



Conservation Advice for *Melichrus* sp. Newfoundland State Forest (P.Gilmour 7852) (Hairy Melichrus)

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

Melichrus sp. Newfoundland State Forest (P.Gilmour 7852) (Hairy Melichrus) 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 a restricted area of occupancy which is severely fragmented and continuing to contract due to ongoing threats of habitat loss, disturbance and modification and climate change.

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

The Hairy Melichrus was listed under the EPBC Act under the manuscript name *Melichrus hirsutus* J.B.Williams ms on 16 July 2000. From 2005, the phrase name *Melichrus* sp. Newfoundland State Forest (P.Gilmour 7852) was applied to this taxon (CHAH 2005). In 2020, the species was formally described as *Melichrus hirsutus* J.B. Williams ex H.T. Kenn. & J. J. Bruhl *sp. nov.* (Kennedy et al. 2020). This Conservation Advice will be updated with the species' formally described name when it has been accepted by the Australian Plant Census.

Description

The Hairy Melichrus, family Ericaceae, is a dense shrub with spreading branches that turn up at the ends. It forms a shrub 20–70 cm tall with light green foliage (Kennedy et al. 2020). The leaves are narrow and sharply pointed, 16.9–22.5 mm long and have 9 or 11 distinct parallel veins visible on the underside of the leaf (Kennedy et al. 2020). The flowers are nectar-filled cups, small and half-hidden amongst the crowded leaves but conspicuously deep pink and covered in thick white hairs (OEH 2019, Kennedy et al. 2020). Fruits are fleshy, round and red-purple in colour at maturity (Kennedy et al. 2020).

Distribution

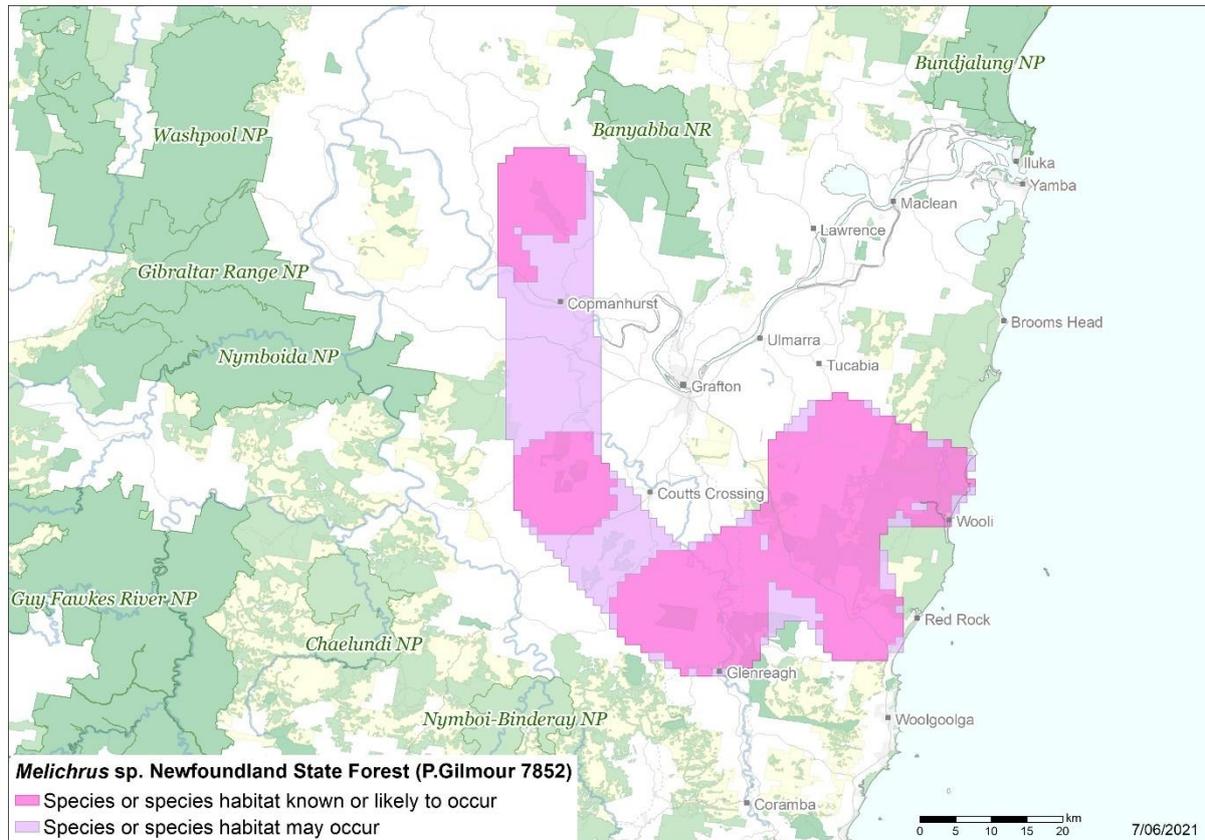
The Hairy Melichrus is endemic to north-east NSW, where it occurs between 30 km north-west of Grafton and Glenreagh, and east to Wooli Road (Kennedy et al. 2020). The species is known from seven localities, each separated by moderate distances (DPIE 2021). The species occurs in the Yuraygir sub-region of the NSW North Coast Bioregion and Clarence Sandstones sub-region of the South East Queensland Bioregion (OEH 2019).

