are not specifically managed for conservation.

## Evaluation of the plan's performance

Parks and Wildlife, with assistance from the Southern Wheatbelt Threatened Flora Recovery Team (SWTFRT), will evaluate the performance of this plan. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed following five years of implementation.

# 2. Recovery objective and criteria

### Plan objective

The objective of this plan is to abate identified threats and maintain or enhance *in situ* populations to ensure the long-term conservation of the species in the wild.

### Recovery criteria

Recovery will be considered successful if one or more of the following take place over the term of the plan.

- The known population has remained extant and the number of mature plants within the population has remained within a 10% range or has increased by >10% from 800 to 880 or more or
- New populations have been found, increasing the number of known populations from one to two or more with no net loss of mature plants or
- The area of occupancy has increased by >10% with no net loss of mature plants.

Recovery will be considered unsuccessful if one or more of the following take place over the term of the plan.

- The known population has been lost or
- The number of mature plants has decreased >10% from 800 to 720 or less or
- The area of occupancy has decreased by >10%.

# 3. Recovery actions

## Existing recovery actions

Parks and Wildlife, with the assistance of the SWTFRT, is overseeing the implementation of recovery actions for *Stylidium applanatum*.

Land managers have been notified of the location and threatened status of *Stylidium applanatum*. Notifications detail the current Declared Rare Flora (DRF) status of the species, the associated legal obligations in regards to its protection, and contact details for management assistance.

DRF markers have been installed at Subpopulation 1a. Markers aim to reduce the risk of accidental damage during road maintenance.

Although *Stylidium applanatum* has been opportunistically surveyed for in areas of suitable habitat, no new populations have been located. Surveys include:

- The area of known population in October 2013 by volunteer Bert Hort. Bert has also surveyed other accessible nearby remnants of natural vegetation that comprise similar soil/vegetation associations.
- A number of ad hoc surveys conducted by Juliet Wege over the past 10 years, concentrating on small, roadside fragments near the known population.
- A survey of a water reserve immediately west of Corrigin by Ryonen Butcher (WA Herbarium) in spring 2006.

Approximately 100 *Stylidium applanatum* seeds are stored in the Threatened Flora Seed Centre (TFSC) at –18°C (see table 4) and a 55 seeds are stored at the Millennium Seed Bank in Kew.

**Table 4. TFSC collection details for *Stylidium applanatum***

| Accession number | Date collected | TPFL population number | Collection type | No. seed in storage | Estimated germinable seed |
|---|---|---|---|---|---|
| 025361 | 17/11/2007 | 1 | B/61* | 501 | Not yet tested |

* Note: 'B' = a bulked collection and the number of plants sampled.

# Future recovery actions

The following recovery actions are listed in approximate order of decreasing priority, influenced by their timing over the term of the plan; however, this should not constrain addressing any recovery action if funding is available and other opportunities arise. Where these recovery actions are implemented on lands other than those managed by Parks and Wildlife, permission has been or will be sought from the appropriate land managers prior to actions being undertaken.

## 1. Coordinate recovery actions

Parks and Wildlife with assistance from the SWTFRT will oversee the implementation of recovery actions for *Stylidium applanatum* and will include information on progress in annual reports.

| | |
|---|---|
| **Action:** | Coordinate recovery actions |
| **Responsibility:** | Parks and Wildlife (Wheatbelt Region), with assistance from the SWTFRT |
| **Cost:** | $8,000 per year |

## 2. Monitor population

Monitoring of populations and habitat should be undertaken to identify trends or potential management requirements. Population monitoring should record the health and expansion or decline in the population, and other observations such as pollinator activity or seed production. Site monitoring should include observations of grazing, habitat degradation including weed invasion, and hydrological status (inundation and drought).

Markers will be installed around the boundary of the erosion area at Subpopulation 1a and monitored yearly to determine if the area is increasing and encroaching on existing habitat. Permanent quadrats will also be established at the population to monitor the fire response of the species following the 2015 wildfire. This information will contribute to determining an appropriate fire management regime for the species.

