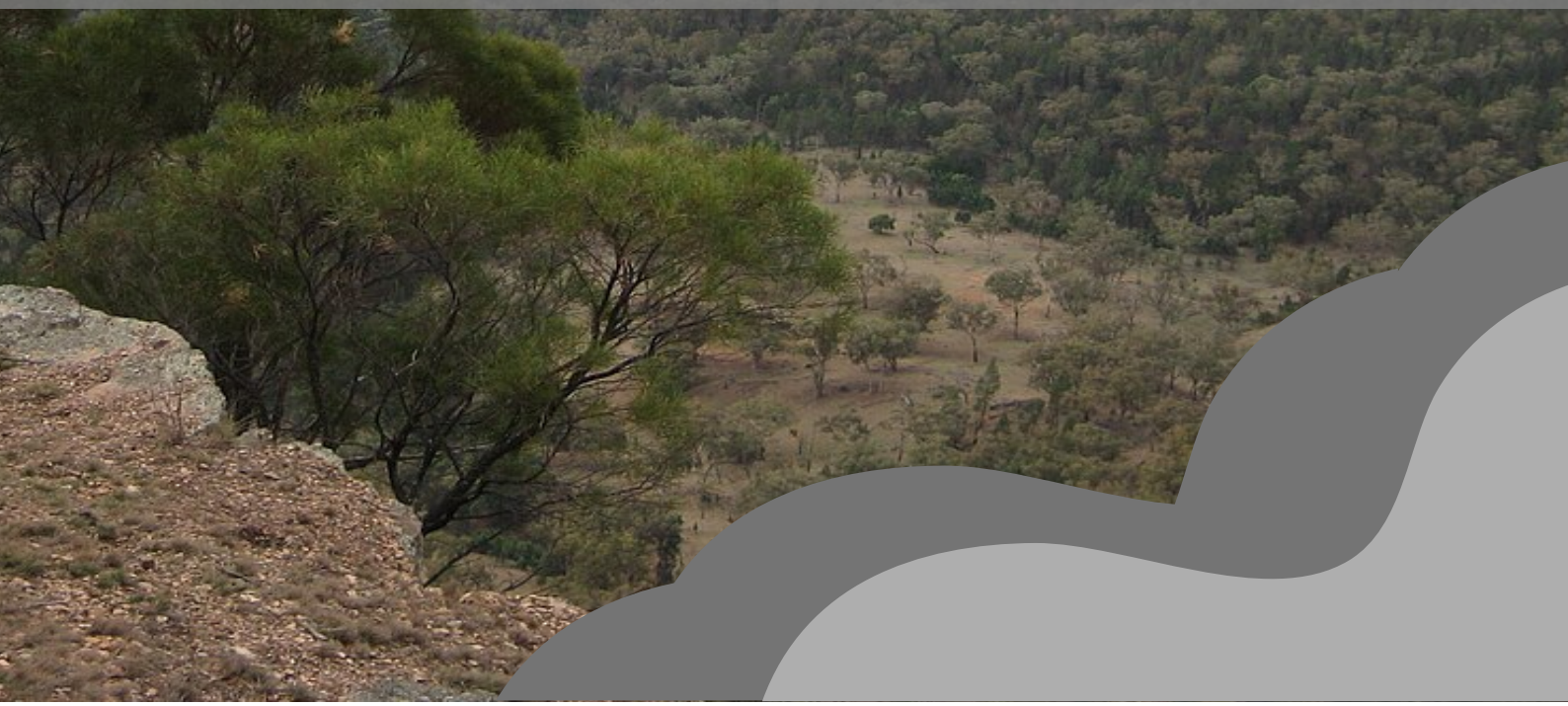
Response to Draft Conservation Advice – Sandhill Pine Woodlands Riverina, Murray Darling Depression and NSW South Western Slopes bioregions



the climate centre

Response to Draft Conservation Advice – Sandhill Pine Woodlands Riverina, Murray Darling Depression and NSW South Western Slopes bioregions

The Department of Climate Change, Energy, the Environment and Water has invited views and reasons about the draft listing assessment and conservation advice regarding:

- the eligibility of Sandhill Pine Woodlands in the Riverina, Murray Darling Depression and NSW South Western Slopes bioregions for inclusion on the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) list of threatened ecological communities; and,
- actions to stop the decline of, or support the recovery, for this ecological community.

As an advocate for betterment of the environment, the Climate Centre welcomes the opportunity to provide such feedback.