The Atlas of Living Australia (ALA) has 341 records of this species since 2000 (ALA 2020). Based on records from 1998 to 2019, the species extent of occurrence is estimated to be 1928 km² and its area of occupancy is 136 km² (ERIN 2020). The Hairy Melichrus is known from 2775 individuals (see Table 1).

Table 1. Summary of Hairy Melichrus subpopulations (DPIE 2021)

Subpopulation	Number of Individuals
Flaggy Creek Nature Reserve	379
Tallowudjah Nature Reserve	40
Yuraygir State Conservation Area	38
Chambigne Nature Reserve	1918
Wombat Creek State Conservation Area	12
Shannon Creek Dam (Clarence Valley Council land)	382
Yuraygir National Park	6
Total	2775

Map 1 Modelled distribution of the Hairy Melichrus



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

The cultural significance of the species is not well understood, although several occurrences of the Hairy Melichrus occur in Yuraygir National Park which is the traditional country of the Yaegl and Gumbaingirr People. There are four Local Aboriginal Land Councils (LALCs), several local communities and Elders groups associated with Yuraygir National Park. Many Gumbaingirr and Yaegl Elders still live in the area and speak their respective languages. These Elders retain traditional knowledge of the park landscape, its resources and locations of places of mythological and spiritual significance (NPWS 2003).

Relevant biology and ecology

The biology and ecology of the Hairy Melichrus are not well known. Further studies are required to understand its ecological requirements, soil seedbank dynamics, reproductive strategies,

pollination biology and requirements. The information available on the species habitat and reproductive ecology is presented below, along with aspects of the biology and ecology of a more researched species in the *Melichrus* genus.

Habitat ecology

The Hairy Melichrus grows on gentle to moderate slopes at low altitudes of 20–150 m in sandy soils with conspicuous sandstone outcrops on the Mesozoic Grafton and Kangaroo Creek Sandstone formations (Geoscience Australia 2020). Where the species occurs in the Yuraygir National Park the soils are mainly coastal sands, not the sandstones preferred by Hairy Melichrus (DPIE 2021).

The species occurs in eucalypt shrubby open forest dominated by *Eucalyptus planchoniana* (Needlebark Stringybark), *E. psammitica* (Bastard White Mahogany), *Angophora robur* (Sandstone Rough-barked Apple) and *Corymbia gummifera* (Red Bloodwood). Shrub species commonly associated with the Hairy Melichrus include *Dodonaea crucifolia*, *Hibbertia acuminata*, *Banksia spinulosa*, *Hakea laevipes* subsp. *laevipes* and *Doryanthes excelsa* (Gymea Lily) (Kennedy et al. 2020).

Reproductive biology and ecology

The Hairy Melichrus flowers from March to August, and fruits from August to November (Kennedy et al. 2020). The time to reproductive maturity and pollinators for the Hairy Melichrus are unknown. Similarly, seed dispersal methods are unknown, however, they may be similar to those of other *Melichrus* species, such as *Melichrus urceolatus* (Urn Heath). The seeds of the Urn Heath are thought to be dispersed by vertebrate animals through digestion of the fleshy fruit (McIntyre et al. 1995), but may also be dispersed by ants.

