



Conservation Advice for *Grevillea masonii* (Mason's Grevillea)

In effect under the *Environment Protection and Biodiversity Conservation Act 1999* from 23 November 2021.

This document provides a foundation for conservation action and further planning.



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Conservation status

Grevillea masonii (Mason's Grevillea) is listed in the Endangered category of the threatened species list under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwth) (EPBC Act) effective from 16 July 2000. The species is eligible for listing because prior to the EPBC Act, it was listed as Endangered under the *Endangered Species Protection Act 1992* (Cwlth).

The main factors that make the species eligible for listing in the Endangered category are its very restricted extent of occurrence, five or fewer locations and continuing decline in extent and quality of its habitat due to weed invasion and lack of disturbance from fire; which stimulates its regrowth and seedling recruitment.

Species can also be listed as threatened under state and territory legislation. For information on the current listing status of this species under relevant state or territory legislation, see the [Species Profile and Threat Database](#).

Species information

Taxonomy

Conventionally accepted as *Grevillea masonii* Olde & Marriott (1994).

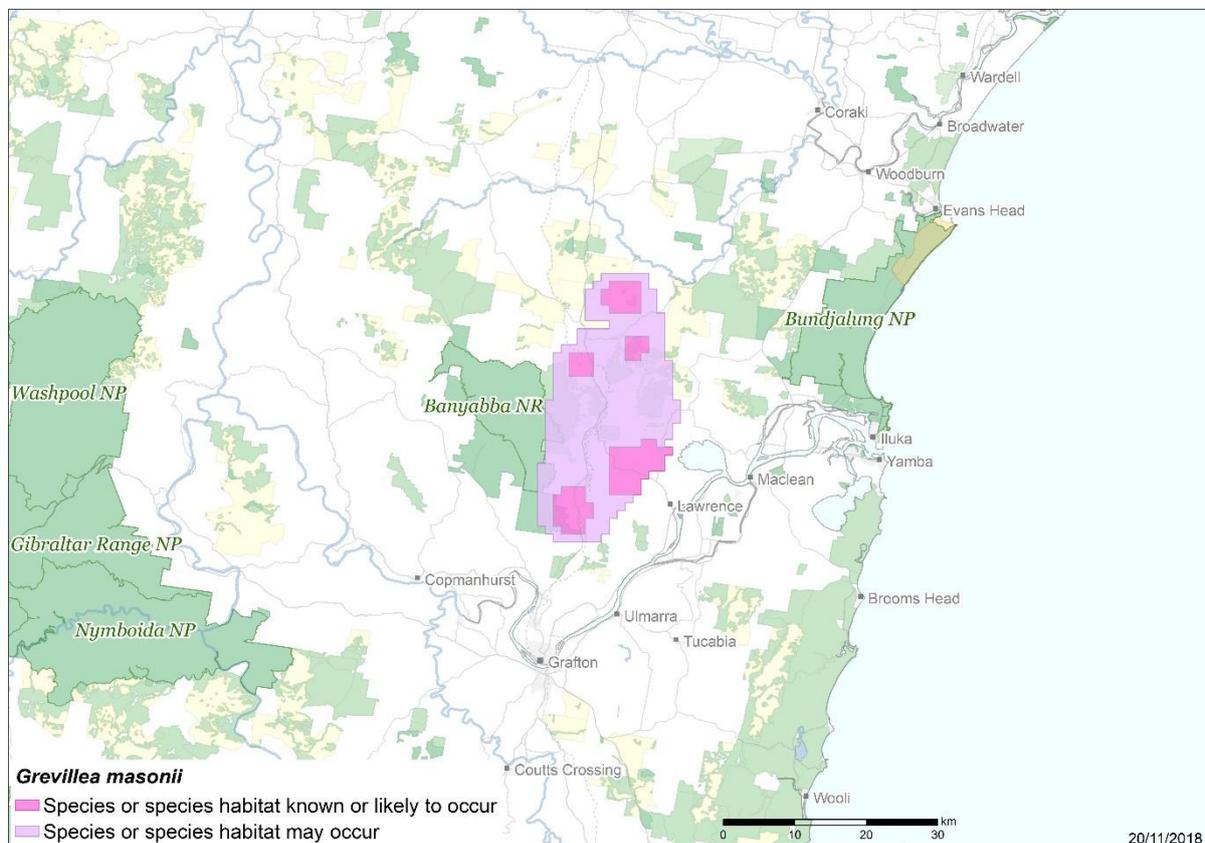
Description

Mason's Grevillea is a low-growing shrub to 1.5 m tall, with many short, erect branches. The leaves are up to 2.5 cm long, 2–11 mm wide, rounded at the tips and have a tiny projecting point. The lower surface of the leaves have sparse, silky hairs and the new growth is green. The flowers are red and green, hairy inside and out, and occur in groups of six to ten. The dry fruit has a long, upward-curving projection like a swan's neck (DPIE 2020; PlantNet 2020).

Distribution

Mason's Grevillea is known from three to five subpopulations between Grafton and Casino in north-eastern New South Wales, with the main populations in State Forest, and smaller populations on road reserves and private land (NSW) (ALA 2020a; Map 1). A historic record exists from west of Lismore in 1969, but the locality is imprecise and it is unknown if the species still exists there (ALA 2020a). The total population of Mason's Grevillea numbers around 1000 individuals with an extent of occurrence estimated at 270 km² in Olde & Makinson (2020).

Map 1 Modelled distribution of Mason's Grevillea



Source: Species distribution data [Species of National Environmental Significance](#) database, Base map Geoscience Australia