Draft conservation advice

The evidence presented by the Department in their draft conservation advice supports listing. The proposed status for the Sandhill Pine Woodlands in the Riverina, Murray Darling Depression and NSW South Western Slopes bioregions is the Critically Endangered category (p. 2). This is driven by the highest-scoring criterion met, Criterion 4, reduction in community integrity, assessed as "very severe reduction in integrity across most of its geographic distribution, as indicated by a very severe degradation of the community and its habitat, and a very severe disruption of important community processes" with restoration unlikely even with positive intervention (p. 89, 93). This is reinforced by Criterion 1, decline in geographic distribution, where estimated loss since 1750 ranges from 74% in Victoria (likely underestimate) to 95% in South Australia (p. 83), and Criterion 2, limited geographic distribution coupled with demonstrable threat (p. 84). These two criterion alone would make it eligible for listing as Endangered. Criteria 3, 5, and 6 were left having insufficient information to facilitate a determination (p. 88, 97, 98). These criterion are: decline of functionally important species; rate of continuing detrimental change; and, quantitative analysis showing probably of extinction, respectively.

Insofar as the Government's own advice recommends listing the Sandhill Pine Woodlands as Critically Endangered, it is incumbent upon the Government to give effect to that advice; failure to do so would amount to a negligent abdication of responsibility.

Note on the supporting literature

The draft advice's own evidence base is supported by an independent body of peer-reviewed on this ecological community's structuring genus, *Callitris* and its landscape context.

Callitris itself depends on episodic recruitment events (the processes by which young trees are born, survive, and grow) rather than continuous regeneration. These recruitment events are constrained by several factors, particularly by grazing,

rainfall, fire, broader climate state, and overall health of the mature surrounding environment. *Callitris* is acknowledged as being important for habitat and maintaining essential ecosystem services (Thompson & Eldridge, 2005). This makes the community reliant on rare windows of successful seedling establishment and maturation, and correspondingly fragile to any threat that closes that window, such as climate change.

A multi-site study across NSW found that *Callitris glaucophylla* recruitment failure is complicated by rainfall, grazing and land clearing practices (Zimmer, Florentine, Enke & Westbrooke, 2017). This is challenged further by the fact that this species is slow-growing, meaning recruitment failures at wide scale can be difficult to recover from, and potentially result in reduced range and in extreme cases, extinction (Guo et al. 2026).

A companion study in Roxyby Downs sampled hundreds of plots and found no new seedlings had established following a major wet period in 2010–11 except along road drainage lines. It was determined that for *Callitris glaucophylla* specifically, a total of 600-720mm of rain over a two year period is required for successful regeneration, which could otherwise be described as a "series of unusually wet years" (Prior, Hua & Bowman, 2018). Another study indicated that *Callitris glaucophylla* recruitment moved from success to failure at 405 mm mean annual rainfall in the context of grazed land areas due to introduced species, such as rabbits (Cohn et al. 2013).

A related study of long-term forest plot data (a different *Callitris*-dominated system in the Pilliga, NSW) is consistent with, though not direct evidence for, structural vulnerability in recruitment-poor stands. Using more than half a century of permanent plot data, small trees were described as providing "insurance" against fire and drought losses (Neumann, Eastaugh & Adams, 2022), a finding that is consistent with, but not a direct test of, the concern that recruitment-poor stands like the Sandhill Pine Woodlands lack that buffer.

Note on future projections

The Murray–Darling Basin Authority's 2025 outlook confirms temperatures across the Basin have already risen ~1.4°C since 1910 and are projected to rise a further 1.3–1.8°C by 2050, annual rainfall likely to become more variable, heavy rainfall very likely to be more intense, cool-season rainfall likely to decline, drought to very likely become more severe, occur more frequently and be of longer duration, runoff and water availability very likely to decline, and the frequency of moderate flooding likely to decline even though large floods may see height and duration increase (Murray–Darling Basin Authority, 2025). These trajectories would put added pressure on recruitment failure in a genus already dependent on rare wet-period regeneration pulses.

According to an analysis by Timbal et al. 2015, by 2090, further warming of 1.3–2.4°C is projected under a moderate-emissions pathway (RCP4.5) and 2.7–4.5°C under a high-emissions pathway (RCP8.5), relative to 1986–2005. Cool-season rainfall is projected to decline with high confidence, potentially by as much as 40% by 2090 under RCP8.5, while warm-season rainfall is expected to remain largely unchanged. Because recruitment for this species depends on rare, multi-year wet periods rather

than average conditions (Thompson & Eldridge, 2005), a shift toward more frequent and severe drought (Timbal et al., 2015; MDBA, 2025) is expected to make those rare regeneration windows less frequent, even where the decline in average rainfall is comparatively modest.