Grant (1949) lists *Melichrus* as a bird pollinated genus and Lepschi (1993) observed birds drinking nectar from Urn Heath flowers, so it is evident that birds are visiting *Melichrus* plants, though they have not been directly observed to eat fruits. Johnson (2013) showed that the colour red is linked to a higher likelihood of bird pollination while white either didn't show any effect on pollination syndrome, or possibly suggested a mixed pollinator syndrome under certain conditions. So even though the Hairy Melichrus and the Urn Heath are congeneric, their floral traits (the Urn Heath has white flowers, while the Hairy Melichrus has red flowers) suggest they could have different pollination ecologies. In addition Johnson (2012) proposes that flies and bees are more likely to be the primary pollinators of the Urn Heath. Saunders (2016) suggested that reproduction of the Urn Heath is likely more complex and may utilise wind pollination as well as animal pollination. As a result of these conflicting reports, the pollinator biology of the *Melichrus* genus is unclear and it is difficult to discern the reproductive ecology of the Hairy Melichrus.

Fire ecology

The Hairy Melichrus is likely to be at risk from impacts of high frequency fires (DAWE 2020b, Kennedy et al. 2020), including disruption to the replenishment of seed banks which are essential to post-fire recruitment and subpopulation persistence. Adult plants in Yuraygir State Conservation Area were killed post 2020 wildfire and no recruitment has yet been observed in these subpopulations (DPIE 2021).

Though fire ecology of the Hairy Melichrus is not well known, the fire ecology of the related Urn Heath has been documented. It has been observed regrowing from surviving rootstocks after fire, though no seedlings have been recorded for this species in less than a year post-fire (Purdie 1977). Delayed seedling emergence is a characteristic noted in other species with physiologically dormant seeds in the subfamily Styphelieae of the Ericaceae (Ooi et al. 2007). If the Hairy Melichrus has similar fire ecology, post-fire seedling recruitment for the species could be very low and sensitive to the season of fire, and some post-fire resprouting of established pre-fire plants may occur. A report from a 2018 collection record of the Hairy Melichrus states that plants which had been completely burnt were not regenerating, but plants partially burnt were observed shooting from the base (AVH 2020). Following a fire in the species range in Chambigne Nature Reserve in 2011, a number of plants were killed and there was no postfire germination seedlings evident during spring/summer surveys in 2012 (Cumberland Ecology 2014). However, the timing of this fire is unknown and out-of-season fires (mid-autumn to mid-spring) may delay and reduce recruitment from physiologically dormant seed banks (Miller et al. 2020). In another species in the genus, *Melichrus* sp. *Gibberagee* (Narrow-leaf Melichrus), no seedling recruitment and no regrowth has been observed since the 2019-2020 fires, though post-fire regrowth has probably previously occurred (DAWE 2020a).

Habitat critical to the survival

Due to the species eligibility for listing (restricted range which is severely fragmented and continuing to contract due to ongoing threats), 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 to the Hairy Melichrus are habitat loss, disturbance and modification and climate change. Of particular concern is the increased frequency and intensity of bushfires in south-east Australia. Analysis by the Wildlife and Threatened Species Bushfire Recovery Expert Panel, based on intersecting the modelled distribution of the Hairy Melichrus and the National Indicative Aggregated Fire Extent Dataset, indicates that approximately 40 percent of the range of the species was within the extent of the 2019-20 bushfires (DAWE 2020b).

Table 2 Threats impacting Hairy Melichrus

Threat	Status and severity ^a	Evidence
Climate change and fire		
Fire-related threats	<ul style="list-style-type: none"> Timing: current 	Climate change projections show that southern Australia is likely to