Caveat: The information presented in this map has been provided by a range of groups and agencies. While every effort has been made to ensure accuracy and completeness, no guarantee is given, nor responsibility taken by the Commonwealth for errors or omissions, and the Commonwealth does not accept responsibility in respect of any information or advice given in relation to, or as a consequence of, anything containing herein.

Species distribution mapping: The species distribution mapping categories are indicative only and aim to capture (a) the specific habitat type or geographic feature that represents to recent observed locations of the species (known to occur) or preferred habitat occurring in close proximity to these locations (likely to occur); and (b) the broad environmental envelope or geographic region that encompasses all areas that could provide habitat for the species (may occur). These presence categories are created using an extensive database of species observations records, national and regional-scale environmental data, environmental modelling techniques and documented scientific research.

Cultural and community significance

Although little is known of the cultural significance of Mason's Grevillea, other species of Grevillea are culturally significant plants for Indigenous peoples across Australia (Royal Botanic Gardens Victoria 2014). Their flowers can be sucked or soaked in water to produce a sweet drink (Australian National Botanic Gardens 2007). The area in which Mason's Grevillea grows is on the traditional land of the Bundjalung People (NPWS 2020).

Relevant biology and ecology

Habitat ecology

Mason's Grevillea naturally occurs in open eucalypt woodland on gravelly-loam soil at low elevations, north of Grafton to Myrtle Creek (ALA 2020a; DPIE 2020; PlantNet 2020; Makinson 2000). It now occurs in highest numbers in open areas within and around pine plantations on State Forest. The populations still occurring in natural open woodland are confined to roadsides, state forest, and private land, and are not in good condition. The only other population known occurs along a power-line easement. The species responds well to growing in the open, if weeds and other shrubs and woody vegetation do not compete for sunlight. During the 2018-19 drought, the woodland population on state forest died back so that no individuals were found above ground (DPIE, 2021). After the 2019-20 bushfires at the same location, the woodland population was smothered by tall grasses and weeds, and no individuals were found; however nearby in the open firebreak the plants that were burnt displayed significant regrowth and seedling recruitment where weeds were not as dense (DPIE, 2021).