Specific monitoring of hydrology and activities relating to research into the biology and ecology of *Stylidium applanatum* are included in other recovery actions detailed below.

| | |
|---|---|
| **Action**: | Monitor population |
| **Responsibility**: | Parks and Wildlife (Wheatbelt Region), with assistance from the SWTFRT |
| **Cost**: | $8,000 per year |

## 3. Fence Subpopulation 1a

As Subpopulation 1a is located on private property fencing is required to protect *Stylidium applanatum* and its associated habitat.

| | |
|---|---|
| **Action:** | Fence Subpopulation 1a |
| **Responsibility:** | Parks and Wildlife (Wheatbelt Region), landowners |
| **Cost:** | $10,000 in year 1 |

## 4. Liaise with the land owner, land managers and Aboriginal communities

Parks and Wildlife will liaise with the land owner and land managers to ensure the population of *Stylidium applanatum* is not accidentaly damaged or destroyed, and its habitat is maintained in a suitable condition for the conservation of the species. Consultation with the Aboriginal community will take place to determine if there are any issues or interests in areas that are habitat for the species and opportunities will be provided for Aboriginal people to be involved in implimenting this plan.

| | |
|---|---|
| **Action:** | Liaise with the land owner, land managers and Aboriginal communities |
| **Responsibility:** | Parks and Wildlife (Wheatbelt Region) |
| **Cost:** | $4,000 per year |

## 5. Rehabilitate eroded area

Recovery actions undertaken to reduce the impact of an area of erosion on the species and its habitat may include replacing topsoil and restabilising local plant species.

| | |
|---|---|
| **Action:** | Rehabilitate eroded area |
| **Responsibility:** | Parks and Wildlife (Wheatbelt Region), landowners |
| **Cost:** | $20,000 in years 1, 3 and 5 |

## 6. Collect and store seed

Although seed has been collected from the species, further collections are required for future research and/or establishing new populations. Collections should aim to sample and preserve the maximum range of genetic diversity possible by collecting from the widest range of reproductive plants.

| | |
|---|---|
| **Action:** | Collect and store seed |
| **Responsibility:** | Parks and Wildlife (Wheatbelt Region, TFSC) |
| **Cost:** | $10,000 per year |

## 7. Undertake weed control

Weeds are a threat to the population and the following actions are recommended:

1. Determine which weeds are present.
2. Control weeds by hand removal and/or spot spraying as they first emerge.
3. Monitor the treatment and any observed negative effects on *Stylidium applanatum* and associated native plant species.
4. Report on the method and success of the treatment.
5. Revegetate with site-specific species (in autumn) to suppress weeds.

Controlling weeds is of importance given the large number that appeared following the 2015 fire. *Stylidium applanatum* seedlings that appeared following the fire will be difficult to see and care will be required if spraying.

| | |
|---|---|
| **Action:** | Undertake weed control |
| **Responsibility:** | Parks and Wildlife (Wheatbelt Region) |
| **Cost:** | $10,000 per year, as required |

## 8. Protect plants from herbivory

If annual monitoring of *Stylidium applanatum* ascertains the threat from rabbits and kangaroos is high, control measures such as protective fencing and baiting may be required.

| | |
|---|---|
| **Action:** | Protect plants from herbivory |
| **Responsibility:** | Parks and Wildlife (Wheatbelt Region), landowners |
| **Cost:** | $10,000 in year 1; $8,000 per years 2-5 |

## 9. Develop and implement translocations

Translocations may be required for the long term conservation of *Stylidium applanatum* if the natural population declines.

