

NSW Threatened Species Scientific Committee

Notice of Preliminary Determination

The NSW Threatened Species Scientific Committee, established under the *Biodiversity Conservation Act 2016* (the Act), has made a Preliminary Determination to support a proposal to list *Isopogon prostratus* McGill. as an ENDANGERED SPECIES in Part 2 of Schedule 1 of the Act. Listing of Endangered species is provided for by Part 4 of the Act.

How to make a submission

The NSW TSSC welcomes public involvement in the assessment process and places preliminary determinations on public exhibition on the NSW TSSC pages on the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) website. This public exhibition provides an opportunity for the public to comment on this preliminary determination as well as provide any additional information that is relevant to the assessment.

Postal submissions regarding this Preliminary Determination may be sent to:
Secretariat
NSW Threatened Species Scientific Committee
Locked Bag 5022
Parramatta NSW 2124.

Email submissions in Microsoft Word or PDF formats to:
scientific.committee@environment.nsw.gov.au

Submissions close 29 November 2025

What happens next?

After considering any submissions received during the public exhibition period the NSW TSSC will make a Final Determination and a notice will be placed on the NSW DCCEEW website to announce the outcome of the assessment. If the Final Determination is to support a listing, then it will be added to the Schedules of the Act when the Final Determination is published on the legislation website. www.legislation.nsw.gov.au.

Privacy information

The information you provide in your submission may be used by the NSW TSSC in the assessment to determine the conservation status and listing or delisting of threatened or extinct species, threatened populations and threatened or collapsed ecological communities or to assess key threatening processes.

The NSW TSSC may be asked to share information on assessments with NSW Government agencies, the Commonwealth Government and other State and Territory governments to collaborate on national threatened species assessments using a common assessment method and to assist in the management of species and ecological communities.

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If your submission contains information relevant to the assessment it may be provided to state and territory government agencies and scientific committees as part of this collaboration.

If you wish your identity and personal information in your submission to be treated as confidential you must:

- *request your name be treated as confidential, and*
- *not include any of your personal information in the main text of the submission or attachments so that it can be easily removed.*

Professor Angela Moles, FRSN
Chairperson
NSW Threatened Species Scientific Committee

NSW Threatened Species Scientific Committee

Public Exhibition period: 01/09/2025 – 29/11/2025

Preliminary Determination

The NSW Threatened Species Scientific Committee, established under the *Biodiversity Conservation Act 2016* (the Act), has made a Preliminary Determination to support a proposal to list *Isopogon prostratus* McGill. as an ENDANGERED SPECIES in Part 2 of Schedule 1 of the Act. Listing of Endangered species is provided for by Part 4 of the Act.

Summary of Conservation Assessment

Isopogon prostratus McGill. was found to be Endangered in accordance with the following provisions in the *Biodiversity Conservation Regulation 2017*: Clause 4.3(b)(d)(e i,iii) because: 1) it has a highly restricted geographic distribution with an area of occupancy of 384 km²; 2) it is considered to be severely fragmented; and 3) continuing decline in the number of mature individuals and the area, extent and quality of habitat is estimated due to habitat clearing, fragmentation and degradation, and inferred due to adverse fire regimes (particularly high frequency fire, low frequency fire, high intensity fire, and changes in fire season) and *Phytophthora cinnamomi*.

The NSW Threatened Species Scientific Committee has found that:

