

MURRUMBIDGEE BOSSIAEA

BOSSIAEA GRAYI K.L. MCDOUGALL
ACTION PLAN



PREAMBLE

Murrumbidgee *Bossiaea* (*Bossiaea grayi*) was first described by McDougall (2009) following a review of herbarium specimens and new collections in NSW and the ACT of *Bossiaea bracteosa*. Four new species were described during this review including Murrumbidgee *Bossiaea*. As such, no previous listings occur for this species. *Bossiaea grayi* was listed as an endangered species on 30 January 2012 (currently Instrument No. 265 of 2016).

Under section 101 of the *Nature Conservation Act 2014*, the Conservator of Flora and Fauna is responsible for preparing, where required, a draft action plan for a relevant listed species. The action plan must include proposals for the identification, protection and survival of a threatened species or ecological community, or, in the case of a threatening process, proposals to minimise its effect. The first action plan for this species was prepared in 2013 (ACT Government 2013a). This revised edition supersedes the earlier edition. While the legal authority of this action plan is confined to the Australian Capital Territory, management considerations are addressed in a regional context. Measures proposed in this action plan complement those proposed in the Aquatic and Riparian Conservation Strategy.

CONSERVATION STATUS

Bossiaea grayi is listed as a threatened species in the following sources:

Australian Capital Territory

Endangered – *Nature Conservation Act 2014*.
Special Protection Status native species – *Nature Conservation Act 2014*.

SPECIES DESCRIPTION AND ECOLOGY

Description

Bossiaea grayi K. L. McDougall (Figure 1) is an upright shrub to 1.5 metres high. Its winged and predominantly glabrous stems are flattened into cladodes with dark brown leaf scales between 1 and 2.2 millimetres (mm) long. Its yellow and red flowers are solitary occurring at the nodes with 1 to 2 mm long glabrous pedicels that are obscured by dark brown imbricate floral bracts (Figure 2). The floral bracts are mostly persistent and glabrous apart from marginal hairs, increasing in size from outer to inner and the largest (approximately 2.5 mm) with a broadly acute apex. The calyx is mostly glabrous (5–6.5 mm long), green and sometimes tinged with red. The

glabrous corolla consists of a standard (9.5–11 mm long). It includes a claw 3–3.5 mm long, and 11–12.5 mm wide, exceeding the other petals, with deep yellow with red markings near the base and faint red longitudinal striations radiating from the base to the edge of the lamina. Wings are 9–10 mm long including a claw 3–3.5 mm long, yellow with red markings at the base; and dark red keel 9–10 mm long, including a 3–3.5 mm long claw.

B. grayi flowers from September to October and produces 20–29 mm long oblong pods with tan to dark brown seeds (2.8–3 mm long) that shed in December (McDougall 2009)(Figure 3).

Distribution

Bossiaea grayi occurs exclusively in the Australian Capital Territory in sandy and skeletal soils amongst rock outcrops near and above the edge of the riparian zone (high flood level) along the Murrumbidgee River and its tributaries.

Eleven extant populations were described in the 2013 Murrumbidgee *Bossiaea* Survey Report (ACT Government 2015a): five locations on the Murrumbidgee River, five locations along the Paddys River and one location on the Cotter River. The known distribution along the Murrumbidgee

River is from Red Rocks Gorge north to Woodstock Nature Reserve. An estimated 2500 individuals occur along the Paddys River, making this the largest contributor to total population size for the species. Survey of previous records of *Bossiaea bracteosa* along the Lower Molonglo River and at Googong Foreshores did not detect the presence of *B. grayi* at these locations.

Habitat and ecology

B. grayi has been recorded at elevations between 445 metres and 575 metres above sea level. All sites are located within incised river valleys, most are steep (15–45 degrees) and rocky with skeletal soils. Gradients vary with landscape position, with individuals in the riparian flood zone on lower gradients. All soils were observed to have a high proportion of sand indicating a preference for well-draining substrates. Sites on the Murrumbidgee River have skeletal medium to coarse soils over exposed ignimbrite volcanics. The largest populations on the Paddys River occur on shallow to skeletal coarse sand over granodiorite or interbedded metasandstone and shale. All of the smallest populations comprising only one or a few individuals (Paddys and Cotter Rivers) are associated with recent coarse alluvium (ACT Government 2013).

CURRENT MANAGEMENT ACTIONS

Prior to being listed as a threatened species, *B. grayi* (formerly *Bossiaea bracteosa*) did not have a formal action plan in place. However, being a species with special protection status it attracted monitoring and protection that was periodically undertaken by local parks and conservation rangers. Since being listed as a threatened native species there has been an increased focus on survey, identification of threats or threatening processes, monitoring and research.

The majority of *B. grayi* sub-populations occur within nature reserves of the Murrumbidgee River Corridor. Others, including the sub-populations with the largest number of individuals, occur within land currently designated as Plantation

Forestry under the ACT Territory Plan (ACT Government 2008).