Information on the translocation of threatened plants and animals in the wild is provided in Parks and Wildlife Corporate Policy Statement No. 35 (DPaW 2015*a*), Parks and Wildlife Corporate Guideline No. 36 (DPaW 2015*c*) and the Australian Network for Plant Conservation translocation guidelines (Vallee

*et al*. 2004). The 2004 guidelines state that a translocation may be needed when a species is represented by few populations and the creation of additional self-sustaining, secure populations may decrease its susceptibility to catastrophic events and environmental stochasticity. For small populations which may be declining in size or subject to high levels of inbreeding, successful population enhancement may increase population stability and hence long-term viability.

Depending on the characteristics of the species, Vallee *et al*. (2004) suggest a minimum viable population size estimated between 50 and 2,500 individuals will be required. Suitable translocation sites may include where the taxon occurs, where it was known to have occurred historically and other areas that have similar habitat (soil, associated vegetation type and structure, aspect etc.), within the known range of the taxon (Vallee *et al*. 2004).

All translocation proposals require endorsement by the Department's Director of Science and Conservation. Monitoring of translocations is essential and will be included in the timetable developed for the Translocation Proposal.

| | |
|---|---|
| **Action:** | Develop and implement translocations |
| **Responsibility:** | Parks and Wildlife (Science and Conservation Division, Wheatbelt Region), BGPA |
| **Cost:** | $42,000 in years 1 and 2; and $26,500 in subsequent years as required |

## 10. Undertake regeneration trials

Habitat disturbance (physical or fire) is known to promote recruitment in many species of *Stylidium* and it is recommended that disturbance trials be undertaken for *S. applanatum*. Permanent quadrats will be established to monitor the response of the species (refer to Action 12.4).

| | |
|---|---|
| **Action:** | Undertake regeneration trials |
| **Responsibility:** | Parks and Wildlife (Science and Conservation Division, Wheatbelt Region) |
| **Cost:** | $10,000 in years 1 and 3, $4,000 in years 2, 4 and 5 |

## 11. Develop and implement a fire management strategy

A fire management strategy which includes recommendations on fire frequency, intensity and seasonality, precautions to prevent bushfire and strategies for reacting to bushfire, and the need, method of construction and maintenance of firebreaks will be developed in consultation with the land owner and land managers, and implemented if necessary. Fire, where possible, will be prevented from occurring in the habitat of populations, except where it is being used experimentally as a recovery tool.

| | |
|---|---|
| **Action:** | Develop and implement a fire management strategy |
| **Responsibility:** | Parks and Wildlife (Wheatbelt Region), landowners |
| **Cost:** | $10,000 in year 1, and $6,000 in years 2–5 |

## 12. Obtain biological and ecological information

Research on the biology and ecology of *Stylidium applanatum* should include:

1. Identification of pollinators and their habitat requirements.
2. Seed viability.
3. Conditions necessary for natural germination.
4. Response to disturbance, competition, drought, inundation and grazing.
5. Longevity of plants, time taken to reach maturity, and minimum viable population size.
6. The impact of changes in hydrology.

| | |
|---|---|
| **Action:** | Obtain biological and ecological information |
| **Responsibility:** | Parks and Wildlife (Science and Conservation Division, Wheatbelt Region) |
| **Cost:** | $50,000 in years 1–3 |

## 13. Undertake surveys

Surveys should be undertaken for *Stylidium applanatum* in areas of potentially suitable habitat using, where feasible, volunteers from landcare groups, wildflower societies and naturalist clubs. All surveyed areas will be recorded and the presence or absence of the species documented to increase survey efficiency and prevent duplication of effort.

While best surveyed in early to mid-October during flowering, the basal leaf rosettes which tend to cluster together are distinctive and could be found in targeted surveys during winter or in late spring after flowering but before the leaves brown-off.

| | |
|---|---|
| **Action:** | Undertake surveys |
| **Responsibility:** | Parks and Wildlife (Wheatbelt Region), with assistance from the SWTFRT and volunteers |
| **Cost:** | $10,000 per year |

## 14. Ensure long-term protection of habitat

Improved security of the population and its habitat will be investigated and may include land acquisition for conservation reservation or a conservation covenant.