1. *Isopogon prostratus* McGill. (family Proteaceae) is a “prostrate shrub, occasionally ± erect, young shoots and branchlets pubescent. Leaves 4–10 cm long; ultimate segments 1–2 mm wide, at least ridged on the lower surface at the midrib and margins. Inflorescences terminal, ± globose. Flowers sessile. Perianth c. 3 mm long, yellow, glabrous except for terminal tuft of long hairs. Fruiting cones ± globose, 12–20 mm diam. Nuts 2–3 mm long and covered with hairs 5–6 mm long” (Harden 1991).
2. *Isopogon prostratus* has a sporadic and disjunct distribution in New South Wales (NSW) and Victoria (Vic) (Benson and von Richter 2010), where it occurs in the Sydney Basin, South Eastern Highlands, and South East Corner bioregions of NSW and the South East Corner and South East Coastal Plain bioregions of Vic (Commonwealth DCCEEW 2012). The northern extent of the species occurs in Mugii Murum-Ban State Conservation Area (SCA), northwest of Newnes Plateau, with disjunct occurrences from Penrose along the southern ranges to Eden in NSW and Mallacoota in Vic, with a disjunct subpopulation in Providence Ponds Flora and Fauna Reserve (FFR) a further 200 km west-southwest. The distribution of *I. prostratus* occurs on the traditional lands of the Darkinjung, Dharug, Gundungurra, Yuin, Ngarigo, Bidwell, and Gunaikurnai peoples (AIATSIS 1996; Native Land Digital 2024).
3. *Isopogon prostratus* has a highly restricted geographic range. The extent of occurrence (EOO) was calculated at 71,479 km² and is based on a minimum convex polygon enclosing all mapped occurrences of the species, the method of assessment recommended by IUCN (2024). The area of occupancy (AOO) is estimated to be 384 km² and was calculated using 2 x 2 km grid cells, the scale recommended by IUCN (2024).

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4. There are insufficient data to estimate the population size of *Isopogon prostratus* as few subpopulations have abundance information available, although data from a subset of subpopulations suggest ongoing population declines. *Isopogon prostratus* occurs across 86 known subpopulations, as defined by the IUCN (2024).
5. *Isopogon prostratus* is considered to be severely fragmented as it is inferred that >50% of its population occurs in habitat patches that are smaller than would be required to support a viable population and separated from other habitat patches by a large distance relative to dispersal kernel of the species, as per the IUCN (2024) definition.
6. *Isopogon prostratus* typically occurs in heath and dry sclerophyll woodland in exposed situations on sandy soils (Harden 1991; Benson and McDougall 2000; VicFlora 2025). Across its range, sites vary from 50 m above sea level (a.s.l.) on the coast in the southern parts of its range to 1,100 m a.s.l. on the tablelands. Occurrences are typically localised (Benson and von Richter 2010).
7. Species co-occurring with *Isopogon prostratus* vary across its range and may include *Eucalyptus dives*, *E. radiata*, *E. sieberi*, *E. cephalocarpa*, *Hakea sericea*, *Daviesia latifolia*, *Acacia terminalis*, *Leptospermum polygalifolium*, *Gaudium myrsinoides*, *Allocasuarina nana*, *Grevillea laurifolia*, *Epacris pulchella*, *Monotoca scoparia*, *Brachyloma daphnoides*, *Boronia algida*, *Banksia canei*, *Dillwynia sericea*, *Lomandra glauca*, and *Euryomyrtus denticulata* (Benson and Keith 1990; Benson and von Richter 2010; DELWP 2021; ANHSIR 2024; RBGDT 2024; ALA 2025; BioNet 2025).
8. *Isopogon prostratus* produces a substantial lignotuber (Benson and von Richter 2010; VicFlora 2025), which enables the species to resprout following disturbance, such as above-surface vegetation clearing or fire (Benson and von Richter 2010). However, fire tolerance in *I. prostratus* is likely to be a function of lignotuber size and may not develop until plants are >13 years old, based on experiments with the congener *I. anemonifolius* that found that the age of first fire tolerance was around 13–16 years (Bradstock and Myerscough 1988; Bradstock 1990). The species is serotinous, releasing seed post-fire (D. Benson and I. Baird *in litt.* April 2024) but is incapable of vegetative spread or rooting at the nodes (Benson and McDougall 2000). Resprouting of burnt individuals has been observed on Newnes Plateau following the 2019–2020 fires (D. Benson and I. Baird *in litt.* April 2024).
9. Flowering of *Isopogon prostratus* typically occurs from October to March (Benson and McDougall 2000). The specific pollinators of the species are unknown, but it is inferred to be insect pollinated. The closely related *I. anemonifolius* is known to be visited by several species of native bee in the Apidae and Colletidae families (Bernhardt *et al.* 2019). *Isopogon prostratus* seeds have hairs (Harden 1991) which may aid dispersal (Bate and Trickett 2023). Dispersal of seed is most likely localised via gravity and possibly wind or water over short distances (Benson and McDougall 2000; I. Baird *in litt.* January 2025), although the low stature of plants and surrounding density of undergrowth probably limit dispersal distances. Dispersal of most seeds is likely to be limited to within a metre or so of the parent

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plant, resulting in long-term habitat fidelity with very little colonising potential (Benson 2024).