Reproductive ecology

Mason's Grevillea flowers from July to November (Makinson 2000) and flowering material is needed to distinguish the species from the closely related *Grevillea banyabba* (Banyabba Grevillea) (PlantNet 2020). The time to maturity of Mason's Grevillea is usually two to three years (DPIE 2020), although time to maximum seed production may be longer (Vaughton 1998). Mason's Grevillea and many other *Grevillea* species are pollinated by nectar-feeding birds and bees (Olde & Marriott 1995; Smith & Gross 2002). Seed dispersal vectors are likely via wind, ants or emus (Olde & Marriott 1995; DPIE 2020).

Fire ecology

Mason's Grevillea resprouts from a lignotuber following fire or disturbance and also regenerates from soil-stored seed (Makinson 2000, DPIE 2021). Germination of dormant seeds is probably triggered by fire-related cues, including heat, smoke and scarification (Edwards & Whelan 1995; Morris 2000). There must be sufficient intervals between fires, for new seedlings to reach maturity and replenish the seedbank (Edwards & Whelan 1995; Auld et al. 2007) and probably for resprouting adults to regain enough energy stores to survive the next fire (Knox & Morrison 2005). Optimal fire frequencies for *Grevillea caleyi* (Caley's Grevillea) were 5–15 years, to allow populations to mature following fires and to avoid dominance of senescent age classes (Regan et al. 2003). However, it is possible that the seedbank may be limited by predators, as has been found for Caley's Grevillea (Regan et al 2003). A more recent (DPIE 2021) report puts emphasis on fire as a key disturbance that stimulates new growth in adult plants that were undergoing

senescence, as well as seedling recruitment. Mason's Grevillea also resprouts following slashing (DPIE 2021).

Habitat critical to the survival

Due to the species eligibility for listing (highly restricted range), all habitat is considered critical to the survival of the species.

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat.

Important populations

In this section, the word population is used to refer to subpopulation, in keeping with the terminology used in the EPBC Act and state/territory environmental legislation.

There is sufficient evidence through the species eligibility for listing, to declare all populations/the national population as important populations of this species under particular pressure of survival and which therefore require protection to support the recovery of the species.

Threats

The main threats impacting Mason's Grevillea are an increased frequency of drought and bushfire due to climate change, invasive weeds, damage due to roadside or powerline easement maintenance, disease and the genetic effects of small populations. The species is threatened by several fire-related threats, including high frequency fire, fire-granivore interactions, fire-drought interactions, fire-disease interactions, and fire promoted weed invasion.

Table 1 Threats impacting Mason's Grevillea

Threat	Status and severity ^a	Evidence
Climate change		
Fire-related threats	<ul style="list-style-type: none"> • Timing: current • Confidence: inferred • Consequence: major • Trend: increasing • Extent: across the entire range 	<p>In 2019-20, following years of drought (DPI 2020), catastrophic bushfire conditions resulted in extensive bushfires covering an unusually large area of eastern Australia. This type of event is increasingly likely to reoccur as a result of climate change. Analysis by the Wildlife and Threatened Species Bushfire Recovery Expert Panel, based on intersecting the modelled distribution of Mason's Grevillea and the National Indicative Aggregated Fire Extent Dataset, indicates that approximately 35 % of the range of the species was within the extent of the 2019-20 bushfires (Gallagher 2020).</p> <p>A high-frequency fire regime is likely to reduce the population size and vigour of Mason's Grevillea, by killing adult and immature plants and depleting the soil-stored seed bank (DECCW 2010; DPIE 2020).</p> <p>This could be exacerbated by interval squeeze, earlier fire season and fire-granivore interactions (Gallagher et al. 2021). Interactions between fire and seed predators may also elevate risks of decline, especially under small or patchy fires (Regan et al. 2003). The life-history traits of Mason's Grevillea predispose it to high risk of population decline or extinction, resulting from short fire intervals, fire-disease or fire-granivore interactions or cumulative</p>