| | |
|---|---|
| **Action:** | Ensure long-term protection of habitat |
| **Responsibility:** | Parks and Wildlife (Wheatbelt Region, Species and Communities Branch (SCB)), landowners |
| **Cost:** | $4,000 per year |

## 15. Map habitat critical to the survival of *Stylidium applanatum*

Although spatial data relating to habitat critical to the survival of *Stylidium applanatum* is alluded to in Section 1, it has not been mapped. If additional populations are located, habitat critical to their survival will also be determined and mapped.

| | |
|---|---|
| **Action:** | Map habitat critical to the survival of *Stylidium applanatum* |
| **Responsibility:** | Parks and Wildlife (SCB, Wheatbelt Region) |
| **Cost:** | $6,000 in year 2 |

## 16. Promote awareness

The importance of biodiversity conservation and the protection of *Stylidium applanatum* will be promoted through the print and electronic media and by setting up poster displays. Formal links with local naturalist groups and interested individuals will also be encouraged.

| | |
|---|---|
| **Action:** | Promote awareness |
| **Responsibility:** | Parks and Wildlife (Wheatbelt Region, SCB, Public Information and Corporate Affairs (PICA)), with assistance from the SWTFRT |
| **Cost:** | $7,000 in years 1 and 2; $5,000 in years 3–5 |

## 17. Review this plan and assess the need for further recovery actions

If *Stylidium applanatum* is still listed as threatened at the end of the five-year term of this plan, the need for further recovery actions or a review of this plan will be assessed and a revised plan prepared if necessary.

| | |
|---|---|
| **Action:** | Review this plan and assess the need for further recovery actions |
| **Responsibility:** | Parks and Wildlife (SCB, Wheatbelt Region) |
| **Cost:** | $6,000 at the end of year 5 |

**Table 5. Summary of recovery actions**

| Recovery action | Priority | Responsibility | Completion date |
|---|---|---|---|
| Coordinate recovery actions | High | Parks and Wildlife (Wheatbelt Region), with assistance from the SWTFRT | Ongoing |
| Monitor population | High | Parks and Wildlife (Wheatbelt Region), with assistance from the SWTFRT | Ongoing |
| Fence Subpopulation 1a | High | Parks and Wildlife (Wheatbelt Region), landowners | 2017 |
| Liaise with the land owner, land managers and Aboriginal communities | High | Parks and Wildlife (Wheatbelt Region) | Ongoing |
| Rehabilitate eroded area | High | Parks and Wildlife (Wheatbelt Region), landowners | Ongoing |
| Collect and store seed | High | Parks and Wildlife (Wheatbelt Region, TFSC) | 2021 |
| Undertake weed control | High | Parks and Wildlife (Wheatbelt Region) | Ongoing |
| Protect plants from herbivory | High | Parks and Wildlife (Wheatbelt Region), landowners | Ongoing |
| Develop and implement translocations | High | Parks and Wildlife (Science and Conservation Division, Wheatbelt Region), BGPA | 2021 |
| Undertake regeneration trials | Medium | Parks and Wildlife (Science and Conservation Division, Wheatbelt Region) | 2021 |
| Develop and implement a fire | Medium | Parks and Wildlife (Wheatbelt Region), landowners | Developed by 2017, |

| | | | |
|---|---|---|---|
| management strategy | | | implementation ongoing |
| Obtain biological and ecological information | Medium | Parks and Wildlife (Science and Conservation Division, Wheatbelt Region) | 2019 |
| Undertake surveys | Medium | Parks and Wildlife (Wheatbelt Region), with assistance from the SWTFRT and volunteers | Ongoing |
| Ensure long-term protection of habitat | Medium | Parks and Wildlife (Wheatbelt Region, SCB), landowners | 2021 |
| Map habitat critical to the survival of *Stylidium applanatum* | Medium | Parks and Wildlife (SCB, Wheatbelt Region) | 2018 |
| Promote awareness | Medium | Parks and Wildlife (Wheatbelt Region, SCB, Corporate Relations), with assistance from the SWTFRT | 2021 |
| Review this plan and assess the need for further recovery actions | Medium | Parks and Wildlife (SCB, Wheatbelt Region) | 2021 |

# 4. Term of plan

This plan will operate from March 2017 to February 2022 but will remain in force until withdrawn or replaced. If the species is still listed as threatened after five years, a review of this plan will be completed, the need for further recovery actions determined, and a revised plan prepared if necessary.