10. *Isopogon prostratus* is threatened by habitat clearing, fragmentation and degradation, adverse fire regimes (particularly high frequency, low frequency, and high intensity fire), and *Phytophthora cinnamomi*. 'Clearing of native vegetation', 'Alteration of habitat following subsidence due to longwall mining', 'High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition', and 'Infection of native plants by *Phytophthora cinnamomi*' are listed as Key Threatening Processes under the Act.
11. Habitat clearing, fragmentation, and degradation has resulted in an estimated continuing decline in the number of mature individuals and the area, extent and quality of habitat. Declines and extensive habitat disturbance have occurred in and around subpopulations in Gardens of Stone SCA on Newnes Plateau (DPE 2022; Benson and Baird 2023). There is evidence that the Providence Ponds FFR subpopulation in Vic has undergone a serious decline in the past 40–50 years due to habitat clearing, declining from an estimated 4,000 individuals in 1956 to just 50 currently (DELWP 2021).
12. Adverse fire regimes (particularly high frequency fire, low frequency fire, high intensity fire, and changes in fire season) are inferred to be causing continuing decline in the number of mature individuals and the area, extent and quality of habitat. High frequency fire may result in reduced reproductive output during inter-fire intervals by limiting replenishment of the canopy seedbank (D. Benson and I. Baird *in litt.* April 2024) and may lead to depressed or failed resprouting (Bradstock & Myerscough 1988; Enright *et al.* 2011; Karavani *et al.* 2018; Fairman *et al.* 2019). Low frequency fire may limit seedling recruitment, as the species is reliant on fire to release seed from its cones. High intensity fire is likely to disproportionately kill juvenile plants, which possess smaller lignotubers, based on the response of *I. anemonifolius* to high intensity fire reported by Bradstock and Myerscough (1988). Changes in fire season may also threaten *I. prostratus*. Fires in autumn may cause high mortality as depleted carbohydrate reserves and the long gap between fire and the subsequent growth season may increase mortality risk (Bradstock and Myerscough 1988).
13. *Isopogon prostratus* is susceptible to dieback resulting from infection with the pathogenic oomycete *Phytophthora cinnamomi* (DELWP 2021; D. Benson and I. Baird *in litt.* April 2024). The pathogen is inferred to have caused losses at monitored sites for *I. prostratus* on Newnes Plateau (D. Benson and I. Baird *in litt.* April 2024).
14. Climate change projections indicate a future trend of increased frequency of severe fire weather and more frequent fires (Abatzoglou *et al.* 2019; Dowdy *et al.* 2019; Jones *et al.* 2022), as well as increasing duration and severity of dry weather, increasing the availability of fuels to burn (Abram *et al.* 2021). Regions across the range of *Isopogon prostratus* are projected to become hotter, have more hot days over 35°C, have more dangerous fire weather days, and have a longer fire season by 2079 (BOM and CSIRO 2024; AdaptNSW 2025; DEECA 2025). Regionally, it is projected with high confidence that climate change will result in a harsher fire-

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weather climate in the future (CSIRO 2025a, 2025b, 2025c). It is plausible that these changes will lead to more frequent, intense, and severe fires, and changes in fire season, as well as suitability of post-fire recruitment conditions, which could in turn adversely affect the *I. prostratus* population in the future.

15. *Isopogon prostratus* McGill. is not eligible to be listed as a Critically Endangered species.

16. *Isopogon prostratus* McGill. is eligible to be listed as an Endangered species as, in the opinion of the NSW Threatened Species Scientific Committee, it is facing a very high risk of extinction in Australia in the near future as determined in accordance with the following criteria as prescribed by the *Biodiversity Conservation Regulation 2017*:

Assessment against *Biodiversity Conservation Regulation 2017* criteria

The Clauses used for assessment are listed below for reference.