Threat	Status and severity ^a	Evidence
	<ul style="list-style-type: none"> • Confidence: known • Consequence: major • Trend: increasing • Extent: across the entire range 	<p>experience increasingly harsh fire weather (CSIRO 2015). While the Hairy Melichrus has been observed resprouting following fire (AVH 2020), mortality rates appear to vary, and the effect of fire on seed germination or the longevity of the soil seed bank for the species is unknown. Seedling recruitment has not been observed post-fire in other species of the <i>Melichrus</i> genus.</p> <p>In 2019-20, following years of drought (DPIE 2020), catastrophic bushfire conditions resulted in extensive bushfires across eastern Australia. Approximately 40% of the range of the Hairy Melichrus was within the extent of the 2019-20 bushfires (DAWE 2020b). This type of event is increasingly likely to occur as a result of climate change.</p> <p>The Hairy Melichrus is likely to be at risk from impacts of high fire frequency (DAWE 2020b), which can include disruption to the replenishment of seed banks which are essential to post-fire recruitment and subpopulation persistence.</p> <p>Out-of-season fires (mid-autumn to mid-spring) may also threaten the species by delaying and reducing recruitment from physiologically dormant seed banks (Miller et al. 2020).</p>
Increased temperature intensity/frequency and change to precipitation patterns	<ul style="list-style-type: none"> • Timing: future • Confidence: inferred • Consequence: major • Trend: increasing • Extent: across the entire range 	<p>Climate change projections show that Australia's climate will get hotter and drier, with time in drought predicted to increase over southern Australia (CSIRO 2015). Such changes in climate may cause widespread changes to forest ecosystems, as many plants are vulnerable to drought stress (Choat et al. 2018).</p> <p>However, the temperature and precipitation requirements of the Hairy Melichrus are unknown, and therefore the impacts of changing rainfall and temperature on the species are difficult to determine. Evidence from other species in the Ericaceae family suggests that the genus is generally hardy and able to survive in poor soil, though require a good supply of moisture (Heads 2003).</p>
Habitat loss, disturbance, and modification		
Infrastructure development	<ul style="list-style-type: none"> • Timing: historical/future • Confidence: known/suspected • Consequence: moderate • Trend: decreasing 	Construction of the Shannon Creek Dam has impacted the species, with some individuals destroyed during dam construction (Cumberland Ecology 2005). The catchment area

Threat	Status and severity ^a	Evidence
	<ul style="list-style-type: none"> Extent: across part of its range 	including the Hairy Melichrus is actively being managed for conservation (DPIE 2021). However, infrastructure development is an ongoing potential threat for subpopulations that occur on unprotected land.
Road maintenance	<ul style="list-style-type: none"> Timing: current Confidence: suspected Consequence: minor Trend: static Extent: across part of its range 	<p>Road maintenance is identified as a threat to the Hairy Melichrus as some subpopulations occur on roadsides (AVH 2020; OEH 2019). Further research is required to identify roadside subpopulations and protect them during roadworks.</p> <p>Disturbances associated with road clearing may also promote weed invasion, exacerbating existing competition with invasive weeds (Sindel et al. 2009).</p>
Timber harvesting	<ul style="list-style-type: none"> Timing: historical Confidence: suspected Consequence: moderate Trend: unknown Extent: across part of its range 	The Hairy Melichrus was previously threatened by timber harvesting as a significant subpopulation was found in the Newfoundland State Forest (DECCW 2010; OEH 2019). However, the land this subpopulation occurs on has been reclassified as Yuraygir State Conservation Area and is no longer subject to logging (DPIE 2021).
Land clearing for agriculture	<ul style="list-style-type: none"> Timing: historical Confidence: suspected Consequence: major Trend: decreasing Extent: across part of its range 	Land clearing and increased fragmentation of remnants are the principal factors threatening species and ecosystems in eastern Australia (DECCW 2010). However, The Clarence sandstone environments where the species occurs have been less heavily cleared than areas on more productive soils (DPIE 2021).
Introduced species		
Trampling by cattle	<ul style="list-style-type: none"> Timing: current Confidence: suspected Consequence: minor Trend: unknown Extent: across parts of the range 	OEH (2019) list trampling and disturbance by cattle as a threat to the Hairy Melichrus. Cattle trampling has severe impacts on understory species by both physically disturbing plants and compacting the soil surface, increasing susceptibility to soil erosion (Dunne 2011). However Cattle utilise the poor soils less intensively when other forage is available, and rock outcropping habitat of the Hairy Melichrus (DPIE 2021). Further research is required to determine the degree to which this threat is impacting the species.

Status—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 2 in terms of the extent that it is operating on the species. The risk matrix (Table 3) 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 and using available literature.

Table 3 Hairy Melichrus 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 temperature intensity/frequency and change to precipitation patterns	Very high risk
Likely	Low risk	Moderate risk	High risk	Very high risk	Very high risk
Possible	Low risk	Moderate risk	High risk Infrastructure development	Very high risk	Very high risk
Unlikely	Low risk	Low risk Road maintenance Trampling by cattle	Moderate risk Timber harvesting	High risk Land clearing for agriculture	Very high risk
Unknown	Low risk	Low risk	Moderate risk	High risk	Very high risk

Conservation and recovery actions

Primary conservation objective

By 2030, the population of the Hairy Melichrus will have increased in abundance and viable subpopulations are sustained in habitats where threats are managed.

