



**INDEPENDENT REVIEW OF THE
*ENVIRONMENT PROTECTION AND
BIODIVERSITY CONSERVATION ACT
1999***

Submission by the Stanthorpe
Rare Wildflower Consortium

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Granite boronia (*Boronia granitica*), listed as endangered under the EPBC Act, is threatened by inappropriate fire regimes, feral goats and habitat loss. *Photo: Marc Newman*

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1. INTRODUCTION

We welcome the opportunity to make a submission to the independent review of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Australia has already been greatly impoverished by the extinction and decline of much of its highly distinctive flora and fauna, with the loss of at least 100 endemic Australian species [1]. As is widely acknowledged, Australia is facing an extinction crisis, with many more species edging towards oblivion [2–6].

Our national environmental law has an essential role in compelling, driving, facilitating, enabling and encouraging biodiversity conservation. That it is failing to do so, and abjectly so, is unarguable when we consider what Australia has lost since the EPBC Act commenced, including at least 5 more species (3 extinct and 2 extinct in the wild) in the decade since the last independent review [1].

So, these are not times for mere ‘tinkering at the edges’ of law reform. We hope the independent reviewers will seize this opportunity to craft an ambitious but realistic set of reforms to greatly strengthen the EPBC Act (or a replacement) that will better enable Australians to meet our international and moral obligations to maintain and restore Australia’s biodiversity.

THIS SUBMISSION

In this submission we focus mainly on how well the Act is meeting objective (a):

to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance [MNES]

Our particular focus is threatened plant species as part of the ‘listed threatened species and ecological communities’ MNES. This focus is also relevant to objectives (c) and (f):

to promote the conservation of biodiversity

to assist in the cooperative implementation of Australia's international environmental responsibilities.

The relevant international responsibilities include the following:

Convention on Biological Diversity Article 8(d): Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings.

Aichi Target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

We provide information about threatened flora on the Granite Belt flora as a case study of the failure of the EPBC Act to facilitate recovery of threatened species.

ABOUT THE STANTHORPE RARE WILDFLOWER CONSORTIUM

The Wildflower Consortium was established in 2004 to work on projects to promote, protect and recover plant species and habitats in the Granite Belt district of southern Queensland. Our activities include the following.

Community education and engagement:

- regular wildflower walks open to the public
- publication of plant brochures and books, including a comprehensive guide to the Granite Belt flora [7] and guides for local eucalypts [8] and wattles (forthcoming)
- participation in community events, eg conservation workshops, local shows and festivals

- advice to landholders, government agencies and the public about plant identification and management.

Conservation management and advocacy:

- surveys of threatened plant species
- nominations of threatened species for listing
- weeding and other on-ground work
- engagement with governments, landholders and others to promote improved protection and management.



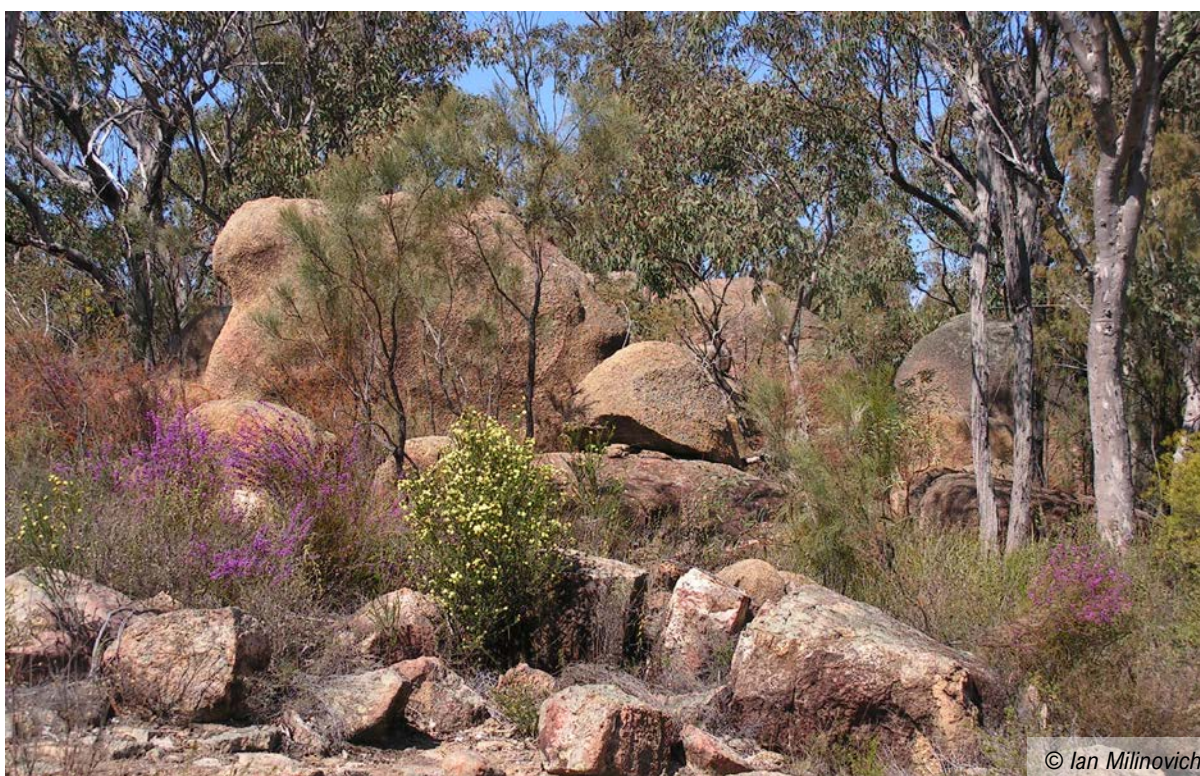
Here, the Wildflower Consortium leads a wildflower walk in a rocky landscape typical of the Granite Belt. *Photo: Ian Milinovich*

2. CASE STUDY: THE GRANITE BELT FLORA

2.1 About the Granite Belt flora

The Granite Belt (an area of 1380 km²) lies on the western edge of the Great Dividing Range in southern Queensland, making up most of the Stanthorpe Plateau subregion at the northern tip of the New England Tableland bioregion.