Overall Assessment Outcome: *Isopogon prostratus* was found to be Endangered under Clause 4.3(b)(d)(e i,iii).

Clause 4.2 – Reduction in population size of species (Equivalent to IUCN criterion A)

Assessment Outcome: Data Deficient.

(1) - The species has undergone or is likely to undergo within a time frame appropriate to the life cycle and habitat characteristics of the taxon:			
	(a)	for critically endangered species	a very large reduction in population size, or
	(b)	for endangered species	a large reduction in population size, or
	(c)	for vulnerable species	a moderate reduction in population size.
(2) - The determination of that criteria is to be based on any of the following:			
	(a)	direct observation,	
	(b)	an index of abundance appropriate to the taxon,	
	(c)	a decline in the geographic distribution or habitat quality,	
	(d)	the actual or potential levels of exploitation of the species,	
	(e)	the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.	

Clause 4.3 - Restricted geographic distribution of species and other conditions (Equivalent to IUCN criterion B)

Assessment Outcome: Endangered under Clause 4.3(b)(d)(e i,iii).

The geographic distribution of the species is:			
	(a)	for critically endangered species	very highly restricted, or

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	(b)	for endangered species	highly restricted, or
	(c)	for vulnerable species	moderately restricted,
and at least 2 of the following 3 conditions apply:			
	(d)	the population or habitat of the species is severely fragmented or nearly all the mature individuals of the species occur within a small number of locations,	
	(e)	there is a projected or continuing decline in any of the following:	
		(i)	an index of abundance appropriate to the taxon,
		(ii)	the geographic distribution of the species,
		(iii)	habitat area, extent or quality,
		(iv)	the number of locations in which the species occurs or of populations of the species,
	(f)	extreme fluctuations occur in any of the following:	
		(i)	an index of abundance appropriate to the taxon,
		(ii)	the geographic distribution of the species,
		(iii)	the number of locations in which the species occur or of populations of the species.

Clause 4.4 - Low numbers of mature individuals of species and other conditions

(Equivalent to IUCN criterion C)

Assessment Outcome: Data Deficient.

The estimated total number of mature individuals of the species is:			
	(a)	for critically endangered species	very low, or
	(b)	for endangered species	low, or
	(c)	for vulnerable species	moderately low,
and either of the following 2 conditions apply:			
	(d)	a continuing decline in the number of mature individuals that is (according to an index of abundance appropriate to the species):	
		(i)	for critically endangered species very large, or
		(ii)	for endangered species large, or
		(iii)	for vulnerable species moderate,
	(e)	both of the following apply:	
		(i)	a continuing decline in the number of mature individuals (according to an index of abundance appropriate to the species), and
		(ii)	at least one of the following applies:
		(A)	the number of individuals in each population of the species is:
		(I)	for critically endangered species extremely low, or
		(II)	for endangered species very low, or
		(III)	for vulnerable species low,
		(B)	all or nearly all mature individuals of the species occur within one population,

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		(C)	extreme fluctuations occur in an index of abundance appropriate to the species.
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Clause 4.5 - Low total numbers of mature individuals of species

(Equivalent to IUCN criterion D)

Assessment Outcome: Data Deficient.

The total number of mature individuals of the species is:			
	(a)	for critically endangered species	extremely low, or
	(b)	for endangered species	very low, or
	(c)	for vulnerable species	low.

Clause 4.6 - Quantitative analysis of extinction probability

(Equivalent to IUCN criterion E)

Assessment Outcome: Data Deficient.

The probability of extinction of the species is estimated to be:			
	(a)	for critically endangered species	extremely high, or
	(b)	for endangered species	very high, or
	(c)	for vulnerable species	high.

Clause 4.7 - Very highly restricted geographic distribution of species—vulnerable species

(Equivalent to IUCN criterion D2)

Assessment Outcome: Not met.

For vulnerable species,	the geographic distribution of the species or the number of locations of the species is very highly restricted such that the species is prone to the effects of human activities or stochastic events within a very short time period.
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Professor Angela Moles, FRSN
Chairperson
NSW Threatened Species Scientific Committee

Supporting Documentation:

Saunders M (2025) Conservation Assessment of *Isopogon prostratus* McGill. (Proteaceae). NSW Threatened Species Scientific Committee.