Conservation and management priorities

Climate change and fire

- Develop and implement a fire management strategy that optimises the survival of the Hairy Melichrus during planned burns and bushfires, including:
 - Avoid successive fire intervals that are shorter than the period required to maintain recovery capacity of resprouting individuals.
 - Avoid planned burns that disrupt the replenishment of the soil seed bank.

- Ensure that fire regimes do not disrupt the life cycle of the Hairy Melichrus, that they support the habitat required for the species, that they do not promote invasion by weeds, and that they do not increase impacts of land clearing and forestry.
- Minimise out-of-season fires (mid-autumn to mid-spring) until germination and resprouting responses are well understood.
- Provide detailed maps of known occurrences to local and state Rural Fire Services and seek inclusion of mitigation measures in bushfire risk management plans, risk register and/or operation maps.

Habitat loss, disturbance and modification

- Ensure land managers are aware of the species' occurrence and provide protection measures against known and potential threats.
- Protect known habitat from forestry by ensuring that logging is carried out in accordance with the legal protection and management measures for the species.
- Ensure local governments, relevant state agencies and utility service providers have access to adequate information regarding the location of the Hairy Melichrus and use best practice methods for roadside and utility corridor maintenance to protect the species and its habitat.
- Ensure that local government bodies consider the Hairy Melichrus in development proposals that occur in known and potential habitat.

Invasive species (including threats from grazing, trampling, predation)

- If livestock grazing is occurring in the species distribution, ensure landowners/managers use an appropriate management regime that does not detrimentally affect the Hairy Melichrus.

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

- To manage the risk of losing genetic diversity, undertake appropriate seed collection and storage in long-term custodial collections until no longer needed, and determine the viability of stored seeds. Best practice seed storage guidelines and procedures should be adhered to, to maximise seed viability and germinability.

Stakeholder engagement/community engagement

- Engage and involve Traditional Owners in conservation actions, including the implementation of Indigenous fire management and other survey, monitoring and management actions.
- Engage with land management agencies to encourage ongoing management and conservation of subpopulations in state conservation areas and national parks.
- Engage with private landowners who have subpopulations of Hairy Melichrus on their properties, to explore options for covenanting and providing assistance with management/monitoring for the species.
- Liaise with forestry organisations to ensure the Hairy Melichrus is appropriately protected and that protection measures are being followed.

Survey and monitoring priorities

- Survey the species to determine current population size and structure. This will provide baseline data to detect any future decline in population numbers.
- Design and implement a monitoring program to:
 - determine trends in population size and distribution,
 - determine threats and their impacts, and
 - monitor the size and structure and reproductive status of subpopulations at different stages in the fire cycle, taking opportunities to monitor after planned and unplanned fires (where they occur) and improve understanding of the fire response of the species.
- Identify subpopulations in timber harvesting areas, along roadsides and on private property and protect these from disturbance.

Information and research priorities

- Investigate options for linking, enhancing or establishing additional subpopulations.
- Determine the susceptibility of the Hairy Melichrus to *P. cinnamomi*.
- Investigate the ecological requirements of the Hairy Melichrus that are relevant to persistence, including:
 - population genetic structure, levels of genetic diversity and minimum viable subpopulation size,
 - soil seed bank dynamics and the role of various disturbances (including fire), competition and rainfall in germination and recruitment,
 - seed dormancy mechanisms,
 - Survival in response to fires of varied seasonal timing and severity,
 - reproductive strategies, and
 - pollinator biology and requirements.
- Undertake seed germination and/or vegetative propagation trials to determine the requirements for successful establishment.

Links to relevant implementation documents

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

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This publication (and any material sourced from it) should be attributed as: Department of Agriculture, Water and the Environment 2021, *Conservation advice for Melichrus sp. Newfoundland State Forest (P.Gilmour 7852) (Hairy Melichrus)*, Canberra.



This publication is available at the [SPRAT profile for Melichrus sp. Newfoundland State Forest \(P.Gilmour 7852\) \(Hairy Melichrus\)](#).

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Acknowledgements

Thank you to Helen Kennedy and Jeremy Bruhl for providing assistance and advice in the preparation of this Conservation Advice.

This Conservation Advice was prepared in consultation with those states and territories who provided input, and we thank them for their contribution.