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Threat	Status and severity ^a	Evidence
		exposure to interactions with other threats (DAWE 2020).
Increased frequency and severity of drought	<ul style="list-style-type: none"> • Timing: current • Confidence: inferred • Consequence: major • Trend: increasing • Extent: across the entire range 	<p>From 2017-19, severe drought impacted much of eastern Australia including north-eastern NSW (DPI 2020). Many plants in the Proteaceae family, which includes <i>Grevillea</i>, are expected to decline in range and population size, primarily due to decreased rainfall (Midgley et al. 2006; Fitzpatrick et al. 2008; Shimizu-Kimura et al. 2017).</p> <p>Fire-drought interactions may also be a threat for Mason's Grevillea, as obligate seeders rely on fire for recruitment, yet seedlings have rudimentary root systems vulnerable to desiccation if post-fire drought occurs (Burgman and Lamont 1992).</p> <p>Given Mason's Grevillea already has very restricted distribution and small population size, it may be at increased risk of extinction following droughts (DPIE 2020).</p>
Invasive species		
Invasion of high threat grassy weeds	<ul style="list-style-type: none"> • Timing: current/future • Confidence: known • Consequence: major • Trend: increasing • Extent: across the entire range 	The invasion of native plant communities by exotic perennial grasses was listed as a key threatening process (KTP) under the Threatened Species Conservation Act in NSW (NSW Scientific Committee 2003). Introduced grasses have the potential to invade native vegetation and may threaten Mason's Grevillea by outcompeting the plants directly, or by indirectly altering fuel loads and fire regimes (D'Antonio & Vitousek 1992; NSW Scientific Committee 2003; DECCW 2010; DPIE 2020). Current management methods use slashing to control grassy weed biomass and appear to be successful (DPIE 2021).
Disease		
Dieback caused by <i>Phytophthora cinnamomi</i>	<ul style="list-style-type: none"> • Timing: future • Confidence: suspected • Consequence: unknown • Trend: unknown • Extent: across the entire range 	<p><i>Phytophthora cinnamomi</i> is an introduced soil-borne pathogen, which infects a large range of plant species and may contribute to plant death, particularly when other stresses are present, such as waterlogging, drought and bushfire (DOEE 2018). <i>Phytophthora cinnamomi</i> can disperse in water flowing from roots of infected plants to roots of healthy plants and by mud clinging to vehicles, animals and walkers (DOEE 2018). Dieback caused by <i>P. cinnamomi</i> is listed as a Key Threatening Process under the EPBC Act (DOEE 2018). The nearest occurrence record of <i>P. cinnamomi</i> is near Booyong, NSW (ALA 2020b).</p> <p>Proteaceae are one of the plant families most susceptible to <i>P. cinnamomi</i> (DSE 2009). The susceptibility of Mason's Grevillea is unknown. If susceptible, it may be impacted if <i>P. cinnamomi</i> spreads to its subpopulations.</p>

Threat	Status and severity ^a	Evidence
Habitat loss, disturbance and modifications		
Damage associated with prescribed burning	<ul style="list-style-type: none"> • Timing: current • Confidence: known • Consequence: major • Trend: increasing • Extent: across its entire range 	<p>Fires occurring at frequent intervals or fires preceded by or followed by drought or herbivore activity are likely to result in subpopulation decline by killing seedlings before they reach maturity and replenish the seedbank (Edwards & Whelan 1995; Auld et al. 2007) and probably by killing resprouting adults before they regain adequate energy stores to survive subsequent fires (Knox & Morrison 2005).</p> <p>Approximately 50% of adult Mason's Grevillea plants failed to resprout after a planned fire in one subpopulation (Olde & Makinson 2020), but the precise cause of mortality is unknown.</p>
Damage associated with road and powerline maintenance	<ul style="list-style-type: none"> • Timing: current • Confidence: known • Consequence: major • Trend: static • Extent: across part of its range 	<p>Mason's Grevillea may be killed or damaged accidentally during spraying, slashing, construction of drainage channels, grading and other road and powerline maintenance activities (DPIE 2020; Olde & Makinson 2020). Such activities may also promote weed invasion (Sindel et al. 2009). Several subpopulations are restricted to roadsides and are at high risk of damage by such activities (DPIE 2020).</p>
Land clearing	<ul style="list-style-type: none"> • Timing: historical/current • Confidence: known • Consequence: catastrophic • Trend: unknown • Extent: across part of its range 	<p>Much of the land adjoining Mason's Grevillea's known locations has been cleared for agriculture, with localised clearing still ongoing, likely reducing habitat and opportunities for recolonization in these areas (DPIE 2020).</p>
Genetic threats resulting from small and fragmented populations		
Allee effects of small subpopulation size	<ul style="list-style-type: none"> • Timing: current • Confidence: suspected • Consequence: unknown • Trend: unknown • Extent: unknown 	<p>Small, isolated subpopulations can be subject to the effects of low genetic diversity (Frankham et al. 2014) and it is possible that this is impacting Mason's Grevillea.</p>