The region features a highly diverse flora, with more than 900 plant taxa [7]. It overlaps a centre of plant diversity and endemism in the Border Ranges [9]. At least 18 plants are endemic to the Granite Belt and several others are nearly endemic, extending over the NSW border in the New England Tableland [7]. New species are still being discovered – an endemic shrub, *Homoranthus inopinatus*, was discovered in 2009 (Box 1) and a new endemic eucalypt, Dalveen blue box (*Eucalyptus dalveenica*), was described in 2019 (Box 2).



One reason for the high plant diversity and endemism is the region's location at the intersection of the temperate Bassian province of south-eastern Australia and the Torresian province of the subtropics and tropics. At least 49 plant species reach their northern range limit in the Granite Belt [7].

Another reason is that the rugged landscape of granite domes, peaks and boulders has functioned as an evolutionary refuge during past glacial ages. During climate fluctuations, plants in 'the craggy, boulder-strewn parts' of the region need move only short distances to find the conditions they need [10]. By promoting survival in this way, the region has retained species that went extinct elsewhere. The rugged landscape has also promoted diversity by providing many different niches for plants. Shady grottos support very different plants from those growing on warm north-facing slopes. Granite pavements suit inland plants that can survive in patches of shallow soil that dry out too readily to suit most plants. The old infertile soils

also foster diversity. Low productivity makes it difficult for any species to dominate, allowing for the coexistence of many plants [11].

Another advantage of the rugged topography for plants is its unsuitability for agriculture. Nonetheless, close to half the remnant vegetation on the Granite Belt has been cleared, mostly for agriculture.

Less than 13% of the Granite Belt is protected in the conservation estate: Girraween National Park (11,800 ha), part of Sundown National Park (5800 ha) and 13 nature refuges (1300 ha).

2.2 Threatened Granite Belt plants

For a small area (0.1% of Queensland), the Granite Belt has a substantial number of threatened plants:

- 16 listed as vulnerable or endangered under the EPBC Act (Table 1)
- 20 listed as vulnerable or endangered under Queensland's Nature Conservation (NC) Act (3% of Queensland's total) (Table 1)
- 13 listed as near threatened under the NC Act (Table 2)
- 6 additional taxa regarded by experts as endangered or critically endangered (Table 1).

All but 2 of the 17 taxa endemic to the Granite Belt are listed as threatened or regarded by experts as threatened, and another is listed as near threatened. Several near-endemics are also listed as threatened.

Of the 16 taxa listed as threatened under the EPBC Act, 6 are endangered and 10 are vulnerable. There are also 17 animal taxa indigenous to the Granite Belt listed under the EPBC Act [12].

Judging by the listings under the EPBC Act, the conservation status of the Granite Belt flora has remained mostly static in the 20 years since the Act commenced. No taxa have been downlisted and all but one were previously listed under the superseded *Endangered Species Protection Act 1992*. But the stasis in listings does not reflect stability of populations. The stasis is mainly due to a lack of monitoring of the Granite Belt flora and a lack of threatened species nominations. There have been new listings under the Queensland NC Act, including of species endemic to the Granite Belt (implying they are nationally threatened), and the majority of threats to flora on the Granite Belt have not abated over the past 20 years (see section 2.4).

The conflicting or unassessed status of many plant taxa in the Granite Belt implies there are major gaps in the listings under the EPBC Act (Table 1); for example:

- 5 species endemic to the Granite Belt are listed under the NC Act, but not the EPBC Act: *Bertya glandulosa* (vulnerable), *Bertya recurvata* (endangered), *Homoranthus papillatus* (vulnerable), *Macrozamia viridis* (endangered), *Zieria graniticola* (endangered)
- 1 species endemic to the Granite Belt and northern NSW is listed under the NC Act and in NSW, but not under the EPBC Act: *Kardomia silvestris* (endangered)
- 3 taxa endemic to the Granite Belt and each known from 1 small population, are not listed under Queensland law or the EPBC Act: *Homoranthus inopinatus* (Box 1), *Boronia inflexa* subsp *montiazura* and *Boronia inflexa* subsp *grandiflora* (an additional unlisted species with a small population, *Eucalyptus dalveenica*, has just been assessed by the Queensland Species Technical Committee)
- 1 species endemic to the Granite Belt is listed as endangered under the NC Act but as vulnerable under the EPBC Act: *Kardomia granitica*.

Based on these and other contradictions and gaps, we estimate that an additional 10 taxa, at least, probably warrant listing under the EPBC Act.

However, because there is almost no monitoring, the current status of most threatened or declining taxa is poorly understood. The risks of this are exemplified by black grevillea (*Grevillea scortechinii* subsp *scortechinii*), endemic to the Granite Belt and listed under both the EPBC Act and NC Act as vulnerable. A 2019 survey by volunteers from the Stanthorpe Rare Wildflower Consortium found that several sub-populations have declined or disappeared and that it qualifies as critically endangered (see Box 3).

Declines in the conservation status of Granite Belt flora are not surprising for there are no recovery plans for any of the 16 species listed under the EPBC Act or any others listed under the NC Act (Table 1) and the major threats have mostly not been abated.



Three species endemic to the Granite Belt and listed as threatened under Queensland's Nature Conservation Act but not listed under the EPBC Act (left to right): *Homoranthus papillatus* (vulnerable), *Bertya recurvata* (endangered), *Bertya glandulosa* (vulnerable). Photos: Ian Milinovich

2.3 Threatened Granite Belt ecological communities

Two ecological communities listed under the EPBC Act partly occur on the Granite Belt: the 'white box–yellow box–Blakely's red gum grassy woodland and derived native grassland' and the 'New England peppermint (*Eucalyptus nova-anglica*) grassy woodlands'. Both are critically endangered. The first is a component of 4 endangered regional ecosystems on the Granite Belt (13.3.1, 13.3.4, 13.12.8, 13.12.9) and the second is a component of the endangered 13.3.2 [13,14]. They have been extensively cleared and modified by grazing.