# 5. References

Department of Parks and Wildlife (2015*a*) Corporate Policy Statement No. 35 *Conserving Threatened Species and Ecological Communities*. Perth, Western Australia.

Department of Parks and Wildlife (2015*b*) Corporate Guideline No. 35 *Listing and Recovery of Threatened Species and Ecological Communities*. Perth, Western Australia.

Department of Parks and Wildlife (2015*c*) Corporate Guideline No. 36 *Recovery of Threatened Species through Translocation and Captive Breeding or Propagation*. Perth, Western Australia.

Government of Australia (1999) Environment Protection and Biodiversity Conservation Act.

International Union for Conservation of Nature (2001) IUCN Red List Categories: Version 3.1. Prepared by the IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK.

Vallee, L., Hogbin, T., Monks, L., Makinson, B., Matthes, M. and Rossetto, M. (2004) Guidelines for the Translocation of Threatened Australian Plants. Second Edition. The Australian Network for Plant Conservation. Canberra, Australia.

Wege, J.A. (2007) New species and new circumscriptions in *Stylidium* (Stylidiaceae). *Nuytsia* 17: 415–432.

Wege, J. and Moore, N. (2014) Form to nominate a Western Australian species for listing as threatened, change of category or delisting 2014. Department of Environment and Conservation, WA.

Western Australian Herbarium (1998–) *FloraBase—the Western Australian Flora*. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/.

# 6. Taxonomic description

***Stylidium applanatum***

Updated from Wege (2007).

Perennial herb 12–35 cm high, with contracted, shallowly-buried stems, fleshy root tubers present, stilt roots absent. Glandular trichomes 0.2–0.4 mm long, with a translucent to yellowish stalk and black, turbinate or subglobular head; eglandular trichomes absent. Leaves in a basal rosette, adpressed to soil, oblanceolate, flat in T.S., 1.5–4 cm long, 2.5–6 mm wide, subacute, entire, glabrous. Scapes 10–35 cm long, 0.5–1.7 mm wide, glabrous; sterile bracts scattered or in a pseudowhorl, 3.5–6.5 mm long, glabrous. Inflorescence paniculate or racimiforme, 5–30-flowered, branches glabrous or glandular-hairy; bracts narrowly ovate, 2.5–6 mm long, subacute, entire, glabrous or sparingly glandular-hairy along margin; prophylls similar to the bracts but smaller; pedicels 6–17 mm long, distally glandular-hairy. Hypanthium clavate to oblong, 2.8–5 mm long, 1–1.5 mm wide, glabrous. Calyx lobes free, 3–4.5 mm long, 0.8–1.5 mm wide, obtuse to subacute, entire, glabrous. Corolla pale yellow, glabrous; lobes paired laterally, *c.* equal in size, narrowly ovate to oblong with the anterior lobes arcuate on the anterior edge, 5–6.5 mm long, 2.5–3.3 mm wide; tube *c.* 1 mm long. Labellum reflexed and angled across the calyx lobes, ovate, *c.* 0.7 mm long, *c.* 0.5 mm wide, glabrous, with a terminal appendage 1.2–1.5 mm long and lateral appendages 0.2–0.5 mm long. Throat appendages 8 (2 on each corolla lobe), yellow with maroon tips, quadrate to oblong, truncate, ± emarginate, 0.4–0.8 mm high, subtended by 3 yellow mounds. Column 9.5–12 mm long, glabrous; stigma sessile, entire. Mature capsules and seed not viewed.