Timing—identify the temporal nature of the threat;

Confidence—identify the extent to which we have confidence about the impact of the threat on the species;

Consequence—identify the severity of the threat;

Trend—identify the extent to which it will continue to operate on the species;

Extent—identify its spatial content in terms of the range of the species.

Each threat has been described in Table 1 in terms of the extent that it is operating on the species. The risk matrix (Table 2) provides a visual depiction of the level of risk being imposed by a threat and supports the prioritisation of subsequent management and conservation actions. In preparing a risk matrix, several factors have been taken into consideration, they are: the life stage they affect; the duration of the impact; and the efficacy of current management regimes, assuming that management will continue to be applied appropriately. The risk matrix and ranking of threats has been developed in consultation with experts using available literature.

The threat of dieback caused by *P. cinnamomi* has not been included in the table as the impacts to Mason’s Grevillea from this pathogen are not well understood.

Table 2 Mason’s Grevillea risk matrix

Likelihood	Consequences				
	Not significant	Minor	Moderate	Major	Catastrophic
Almost certain	Low risk	Moderate risk	Very high risk	Very high risk Fire-related threats Increased frequency and severity of drought	Very high risk
Likely	Low risk	Moderate risk	High risk	Very high risk Invasion of high threat grassy weeds	Very high risk
Possible	Low risk	Moderate risk	High risk Small subpopulation size	Very high risk Damage associated with prescribed burning Damage associated with road and powerline maintenance	Very high risk Land clearing
Unlikely	Low risk	Low risk	Moderate risk	High risk	Very high risk
Unknown	Low risk	Low risk	Moderate risk	High risk	Very high risk

Priority actions have then been developed to manage the threat particularly where the risk was deemed to be ‘very high’ or ‘high’. For those threats with an unknown or low risk outcome it may be more appropriate to identify further research or maintain monitoring.

Conservation and recovery actions

Primary conservation objective

By 2030, the population of Mason’s Grevillea will have increased in abundance and viable subpopulations are sustained in habitats where very high risk threats are managed effectively.

Conservation and management priorities

Climate change and fire

- Survey known populations to monitor impacts from the 2019–20 bushfires.
- Ensure that planned burns do not occur within Mason’s Grevillea populations before an accumulation of a seedbank large enough to replace the number of fire-killed standing plants. Noting that replacement should incorporate expected post-fire rates of seedling survival (see Regan et al. 2003).

- Provide maps of known occurrences to local and state Rural Fire Services and seek inclusion of mitigation measures in bushfire risk management plan/s, risk register and/or operation maps.
- Develop and implement an evidence-based fire management strategy that optimises the survival of Mason's Grevillea during planned burns and bushfires.
- Using distribution modelling and climate change projections to map existing habitat patches and identify potential future habitat.
- Understand and ameliorate the effects of climate change on the species by mitigating interactions with other threats such as fire, disease and habitat degradation.
- Implement an ongoing monitoring program that will provide data capable of addressing the link between population dynamics, fire and drought.