As indicated by the number of threatened regional ecosystems on the Granite Belt, there may be other ecological communities here that warrant listing under the EPBC Act. Of the 13 ecosystems mapped by the Queensland Government, 8 are classed as endangered and 3 of concern (this is their 'biodiversity' status, which takes into account both the extent of clearing and condition).

2.4 Key threats to the Granite Belt flora

The major threats to flora on the Granite Belt are typical of the threats to biodiversity elsewhere in Australia – habitat loss, invasive species and altered fire regimes – with climate change looming as another.

Habitat loss: About half of the native vegetation within the Granite Belt has been cleared, mostly for agriculture. Of Queensland's 13 bioregions, the New England Tableland bioregion has the lowest extent of remnant vegetation (36%), but thanks to its rugged topography and 2 national parks, the Stanthorpe Plateau subregion (the Granite Belt) has retained a higher proportion of remnant vegetation, 53%, than the rest of the bioregion [15]. Clearing has continued in the Granite Belt despite much stricter state vegetation laws, with the loss of 1.5% of the vegetation classified as remnant when the EPBC Act commenced. Due to clearing and degradation, 11 of the 13 regional ecosystems on the Granite Belt are classified by the Queensland Government as threatened.

Invasive species: Threats to the Granite Belt flora include several widespread weeds (eg African lovegrass, whisky grass, blackberry, Japanese honeysuckle, radiata pine) and introduced herbivores (feral goats, pigs, deer and rabbits). Invasive threats are mostly growing.

Altered fire regimes: Too-frequent or too-infrequent fires are known or likely threats for several threatened Granite Belt plants, but due to lack of research, the fire response and favourable burning regimes are unknown for many species. For example, the Australian Government's profile for *Boronia repanda* (endangered) says that plants 'occurring in Queensland are killed by fire after which they regerminate from seed' [16]. This is contrary to recent observations by Consortium members of *B. repanda* resprouting in areas burnt by hot fires in September 2020. Recovery efforts are hampered by the lack of such basic information.

Climate change: Impacts in the Granite Belt are likely to include more frequent and hotter fires, greater rainfall variability and more droughts, changed hydrological regimes resulting in the drying of habitats such as upland swamps, new invasive species and shifts in vegetation types [17,18].

Lack of research and lack of protection in the conservation estate are impediments to recovery of threatened species. About half the threatened plant species on the Granite Belt have no protection at all in a national park. The critically endangered Dalveen blue box (Box 2) and black grevillea (Box 3) are examples of plants lacking representation in a protected area. Only 11% of the preclearing potential habitat of Queensland-listed species is protected in the conservation estate [19].

2.5 Conclusions

During the 20 years operation of the EPBC Act, the status of flora in the Granite Belt has declined despite the listing of 16 taxa as threatened. All but one had been listed under the previous legislation. The current list of threatened species is far from comprehensive, with at least another 10 species probably warranting national listing (Table 1). Listing appears not to have been effective for improving the status of threatened species, as none have been downlisted. This is not surprising as no recovery plans have been enacted. However, the real status of many species is not known because they are mostly not monitored.



Endemic to the Granite Belt, both plants have been listed since the EPBC Act commenced and lack a recovery plan: White's phebalium (*Phebalium whiteii*), listed as vulnerable (left) and black-clubbed spider orchid (*Caladenia atroclavia*), endangered. Photos: Ian Milinovich

TABLE 1. THREATENED (ENDANGERED OR VULNERABLE) FLORA OF THE GRANITE BELT

Species	Common name	Family	Endemicity	National status (EPBC Act)	Qld status (NC Act) ^[A]	NSW status (BC Act) ^[B]	Unofficial status ^[C]	Recovery plan?	National conservation advice?	Protected area? ^[D]	Community surveys? ^[E]
<i>Acacia pubifolia</i>	Wyberba wattle	Mimosaceae	Granite Belt, nNSW	Vulnerable	Vulnerable	Endangered		No	2008	Girraween (partly)	2009
<i>Acacia ruppii</i>	Rupp's wattle	Mimosaceae	Granite Belt, nNSW	Endangered	Vulnerable	Endangered		No	No	Girraween (partly)	2009
<i>Bertya glandulosa</i>		Euphorbiaceae	Granite Belt		Vulnerable			No		Girraween (partly)	2009
<i>Bertya recurvata</i>		Euphorbiaceae	Granite Belt		Endangered			No		Girraween (partly)	2009
<i>Boronia granitica</i>	Granite boronia	Rutaceae	New England Tableland	Endangered	Endangered	Vulnerable		No	2016	No	2008, 2020
<i>Boronia inflexa</i> subsp <i>grandiflora</i>		Rutaceae	Granite Belt				Critically endangered [20]			Girraween (all)	
<i>Boronia inflexa</i> subsp <i>inflexa</i>	Rock boronia	Rutaceae	Granite Belt, nNSW				Endangered [21]			Girraween (partly)	
<i>Boronia inflexa</i> subsp. <i>montiazura</i>	Blue mountain boronia	Rutaceae	Granite Belt				Critically endangered [20]			No	2009
<i>Boronia repanda</i>	Repand boronia	Rutaceae	Stanthorpe Plateau	Endangered	Endangered	Endangered		No	2014	No	2008, 2020
<i>Caladenia atroclavia</i>	Black club spider orchid	Orchidaceae	Granite Belt	Endangered	Endangered			No	2008	Girraween (partly)	
<i>Diuris parvipetala</i>	Slender donkey orchid	Orchidaceae	Qld, NSW		Vulnerable					No	2008, 2009–19 ^[F]
<i>Dodonaea hirsuta</i>	Hairy hopbush	Sapindaceae	Granite Belt, nNSW		Vulnerable					Girraween (partly)	2009
<i>Eucalyptus dalveenica</i>	Dalveen blue box	Myrtaceae	Granite Belt				Critically endangered [22]			No	2008, 2019
<i>Eucalyptus mckieana</i>	McKie's stringybark	Myrtaceae	New England Tableland	Vulnerable		Vulnerable		No	2008	No	