Figure 1 Murrumbidgee Bossiaea (*Bossiaea grayi*). Illustration: ACT Government.



Figure 2 Murrumbidgee Bossiaea (*Bossiaea grayi*): in flower at Australian National Botanical Gardens (above) and bearing young fruit at Paddys River (below). Photos: L. Johnston, ACT Government.

Ex situ conservation and translocation

Since the original production of Action Plan 34: Murrumbidgee Bossiaea (ACT Government 2013a), a collaborative effort between the Australian National Botanic Gardens, ACT Government and the Australian Native Plant Society has instigated an *ex situ* reserve via the collection and storage of seed at the National Seed Bank. An initial investigation into seed germination requirements has been undertaken by a member of the Australian Native Plant Society.

THREATS

The main threat to *B. grayi* is population range reduction and further fragmentation of the already disjunct populations. Previous surveys

have already identified that the species may have undergone a range reduction when previously recorded sub-populations along the Molonglo River valley could not be found (ACT Government 2013b). Recent monitoring indicates that small sub-populations along the Paddys River valley are currently at risk of loss due to reducing number of individuals (ACT Government 2015b).

Recent monitoring in 2016 has revealed the susceptibility of the species to dieback in one sub-population. Initial investigations have failed to identify the cause, although soil analyses have been negative for the presence of *Phytophthora cinnamomi* (ACT Government 2015b).

Several sub-populations are subject to heavy weed infestations. This creates competition for resources such as water, nutrients and light. Management of weeds also creates the potential for inadvertent application of foliar herbicide on *B. grayi*, which has been reported in the past (ACT Government 2013b).

Three extant sub-populations occur within land designated as Plantation Forestry under the ACT Territory Plan. Mechanical disturbance associated with forest harvesting and plantation management has also been identified as a potential threat along the Paddys River valley. Additionally, recreational vehicle use occurs along management trails that either bisect or are immediately adjacent to *B. grayi* individuals and poses a threat if not managed appropriately.

MAJOR CONSERVATION OBJECTIVES

The overall objective of this action plan is to maintain viable, wild populations of Murrumbidgee Bossiaea in the ACT.

Specific objectives of the *Bossiaea grayi* action plan:

- Conserve all sub-populations in the ACT.

- Manage habitat to conserve existing sub-populations and facilitate expansion into adjacent habitat.
- Arrest decline in sub-populations which have reduced in population size and increase the number of sub-populations overall.

CONSERVATION ISSUES AND INTENDED MANAGEMENT ACTIONS

Protection

It is important to ensure existing populations within protected areas are managed to enhance survival and natural recruitment. This includes mitigating threatening processes and maintaining suitable conditions for reproduction and expansion. These actions will be assisted on reserved land by: targeted sensitive weed management within and around known populations in river corridor reserves, monitoring native vegetation encroachment, appropriate collection and propagation of material for revegetation projects and continuing to monitor and manage for known threatening processes.

Sub-populations occurring on unreserved land need special attention to ensure long-term survival. In addition to measures listed above, raising and maintaining awareness of the presence of populations among land managers and field workers is essential. Demarcating areas or erecting barriers to ensure land management or road maintenance operations may aid protection of the species.

Implementing the proposed extension of the Bullen Range Nature Reserve would assist the protection of a proportion of the individuals on currently unreserved lands.

Environmental offsets requirements

Environmental offset requirements for species and ecological communities in the ACT are outlined in the ACT Environmental Offsets Policy and associated documents, including the ACT

Environmental Offsets Assessment Methodology and the Significant Species Database.

An Environmental Offsets Assessment may result in a development being flagged. A flag identifies an area of land with significant protected matter values. If a proposed impact is flagged, it will require additional consideration by the Conservator of Flora and Fauna as to whether offsets are appropriate in the particular instance. Given the fragmented and vulnerable nature of *B. grayi* sub-populations across the ACT, it has been determined that a development proposal that may have an impact on this species should be flagged for consideration by the Conservator.

If threatened species numbers are observed to change dramatically (either increase or decrease), a review of the threshold for that particular species in the Assessment Methodology and Database would be undertaken.

Survey, monitoring and research

Surveys have been undertaken at all sites where *B. grayi* (or *Bossiaea bracteosa*) had previously been recorded. From this an estimated baseline population size, extent and physiographic environment for the species was documented (ACT Government 2013b). Known extant populations continue to be monitored by the Conservation Research Unit and the Parks and Conservation Service to identify and assess any threatening processes and evaluate the effects of management.

Surveys in 2013 failed to detect the species at a number of sites where it had previously been recorded (ACT Government 2015a). Due to the coarseness of the original spatial records it is plausible that the species may still be present in the vicinity but further broader-scale investigations would be required for confirmation.

It is also possible the species exists at previously undocumented locations elsewhere in the ACT but surveys aimed solely at finding additional populations are unlikely to be practical. Discovery of new populations is likely to be through unrelated surveys or from opportunistic

observations from field workers, naturalists and other interested persons.