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References:

- Abatzoglou JT, Williams AP, Barbero R (2019) Global emergence of anthropogenic climate change in fire weather indices. *Geophysical Research Letters* **46**, 326–336.
- Abram NJ, Henley BJ, Sen Gupta A, Lippmann TJ, Clarke H, Dowdy AJ, Sharples JJ, Nolan RH, Zhang T, Wooster MJ, Wurtzel JB (2021) Connections of climate change and variability to large and extreme forest fires in southeast Australia. *Communications Earth & Environment* **2**(1), 1-7.
- AdaptNSW (2025) Interactive climate change projections map [Online]. Available at: <https://www.climatechange.environment.nsw.gov.au/projections-map> (accessed on 22 January 2025)
- Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) (1996) Map of Indigenous Australia [Online]. Available at: <https://aiatsis.gov.au/explore/map-indigenous-australia> (accessed 20 January 2025)
- Australian National Herbarium Specimen Information Register) (ANHSIR) (2024) *Isopogon prostratus* specimen records [dataset]. Australian National Herbarium (accessed 19 December 2024)
- Atlas of Living Australia (ALA) (2025) *Isopogon prostratus* records recorded until 10 January 2025 [dataset]. National Collaborative Research Infrastructure Strategy (NCRIS) and Commonwealth Scientific and Industrial Research Organisation (CSIRO).
- Bate C, Trickett P (2023) Seeds, fruits & hairs. *Isopogon and Petrophile Study Group* **32**, 2023.
- Benson D (2024) Vegetation patterns across the Sydney Basin during the Last Glacial Maximum based on plant biogeography, ecology, geomorphology and climate. *Proceedings of the Linnean Society of New South Wales* **5**(146), 1–47.
- Benson D, Baird I (2023) Brief note for David Crust, Blue Mountains NPWS Branch Manager. Management recommendations arising from rare plant *Isopogon prostratus* monitoring on the Newnes Plateau, April 2023. Unpublished report.
- Benson D, McDougall L (2000) Ecology of Sydney plant species: part 7b, Dicotyledon families Proteaceae to Rubiaceae. *Cunninghamia* **6**(4), 1,016–1,202.
- Benson DH, Keith DA (1990) The natural vegetation of the Wallerawang 1: 100 000 map sheet. *Cunninghamia* **2**(2), 305–335.
- Benson DH, von Richter L (2010) Recent ecological observations on growth rates and seed production in *Isopogon prostratus* (Proteaceae), a little-known prostrate shrub from south-eastern NSW and Victoria. *Cunninghamia* **11**(3), 283–286.
- Bernhardt P, Camilo GR, Weston PH (2019) Shaken vs scraped: floral presentation contributes to pollinator guild segregation in co-blooming *Symphionema*

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montanum and *Isopogon anemonifolius* (Proteaceae). *Gardens' Bulletin Singapore* **71**(2), 377–396.

BioNet (2025) *Isopogon prostratus* records recorded until 10 January [dataset]. NSW Department of Planning and Environment.

Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation (BOM and CSIRO) (2024) State of the Climate 2024. Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation, Commonwealth of Australia (Online). Available at: <http://www.bom.gov.au/state-of-the-climate/2024/documents/2024-state-of-the-climate.pdf> (accessed 22 January 2025)

Bradstock RA (1990) Demography of woody plants in relation to fire: *Banksia serrata* Lf. and *Isopogon anemonifolius* (Salisb.) Knight. *Australian Journal of Ecology* **15**(1), 117–132.

Bradstock RA, Myerscough PJ (1988) The survival and population response to frequent fires of two woody resprouters *Banksia serrata* and *Isopogon anemonifolius*. *Australian Journal of Botany* **36**(4):415–431.