Species	Common name	Family	Endemicity	National status (EPBC Act)	Qld status (NC Act) ^[A]	NSW status (BC Act) ^[B]	Unofficial status ^[C]	Recovery plan?	National conservation advice?	Protected area? ^[D]	Community surveys? ^[E]
<i>Eucalyptus scoparia</i>	Wallangarra white gum	Myrtaceae	New England Tableland	Vulnerable	Vulnerable	Endangered		No	2008	Girraween (partly)	
<i>Grevillia scortechinii</i> subsp. <i>scortechinii</i>	Black grevillea	Proteaceae	Granite Belt	Vulnerable	Vulnerable		Critically endangered [23]	No	2008	No	2008, 2019
<i>Hakea macrorrhyncha</i>	Tall needlebush	Proteaceae	Granite Belt, nNSW		Vulnerable			No		Girraween (partly)	
<i>Homoranthus inopinatus</i>		Myrtaceae	Granite Belt				Critically endangered [24]			No	2009
<i>Homoranthus montanus</i>	Mountain mouse bush	Myrtaceae	Granite Belt	Vulnerable	Vulnerable			No	2008	Sundown (partly)	
<i>Homoranthus papillatus</i>	Mouse bush	Myrtaceae	Granite Belt		Vulnerable					Girraween (all)	
<i>Kardomia granitica</i>		Myrtaceae	Granite Belt	Vulnerable	Endangered			No	2013	Girraween (part)	2009
<i>Kardomia silvestris</i>	Woodland babingtonia	Myrtaceae	Granite Belt, nNSW		Endangered	Endangered				Girraween (all)	
<i>Lepidium peregrinum</i>	Wandering peppercress	Brassicaceae	Qld, NSW	Endangered		Endangered		No	2014	Sundown (partly)	
<i>Macrozamia occidua</i>		Zamiaceae	Sundown NP	Vulnerable	Vulnerable					Sundown (all)	
<i>Macrozamia viridis</i>		Zamiaceae	Granite Belt		Endangered					Girraween (partly)	2009
<i>Melaleuca williamsii</i> [<i>Callistemon pungens</i>] subsp. <i>fletcheri</i>	Prickly bottlebrush	Myrtaceae	Granite Belt	Vulnerable [species level]	Vulnerable			No	2008	No	2009
<i>Phebalium glandulosum</i> subsp. <i>eglandulosum</i>	Rusty desert phebalium	Rutaceae	Granite Belt, nNSW	Vulnerable	Vulnerable	Endangered		No	2008	Girraween (partly)	2008
<i>Phebalium whitei</i>	White's phebalium	Rutaceae	Granite Belt	Vulnerable	Vulnerable			No	2008	Girraween (all)	
<i>Tylophora woollsii</i>	Cryptic forest twiner	Apocynaceae	Granite Belt, nNSW	Endangered	Endangered	Endangered		No	2008	Girraween (all)	

Species	Common name	Family	Endemicity	National status (EPBC Act)	Qld status (NC Act) ^[A]	NSW status (BC Act) ^[B]	Unofficial status ^[C]	Recovery plan?	National conservation advice?	Protected area? ^[D]	Community surveys? ^[E]
<i>Zieria graniticola</i>		Rutaceae	Granite Belt		Endangered					No	

Notes: **[A]** Listed as vulnerable or endangered under Queensland's Nature Conservation Act 1992. **[B]** Listed as vulnerable or endangered under NSW's Biodiversity Conservation Act 2016. **[C]** Not listed but considered by experts to be threatened or assessed as threatened. **[D]** Only national parks in the Granite Belt are noted. **[E]** The community surveys were not all comprehensive and do not include national parks. Some non-community surveys have also been conducted, although not across the entire species range – eg those done for environmental impact assessments or similar and those done in national parks. The extent of monitoring in the 2 national parks is unknown, but likely to be limited due to resource constraints. The Queensland Audit Office notes that the Queensland Parks and Wildlife Service (QPWS) 'does not identify specific allocations of funding for the protection and recovery of threatened species on the land it manages' [25]. **[F]** *Caladenia atroclavia* is one of the few species that has been the subject of some monitoring and research by the Queensland Government in conjunction with the University of Queensland.

TABLE 3. NEAR-THREATENED PLANTS LISTED UNDER THE NATURE CONSERVATION ACT (QLD)

Species	Common name	Family	Endemicity	Community surveys?
<i>Agiortia cicatricata</i>		Ericaceae	SEQ, nNSW	
<i>Allocasuarina rupicola</i>	Shrubby she-oak	Casuarinaceae	Granite Belt, nNSW	2009
<i>Boronia amabilis</i>	Lovely boronia	Rutaceae	Granite Belt	2009
<i>Conospermum burgessiorum</i>	Smokebush	Proteaceae	New England Tableland	2009
<i>Corunastylis [Genoplesium] sigmoidea</i>	Dave's Creek midge orchid	Orchidaceae	SEQ	
<i>Eucalyptus codonocarpa</i>	New England mallee	Myrtaceae	New England Tableland	
<i>Euphrasia orthocheila subsp. peraspera</i>		Orobanchaceae	Granite Belt, nNSW	
<i>Hibbertia elata</i>	Tall guinea flower	Dilleniaceae	Granite Belt, central NSW	2009
<i>Leionema ambiens</i>	Forest phebalium	Rutaceae	New England Tableland	2009
<i>Melaleuca flavovirens</i>	Green bottlebrush	Myrtaceae	New England Tableland	
<i>Mirbelia confertiflora</i>		Fabaceae	Granite Belt, nNSW	2009
<i>Persoonia daphnoides</i>		Proteaceae	Northern New England Tableland	
<i>Prostanthera petraea</i>		Lamiaceae	Northern New England Tableland	

BOX 1. A NEW, CRITICALLY ENDANGERED BUT UNLISTED MYRTACEOUS SHRUB

Homoranthus inopinatus, a shrub in the Myrtaceae family that grows in heath around granite outcrops, was described only in 2011 [24]. It had been discovered 2 years earlier by Jenny and Glenn Holmes, while doing survey work for the Stanthorpe Rare Wildflower Consortium.