Habitat loss disturbance and modifications

- Ensure land managers, local governments, relevant state agencies, fire fighting agencies and utility service providers have access to adequate information regarding the location of Mason's Grevillea (e.g. up to date databases of known subpopulations) and are aware of its occurrence.
- Provide physical protection measures against accidental destruction where necessary (e.g. bollards demarcating the extent of a subpopulation).
- Ensure best practice methods for roadside and utility corridor maintenance are used to protect the species and its habitat (e.g. avoid the use of herbicide, ensure slashing does not result in soil disturbance, ensure grading of roadside verges is restricted to the road shoulder and does not encroach into roadside vegetation).
- Liaise with landowners about entering into voluntary management agreements to maintain or enhance the species and its habitat on unsecured private land (DPIE 2020a).

Invasive species

- Implement weed management actions in consultation with land managers where appropriate, using appropriate methods to minimise the effect of herbicide on Mason's Grevillea and the surrounding native vegetation.
- Monitor weed infestations to determine if control strategies are effective.

Disease

- Determine the susceptibility of Mason's Grevillea to *P. cinnamomi*.
- If susceptible, implement a *P. cinnamomi* management plan (Department of the Environment and Energy 2018) to ensure that:
 - the pathogen is not introduced into subpopulations of the threatened species and that the spread in areas outside of, but adjacent to, any subpopulation is mitigated (Podger et al. 2001).
 - potential translocation sites are free of, and do not become infected by, *P. cinnamomi*.
 - Implement mitigation measures (e.g. treatment with phosphite) if required.
- Where feasible, close and revegetate roads and tracks to reduce ingress of disease.

Breeding, seed collection, propagation and other ex situ recovery action

- To manage risk of losing genetic diversity, undertake seed collections and store at appropriate institutions. Seeds from as many wild plants as possible across the majority of wild subpopulations should be collected and stored.
- If deemed appropriate, undertake ex situ propagation and conservation translocations in suitable habitat with secure land tenure, to increase the number of subpopulations of Mason's Grevillea, in accordance with the *Guidelines for the Translocation of Threatened Plants in Australia* (Commander et al. 2018).

Stakeholder engagement/community engagement

- Engage and involve Traditional Owners in conservation actions, including survey, monitoring and management actions.
- Liaise with the local community and government agencies to ensure that up-to-date population data and scientific knowledge inform the implementation of conservation actions for this species.
- If appropriate, engage interested nature conservation groups in participating in surveys for the species in areas of suitable habitat.

Survey and monitoring priorities

- Survey subpopulations impacted by bushfires to document impacts and post-fire recovery.
- Continue or establish a monitoring program to:
 - determine minimum tolerable fire intervals;
 - determine trends in seed production, recruitment, population size and distribution;
 - determine threats and their impacts; and,
 - monitor the effectiveness of management actions and the need to adapt them.
- Survey suitable habitat to locate any additional subpopulations to assess population size and distribution more precisely. Prioritise national parks, as the species is not protected in any yet, and identify areas nearby to known populations as these are also potential translocation sites.

Information and research priorities

- Investigate the ecological requirements of Mason's Grevillea, that are relevant to persistence and recruitment:
 - appropriate fire regimes and their spatial configuration for the conservation of this species.
 - the presence and effect of *P. cinnamomi* in subpopulations.
 - population genetic structure, levels of genetic diversity and minimum viable population size.
 - reproductive status, longevity, fecundity and frequency and size of recruitment events.
 - soil seed bank dynamics and the role of various disturbances, including granivory, fire, rainfall, soil disturbance and grazing in germination and recruitment.
 - pollinator identity, biology and requirements.
 - the effect of drought on the species.

Links to relevant implementation documents

[Northern Rivers Regional Biodiversity Management Plan, National Recovery Plan for the Northern Rivers Region \(2010\).](#)

[Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi* \(2018\)](#)

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