Commonwealth DCCEEW (Commonwealth Department of Climate Change, Energy, the Environment, and Water (Commonwealth DCCEEW) (2012) Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Regions) [spatial dataset]. Available at: <https://datasets.seed.nsw.gov.au/dataset/interim-biogeographic-regionalisation-for-australia-ibra-version-7-regions> (accessed 20 January 2025)

Commonwealth Scientific and Industrial Research Organisation (CSIRO) (2025a) Climate Change in Australia: Central Slopes projection summaries (Online). Available at: <https://www.climatechangeinaustralia.gov.au/en/projections-tools/regional-climate-change-explorer/sub-clusters/?current=ECSC&tooltip=true&popup=true> (accessed 22 January 2025)

Commonwealth Scientific and Industrial Research Organisation (CSIRO) (2025b) Climate Change in Australia: East Coast South projection summaries (Online). Available at: <https://www.climatechangeinaustralia.gov.au/en/projections-tools/regional-climate-change-explorer/sub-clusters/?current=ECSC&tooltip=true&popup=true> (accessed 22 January 2025)

Commonwealth Scientific and Industrial Research Organisation (CSIRO) (2025c) Climate Change in Australia: Southern Slopes projection summaries (Online). Available at: <https://www.climatechangeinaustralia.gov.au/en/projections-tools/regional-climate-change-explorer/sub-clusters/?current=ECSC&tooltip=true&popup=true> (accessed 22 January 2025)

Department of Energy, Environment and Climate Action (DEECA) (2025) Victoria's Future Climate Tool [Online]. Available at: <https://vicfutureclimatetool.indraweb.io/project> (accessed 22 January 2025)

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- Department of Environment, Land, Water and Planning (DELWP) (2021) Threatened Species Assessment *Isopogon prostratus* prostrate cone-bush. DEWLP: Melbourne.
- Dowdy AJ, Ye H, Pepler A, Thatcher M, Osbrough SL, Evans JP, Di Virgilio G, McCarthy N (2019) Future changes in extreme weather and pyroconvection risk factors for Australian wildfires. *Scientific Reports* **9**(1), 10073.
- Department of Planning and Environment (DPE) (2022) Gardens of Stone State Conservation Area Plan of Management. DPE: Parramatta.
- Enright NJ, Fontaine JB, Westcott VC, Lade JC, Miller BP (2011) Fire interval effects on persistence of resprouter species in Mediterranean-type shrublands. *Plant Ecology* **212**, 2,071–2,083.
- Fairman TA, Bennett LT, Nitschke CR (2019) Short-interval wildfires increase likelihood of resprouting failure in fire-tolerant trees. *Journal of Environmental Management* **231**, 59–65.
- Harden G (1991) *Isopogon*. In 'Flora of New South Wales. Volume 2'. pp. 20–22. (UNSW Press: Sydney).
- IUCN Standards and Petitions Subcommittee (2024) Guidelines for Using the IUCN Red List Categories and Criteria. Version 16 [Online]. Available at: <http://www.iucnredlist.org/documents/RedListGuidelines.pdf> (accessed on 22 January 2025)
- Jones MW, Abatzoglou JT, Veraverbeke S, Andela N, Lasslop G, Forkel M, Smith AJ, Burton C, Betts RA, van der Werf GR, Sitch S (2022) Global and regional trends and drivers of fire under climate change. *Reviews of Geophysics* **60**(3), e2020RG000726.
- Karavani A, Boer MM, Baudena M, Colinas C, Díaz-Sierra R, Pemán J, de Luis M, Enríquez-de-Salamanca Á, Resco de Dios V (2018) Fire-induced deforestation in drought-prone Mediterranean forests: drivers and unknowns from leaves to communities. *Ecological Monographs* **88**(2), 141–169.
- Native Land Digital (2024) Native Land [Online]. Available at <https://native-land.ca/> (accessed 20 January 2025)
- Royal Botanic Gardens and Domain Trust (RBGDT) (2024) *Isopogon prostratus* specimen records [dataset]. NSW Herbarium specimen catalogue (accessed 19 December 2024)
- VicFlora (2025) *Isopogon prostratus* McGill prostrate cone-bush [Online]. Available at: <https://vicflora.rbg.vic.gov.au/flora/taxon/4709cd40-1421-4aa1-a700-2de5e2fe8be6> (accessed 21 January 2025)