The species is known from only a single population of about 100 plants on a private property in the Granite Belt. It is threatened by an inappropriate fire regime, grazing, and disturbance by feral pigs and deer, as well as critically low numbers, and satisfies the IUCN criteria for critically endangered. However, it is not listed by the Queensland or Australian governments.



©Glenn & Jenny Holmes

BOX 2. A NEW, CRITICALLY ENDANGERED EUCALYPT

Prior to 2019, a cluster of eucalypts at Dalveen were classified either as *Eucalyptus baueriana* (least concern) or *E. magnificata* (endangered). Then, an Honours student took a closer look and found they differed chemically, genetically and morphologically from both species [26]. (One of their distinctions is a milder, fruity smelling leaf.) They have now been accepted as a separate species, Dalveen blue box (*E. dalveenica*).

This species has almost disappeared due to land clearing. Only 200 hectares of its main associated regional ecosystem remains. Members of the Stanthorpe Rare Wildflower Consortium could find only about 300 trees in a 2019 survey. Our nomination for listing the species was accepted by the Queensland Species Technical Committee and the species should soon be listed as critically endangered.

BOX 3. A NEGLECTED AND NOW CRITICALLY ENDANGERED GREVILLEA

Black grevillea (*Grevillea scortechinii* subsp *scortechinii*) is an attractive prostrate shrub with a partly black flower endemic to the Granite Belt.

It is currently listed by the Australian and Queensland governments as vulnerable. Surveys in 2019 by members of the Stanthorpe Rare Wildflower Consortium of known sites found there had been a substantial decline over 3 generations. It now qualifies as critically endangered and this listing has been recommended by the Queensland Species Technical Committee.

Black grevillea grows mainly in disturbed sites – on roadsides, rail reserves and dam banks. It does not occur in any protected area and no sites have been managed for conservation.

It has been lost from several sites, particularly on private property that has been grazed, not burnt for many years or invaded by exotic pine trees. One site on a railroad was destroyed due to construction of a track in 2012. The main threats are weed invasion, inappropriate fire regimes and habitat destruction.



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3. OPERATIONS OF THE EPBC ACT

3.1 Assessing and listing threatened species

Fundamental to conservation of threatened species and ecological communities is a comprehensive list of what is threatened. It is essential for shaping conservation priorities, charting trends in biodiversity, and regulating harmful actions. Australia lacks a comprehensive list. There is inadequate survey effort, particularly of plants, to determine the status of many species, and the listing process is ad hoc (relying on nominations), onerous and slow, typically taking at least 2 to 3 years from the nomination to listing of species and longer for ecological communities. Ironically, it is often from surveys required as part of environmental approvals for developments that distribution information about threatened species is obtained.

However, on the Granite Belt, the best recent information about the status of threatened or potentially threatened plants has mainly come from community surveys instigated by the Stanthorpe Rare Wildflower Consortium. Members recently surveyed 2 species endemic to the Granite Belt – black grevillea and Dalveen blue box – and prepared nominations for them to be listed under Queensland law (Box 2 and 3). This took several weeks of voluntary effort. Both plants qualify as critically endangered (and should soon be listed as such in Queensland). If not for volunteers, the status of these species could go legislatively unrecognised for years. Such fundamental conservation work should not rely on community volunteers.

We applaud one recent advance in the listing process – the adoption of a common assessment method by the federal and state/territory governments. This means that the 2 species we nominated under Queensland law should also soon be listed under the EPBC Act. However, the rate of assessments under the EPBC Act continues to be far too slow.

The current conflicting or unassessed status of many plant taxa in the Granite Belt (as outlined above) exemplifies major gaps in the current threatened species list under the EPBC Act, including:

- 5 species endemic to the Granite Belt listed under the NC Act, but not under the EPBC Act
- 1 species endemic to the Granite Belt and northern NSW listed under the NC Act and in NSW as endangered, but not under the EPBC Act
- 3 species endemic to the Granite Belt and each known from only 1 small population not listed under the EPBC Act or the NC Act.

One advance in conservation knowledge has been the preparation of several action plans ('species expert assessment plans') with recent status assessments of Australian mammals [2], birds [3] and reptiles [27]. This should also be done for plant groups. A recent assessment of eucalypts is a good start [28]. One practical way of maintaining a reasonably contemporary and comprehensive threatened species list is to base it largely on regular (10-yearly) systematic expert reviews of major species groups.

However, many assessments and nominations are hampered by a lack of information about poorly known species, including those in remote areas or recently discovered. It can take many years to obtain sufficient information and submit a nomination for listing, during which a rare species could be further imperilled or lost. The EPBC Act lacks a 'data deficient' category for threatened species. Insufficient information for a listing decision has resulted in the rejection of 16 nominations [29], but there are far more such species for which a nomination has not been made due to lack of information. This biases the threatened species list to species in more populated areas or those favoured for research. Consistent with the precautionary principle, there should be a category for data deficient species considered likely to be threatened that provides for protection until there is sufficient information to assess their conservation status. Priority candidates for such listings would be species with tiny ranges.