An initial investigation into seed germination of the *B. grayi* has successfully demonstrated optimal techniques for both manual and bulk seed imbibitions (ACT Government 2015b). There is scope to further develop this research as it will provide useful information for both small and larger scale propagation. *B. grayi* has only been recently taxonomically described so there is also much scope for research into various physiologic, life history and ecological aspects of the species.

Priority research areas include:

- Improved knowledge of life history and ecology, such as plant longevity, seed longevity, conditions associated with germination and recruitment and effects of surrounding vegetation biomass.
- Methods for reintroducing or establishing additional populations, such as translocation of plants.
- More detailed investigations of chemistry, composition and structure of soil at the known sites, to assist with identification of similar sites for establishment of other populations.
- Identify genetic diversity and population structure among the disjunct sub-populations.
- Further investigate causes of dieback in some subpopulations and investigate possible management responses.

Management

Due to the fragmented distribution of the species across its range, management actions need to be directed towards maintaining conditions that minimise loss or degradation of the small sub-populations. This will involve managing threats such as invasive plants, and managing activities to prevent adverse impact on the sites.

Priority management actions include:

- Sensitive management of weeds to reduce species competition and maintain a suitable habitat structure.

- Management or restriction of incompatible activities such as recreational use near the sites, particularly where activities may damage individuals or sub-populations.
- Maintaining a suitable public profile for the sites where the species is located. The appropriateness of signage and fencing will need careful consideration.
- Incorporating appropriate management actions in relevant plans and strategies
- Continuing field collection and management of seed for storage in the National Seed Bank.
- Maintaining an *ex situ* 'insurance' population (plants and/or seed bank) whilst there is a high risk of further extant sub-populations becoming extinct.

IMPLEMENTATION

Implementation of this strategy will require:

- Land planning and land management areas of the ACT Government to take into account the conservation of this (and other) threatened species.
- Allocation of adequate resources to undertake the actions specified in the Aquatic and Riparian Conservation Strategy and action plans.
- Collaboration with universities, CSIRO, Australian National Botanic Gardens and other research institutions to facilitate and undertake research required to inform management of the species.
- Collaboration with non-government organisations such as Greening Australia to undertake on-ground actions.
- Engagement with the community, where relevant, to assist with monitoring and other on-ground actions and to help raise community awareness of conservation issues for this species.

OBJECTIVES, ACTIONS AND INDICATORS

Table 1 Objectives, actions and indicators.

Objective	Action	Indicator
1. Protect all ACT sub-populations.	1a. Apply legal measures to protect all populations.	1a. All populations protected by appropriate legal measures.
	1b. Ensure legal protection measures require land management to conserve the species.	1b. Legal protection measures include requirement for conservation management.
	1c. Monitor existing populations for changes in size, numbers and health and any observable threatening processes.	1c. Production of research reports documenting outcomes of regular population monitoring and evaluation of management practices.
	1d. Maintain alertness to the possible presence of the species in previously undocumented locations or sites where surveys have indicated sub-population loss.	1d. Communication with land managers, community groups and individuals that are or may undertake operational or research work in areas likely to discover the species.
	1e. Maintain a seed bank as insurance against loss of extant sub-populations.	1e. The seed bank of <i>Bossiaea grayi</i> in the National Seed Collection is maintained and seed collected at regular intervals (determined by seed longevity).
2. Manage habitat to conserve the species.	2. Manage sites to reduce competition from introduced (and where suitable native) species.	2. Extant populations are stable or increasing.
3. Maintain and enhance geographic area of the population.	3a. Increase the number of individuals at sites where sub-populations are susceptible to loss due to very low numbers.	3a. Documentation of sites where additional numbers of individuals would greatly decrease the chance of loss of entire sub-populations. Plants propagated and trial plantings and maintenance undertaken and documented.
	3b. Facilitate trials to re-establish sub-populations in locations from which sub-populations have been lost.	3b. Trial re-establishment of sub-population/s has been undertaken.
4. Improved understanding of the species' ecology, habitat and threats.	4a. Undertake or facilitate research on appropriate methods for managing the species and its habitat such as life history, germination, recruitment and genetics.	4a. Research results reported and where appropriate applied to the conservation management of the species.
	4b. Continue to monitor observed dieback occurrences.	4b. Populations regularly monitored for dieback and potential causes tested for and documented.

Objective	Action	Indicator
5. Promote a greater awareness of, and strengthen stakeholder and community engagement in, the conservation needs of the species.	5. Undertake or facilitate stakeholder and community engagement and awareness activities and promotions.	5. Engagement and awareness activities and promotion undertaken and reported.

ACKNOWLEDGMENTS

Luke Johnston contributed to the preparation of this action plan. The illustration of the species (Figure 2) was prepared for the ACT Government by John Pratt.

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