One problem with the assessment process under the EPBC Act is that whether a nomination is assessed and whether a species or ecological community is listed is a decision of the environment minister after receiving advice from the Threatened Species Scientific Committee. The status of a species or community is a scientific question, so a minister should have no role in that decision. The ministerial prerogative to not

assess nominations, delay listings and reject scientific advice can be a particular problem when interest groups oppose listings for species (eg flying-foxes) or ecological communities (eg poplar box grassy woodland on alluvial plains). Ministerial decision-making also adds several steps to the listing process, therefore delaying listings.

RECOMMENDATIONS

Generate and maintain a comprehensive, up-to-date national list of threatened species and ecological communities: Rather than rely only on nominations for threatened species and ecological communities, require regular systematic assessments of the conservation status of Australia's species and ecological communities by experts in each group. Nominations would be useful for supplementing such assessments.

Protect data-deficient species likely to be threatened: A category of 'data deficient' or 'pending assessment' should be added as a listing category under Section 178 of the EPBC Act for species assessed by the Threatened Species Scientific Committee as likely to be threatened but lacking sufficient information for assessment. Newly discovered or described species and species with very narrow ranges should be automatically considered for this category. The category would serve as a high-priority list for research.

Ensure that listing decisions are scientific: The Threatened Species Scientific Committee (or similar independent scientific committee) rather than the environment minister should make the final decisions about which species and ecological communities are listed as threatened.

3.2 Recovery of threatened species

Recovery planning

The majority of threatened species in Australia lack what is fundamental to their conservation – a plan specifying the actions, research and funding required for their recovery.

Prior to amendments in December 2006, the EPBC Act required a recovery plan for each listed threatened species and ecological community. Now it is up to the environment minister whether a recovery plan is prepared. There had also been a commitment by federal, state and territory environment ministers to prepare recovery plans for all critically endangered and endangered species by 2004, but only 22% of such species had recovery plans by 2004 [30].

Only 41% of the 1799 currently listed threatened species (excluding extinct species) and 30% of listed ecological communities have recovery plans [31]. Most recovery plans are out of date. For listed species, >90% of plans are more than 5 years old and >50% are more than 10 years old.

There are no recovery plans (state or federal) for the 16 threatened plants on the Granite Belt (Table 1). Plants are a particularly neglected group. The Queensland Audit Office reported in late 2018 that the Queensland environment department had 'no recovery or project plans for threatened flora' [25].

There are, however, 'conservation advice' documents for most of the Granite Belt flora listed under the EPBC Act. But these have even less regulatory effect than recovery plans and the advice is often generic and not helpful for driving recovery action (often due to lack of research on the species). For example, the advice for *Boronia repanda* (endangered) includes 'Implement an appropriate fire management regime for local populations' without specifying what that is (and without recommending research into fire responses) and 'Monitor known populations to identify key threats'. No conservation advice has proved helpful for driving conservation of the Granite Belt flora.

Given that a substantial proportion of threatened species on the Granite Belt are endemic or nearly endemic to the region, a regional recovery plan would be appropriate. This would provide valuable guidance and impetus for community groups, landholders, businesses and government agencies. It would engender greater community involvement in recovery planning and implementation and provide groups such as the Rare Wildflower Consortium, Southern Queensland Landscapes and Granite Borders Landcare with greater authority to encourage recovery actions and obtain funding. A recovery plan for 9 threatened Granite Belt plants (commissioned by the Queensland Murray Darling Committee) was submitted to the federal environment department in 2009 but refused as a plan under the EPBC Act due to the inclusion of several

species not endemic to the region [32]. Fortunately, it appears this is no longer an impediment to a regional plan being adopted.



Boronia repanda is a near-endemic to the Granite Belt, extending just over the border into NSW, listed as endangered under the EPBC Act (since the Act's commencement) and in Queensland and NSW. The profile of this species in the Species Profile and Threats Database says 'Very little is known of Repand Boronia's life history, ecology or response to disturbance although it is recorded as being an obligate seeder'. This last point was shown to be incorrect after members of the Wildflower Consortium found it resprouting 4 months after hot fires in late 2019. This exemplifies the lack of basic knowledge of many of Australia's threatened species. Photos: Tim Low, Michael Jefferies

Implementation of recovery plans

Even when a species does have a recovery plan there is no obligation to implement it. One of the highest priorities for reform of the EPBC Act should be to compel a recovery response. The extent of the response will inevitably be subject to funding and feasibility and priorities, but at the very least the government should be required to specify the minimum recovery responses it will commit to for each listed species rather than leaving implementation almost wholly to other governments and the community.

One model worth considering is that of the Ontario Government. Upon a species being listed under their Endangered Species Act 2007, it is automatically 'protected from harm or harassment' and its habitat is 'protected from damage or destruction' [33]. A recovery strategy must be prepared for each listed species, which 'provides science-based advice to government on what is required to achieve recovery'. Within 9 months of that advice, the government is required to publish a 'response statement' summarising the government's intended actions and priorities in response to the recovery strategy. That statement takes into account the views of stakeholders, other jurisdictions, Aboriginal communities and members of the public as well as what is feasible. The statement specifies 'government-led actions' and 'government-supported actions' (see [34] for a threatened plant example). Although the Ontario response statements may not include sufficient commitments by the government to recover all species, they do at least serve to generate commitments to recovery actions, which is more than the EPBC Act does.

It is also essential to engender strong commitments by state and territory governments to implement recovery plans. This will require a high-level agreement (see section 3.4).

Recovery plans need to have greater legal clout, particularly to protect critical habitat. A 2015 analysis found that of the 120 most endangered animals covered by recovery plans, only 10% of plans placed any prescriptive limits on habitat loss, even though it was listed as a key threat for two-thirds of those species [35]. Threatened species have lost considerable habitat in the 20 years since the EPBC Act commenced [25]. Protection of critical habitat should be automatic for threatened species.

Monitoring

As *Australia State of the Environment 2016* notes, the 'lack of data and information from long-term monitoring of biodiversity is universally acknowledged as a major impediment to biodiversity conservation' [36]. A recent survey found that 21–46% of threatened vertebrate species and 70% of threatened ecological

communities 'are not monitored at all' and for those that are monitored, the quality of monitoring is often 'suboptimal' [37]. The monitoring of threatened plants is likely to be less than that for threatened animals.

The Queensland Audit Office reported that monitoring data on population status and trends are only available for a few threatened species [25]. This is exemplified in the Granite Belt, where there is no regular monitoring of threatened species. Surveys of threatened species outside national parks have mainly been by community groups (Table 1).

RECOMMENDATIONS

Commit to recovery: It is essential that the federal government recommit to prepare recovery plans for all threatened species. Without a plan, there is unlikely to be an effective recovery effort. However, given that less than 40% of listed species currently have a recovery plan, many of these are outdated and many more species are threatened than are listed, more planning resources are needed. For it to be feasible, simplification of the planning process and document will be needed. A certain minimum level of funding should be committed for planning for each species.

Undertake recovery planning in a 2-step process: We recommend a process similar to that employed by the Ontario Government. Upon listing of a species, require the Threatened Species Scientific Committee or delegated independent experts to prepare a scientific advice/strategy specifying the research and actions (including regulatory and policy actions) needed for species recovery (without considering social and economic feasibility issues). Within a specified timeframe (eg 1 year), require the government to respond to the advice and prepare a recovery plan that includes commitments for recovery actions and other high priority actions that will be supported.

Analyse the effectiveness of recovery planning and implementation: It is important to understand the elements of successful planning and implementation. We recommend that the government commissions independent analysis to analyse success factors and prepare best-practice guidelines for recovery planning. This should include who to involve in planning and implementation. Our understanding is that a cross-sectoral planning team or taskforce is often beneficial, particularly for more socially complex recovery needs.

Support the development of regional recovery plans: Grouping threatened species regionally is likely to engender greater community involvement in recovery efforts and focus effort on the highest priority species rather than just the iconic species. It will require coordination between regions for non-endemic species.

Require monitoring and reporting to track the status of threatened species and recovery progress: Essential for effective recovery programs is development of a national monitoring and reporting framework and standards with reporting requirements harmonised across projects, programs and states to enable tracking of national progress.

3.3 Abatement of key threats

Addressing Australia's biodiversity crisis requires a 2-pronged approach: in addition to nationally coordinated recovery efforts, we need a strong national focus on abating the major threats to biodiversity. Without this, the recovery of many threatened species is extremely difficult or impossible.

The focus on threats in the EPBC Act – through the listing of key threatening processes (KTPs) and development of threat abatement plans – is one of its greatest potential strengths. Where abatement is feasible, this is likely to be the most effective and cost-effective way to protect threatened species and it also benefits many other species (including those threatened but not listed) and improves environmental health and resilience.

But the potential of the KTP system has been stymied due to lack of systematic listing of KTPs, lack of threat abatement planning and lack of implementation of abatement plans (mirroring the failings of listing and recovery planning for threatened species) [38]. Most threats to nature in Australia are worsening. As documented by the Invasive Species Council, the available reviews of threat abatement plans (for 11 of 21 KTPs) reported good progress on abating only 4 KTPs (27% of abatement plans) moderate progress on 4

(27% of plans) and poor progress on 3 (20% of plans) [38]. Nonetheless, the few examples of good abatement progress demonstrate that major threats to Australian biodiversity are surmountable.

The failings of the KTP system are evident in its current irrelevance to addressing the major threats facing the Granite Belt flora:

- *Habitat loss*: Land clearance is listed as a KTP but there is no abatement plan. It threatens about 80% of plants listed as nationally threatened [39].
- *Invasive species*: Many invasive species are listed as KTPs, including as part of the all-encompassing novel biota KTP, but there are few abatement plans. Invasive species threaten about 80% of nationally listed plants [40].
- *Inappropriate fire regimes*: This is not listed as a KTP despite having been nominated and under assessment for more than a decade. Inappropriate fire regimes threaten about 46% of nationally listed plants [39]. The recent fires, including in the Granite Belt in September 2019, starkly demonstrated the severity of this threat and the interactions with climate change that will bring hotter and more frequent fires in future.
- *Climate change*: It is listed as a KTP, but there is no abatement plan. Climate change is listed as a threat to about 32% of nationally listed plants [40].

Examples of desired outcomes of a national KTP system relevant to the Granite Belt flora are as follows:

- *Habitat loss*: An agreed national approach (laws and policies) to prevent further biodiversity declines and a national plan to restore habitats of prioritised threatened species and ecological communities.
- *Invasive species*: A systematic national categorisation of exotic species specifying a management category, nationally consistent laws and policies, and research priorities aimed at developing effective control options, including biological control priorities.
- *Inappropriate fire regimes*: National research priorities and guidelines for biodiversity-focused burning in different bioregions and for different groups of species.
- *Climate change*: A national climate change resilience plan, including stronger protection of climate refuges.



Members of the Wildflower Consortium search for the endangered *Boronia repanda* 4 months after severe fires in September 2019. Photo: Tim Low

RECOMMENDATIONS

We endorse the recommendations of the Invasive Species Council and other NGOs for reforming the KTP system [41]. They include the following.

Generate and maintain a comprehensive, up-to-date national list of key threatening processes: Rather than rely only on nominations for KTPs, require regular systematic scientific assessments of major threats. Nominations would be useful for supplementing such assessments. Decisions about whether to list a KTP should be scientific and made by the Threatened Species Scientific Committee rather than the environment minister.

Commit to abatement: Require a mandatory national response to a listed KTPs. As for recovery planning, we recommend a 2-step process: (a) a 'threat response statement/strategy' as an independent science-based statement of what is needed to abate the threat, specifying the urgency, benefits and likely costs of abatement and providing advice about the most appropriate instruments (whether planning, policy or regulatory) to facilitate abatement, and (b) a full threat abatement plan unless abatement can only be achieved through other processes such as legislative or policy changes or is significantly constrained by deficiencies of data, knowledge or technical feasibility. Abatement plans should specify and prioritise abatement research and actions (including policy and legal responses), integrate with recovery plans, and specify targets, costs, requirements for monitoring and reporting and triggers for review.

Analyse the effectiveness of abatement planning and implementation: As recommended above for recovery planning, we recommend that the government commissions independent analysis to analyse success factors and prepare best-practice guidelines for threat abatement. This should include who to involve in planning and implementation. Our understanding is that a cross-sectoral planning team or taskforce is often beneficial, particularly for complex KTPs.

Require monitoring and reporting to track the status of KTPs and abatement progress: Up to date information about the status of a KTP is an essential basis for effective abatement. As recommended above for recovery planning, a national monitoring and reporting framework and standards are needed that include a focus on the status of each KTP and the status of biodiversity threatened by each KTP. Reporting requirements should be harmonised across projects, programs and states to enable tracking of national progress. The federal government should report in detail on its implementation of threat abatement plans on Commonwealth land to demonstrate whether it is fulfilling its obligations under the EPBC Act, and to exemplify best practice and leadership.

Require costing analysis and reporting: The costs to achieve abatement and levels of current funding are also essential information. The costs of not abating threats should also be quantified. Each threat abatement plan should specify the costs for high-priority abatement actions.

List major complex KTPs as matters of national environmental significance to facilitate fit-for-purpose policy options: Threat abatement plans are likely to suffice as the primary response instrument for relatively simple or smaller scale KTPs or those that mostly occur on land or water under government jurisdiction. But for complex KTPs such as invasive species, land clearing, altered fire regimes and hydrological regimes, additional response options are needed. Making these KTPs matters of national environmental significance would enable the federal government to apply policies for abating the KTP and more effectively coordinate a national response.

Establish a fit-for-purpose process for invasive species: For invasive species a separate assessment and listing process is needed to respond effectively to the huge numbers of individual threats. All naturalised exotic species in Australia should be systematically assessed and categorised by an expert invasive species committee as the basis for action to prevent and minimise harm to biodiversity and other values. Management categories could include the following: (1) priority for eradication, (2) priority for containment, (3) priority for control, (4) not to be traded, (5) of economic importance and escapees to be controlled, (6) no action. Threat abatement plans or an equivalent should be developed for invasive species or species groups that meet the criteria for KTPs.

3.4 Governance and funding

To reverse Australia's extinction crisis, much higher national priority must be accorded to recovering threatened species and abating major threats. As for any national crisis, including the current coronavirus epidemic, we need strong national leadership, an agreement between the federal, state and territory governments to coordinate and implement recovery and abatement plans, effective public outreach and engagement, realistic levels of funding and robust accountability mechanisms.

Intergovernmental arrangements

Australia's biodiversity crisis is partly a failure of federalism. The federal government mostly leaves it to the states and territories to undertake species recovery and threat abatement. But this is not working. As reported by the Queensland Audit Office, for example, the Queensland Government is undertaking almost no threatened species recovery work, and does not coordinate the recovery work being undertaken by local governments, regional natural resource management bodies, conservation groups, landholders and individuals [25].

Although the federal government is often limited in the extent to which it can compel other governments or individuals to undertake threat abatement, it can apply considerable pressure through strong leadership, incentives for implementation of recovery and abatement plans, and use of federal powers to partially compensate for state or territory failings.

Unlike many other federalist endeavours, there is no high-level agreement committing federal, state and territory governments to cooperatively achieve recovery of threatened species and abatement of major threats. *The Intergovernmental Agreement on the Environment* is 28 years old and Schedule 6 on Biological Diversity is vague, lacks conservation commitments, and does not mention threatened species recovery or threat abatement [42]. *Australia's Strategy for Nature 2019–2030* has lofty objectives – 'maximise the number of species secured in nature' and 'reduce threats and risks to nature and build resilience' – but no explicit commitments [43].

Funding

Australia's most recent state of the environment report states that 'Biodiversity and broader conservation management will require major reinvestments across long timeframes to reverse deteriorating trends' [36]. Much greater levels of funding are needed for all aspects of recovery and abatement programs. It's not known how much Australia currently spends, but it has been estimated that federal government spending needs to increase probably by an order of magnitude to prevent further extinctions [44]. Although Australia has one of the world's highest rates of species losses, expenditure on threatened species is low compared to that of other western nations [45,46]. As biodiversity has declined, funding to the environment department and staff numbers has also declined [47].

Accountability

There is almost no accountability within the conservation system – with no obligations for monitoring or reporting on the status of threatened species and KTPs or implementation of recovery and abatement plans, no requirements for independent review of plans, and no consequences for failures to implement them.

RECOMMENDATIONS

Negotiate a biodiversity agreement with state and territory governments: Australia needs a new biodiversity agreement between governments with targets for threatened species recovery and threat abatement, explicit commitments to prepare and implement recovery plans and threat abatement plans, and funding arrangements.

Scale up funding and investigate options for new funding sources: Funding decisions should be based on a realistic assessment of the level of funding needed to achieve specific recovery and abatement targets. We recommend that options for a new biodiversity levy be investigated. A recent precedent is the imposition of

a levy on imported containers to strengthen biosecurity, as recommended by the 2017 Independent review of Australia's biosecurity system [48]. Incentives and support for conservation on private land are essential.

Strengthen accountability: An independent statutory review position can be a powerful way of fostering greater accountability. We recommend the establishment of a parliamentary commissioner for biodiversity, similar to that in New Zealand, to review the performance of federal, state and territory governments in meeting Australia's international and national responsibilities for biodiversity conservation.



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