Comparison with current climate conditions

Climate change has been undergoing an acceleration in recent years (Foster and Rahmstorf, 2026), and with global temperatures exceeding the 1.5°C threshold for the first time in 2024, climate projection accuracy has been questioned (Nordling et al. 2026). In addition to this, many climate models are noted for failing to capture small scale detail, only being capable of representing larger scale averages (Roberts et al. 2025). Because of this, the Climate Centre has concerns about the government's reliance on national, state or otherwise large scale area averages to infer impacts upon small areas such as those relevant to the Sandhill Pine Woodlands in the Riverina, Murray Darling Depression and NSW South Western Slopes bioregions.

The Climate Centre regularly undertakes analysis relevant to smaller scale geographies in an Australian context, including bioregions, on an annual and quarterly (seasonal) basis. Autumn 2025 ranked as the warmest autumn on record across all three bioregions: maximum temperature anomalies of 3.15°C above baseline in both the Murray-Darling Depression and the NSW South Western Slopes, and 3.41°C above baseline in the Riverina (The Climate Centre, 2026). This indicates that these bioregions are already experiencing temperatures far in excess of what is being reported to the Department and being used as the basis for and in the preparation of conservation advice.

There has also been a pronounced swing between drought and extreme wet conditions. Summer 2025 is recorded as among the driest seasons on record in the Murray-Darling Depression (62 per cent below the 1941–1970 baseline, ranked 125th) and the Riverina (52 per cent below baseline, ranked 118th). By Autumn 2026, the same two bioregions were recorded as having received rainfall substantially above baseline, 127 per cent above baseline in the Murray-Darling Depression, ranked fourth-wettest on record, and 61 per cent above baseline in the Riverina, with the NSW South Western Slopes also recording an above-baseline result of 42 per cent for the same season.

This has two implications for the matters addressed earlier in this review. First, it would generally corroborate the CSIRO and Bureau of Meteorology's projection of increased drought frequency alongside increased extreme rainfall intensity for this cluster (Timbal et al., 2015), with the pattern recorded here occurring well in advance of that report's 2030 and 2090 projection horizons. Second, the wet conditions recorded for Autumn 2026 in the Murray-Darling Depression and Riverina would be of particular relevance to the community's regeneration prospects, given that *Callitris glaucophylla* recruitment is dependent on rare episodes of above-average rainfall (Cohn et al., 2013), and that recruitment outcomes are influenced by whether grazing exclusion measures are already in place at the time such an episode occurs (Zimmer et al., 2017). This recorded event, would represent a recent, practical test of

whether on-ground management was appropriately positioned to take advantage of such events.

The conditions for 2026/2027 are likely to be even more extreme than previously experienced, with “a strong to very strong El Niño event” currently developing, and the event “likely to peak at levels among, or above, the highest observed” (Bureau of Meteorology 2026). Because of this event, Australia will likely experience some of its warmest temperatures on record to date, and the records mentioned above for the constituent bioregions of the Sandhill Pine Woodlands could easily be exceeded.

Note on supportive actions

The Sandhill Pine Woodlands qualify for listing based on the evidence presented by the Department in their draft conservation advice, as previously stated. While criteria 3, 5, and 6 were left having insufficient information to facilitate a determination (p. 88, 97, 98), the Department should prioritise filling the gaps in information to ensure these criteria can be better informed, not for the sake of making a determination, but to better conserve the ecological community. Long-term demographic monitoring of the kind used in comparable *Callitris* studies (permanent forest plots: Neumann, Eastaugh & Adams, 2023; arid-zone plot surveys: Prior, Hua & Bowman, 2018) would let future reassessments inform these criteria and also track whether interventions are working, rather than relying on point-in-time snapshots.

Monitoring should also include programs that collect and analyse data on the magnitude and rate of climatic shift, which has been underestimated in the Department’s guidance, as previously stated. The Department is reliant upon climate change measurements that fail to capture small scale detail and extremes relevant to the Sandhill Pine Woodlands. The Climate Centre encourages the Department to engage an appropriately skilled provider of specialised services focusing on the analysis of small scale detail to capture climate extremes, and measure to what extent this may contribute to the extinction risk for functionally important species in the Sandhill Pine Woodlands.

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About The Climate Centre

The Climate Centre is a volunteer-run charitable not-for-profit focused on building bridges between research, policy and communities. It achieves this by undertaking research relevant to local communities, providing digital materials and outreach initiatives that make it easier to interpret climate information and apply it to a local scale, as well as engaging in policy analysis and advocacy to government, and fostering conversations and understanding at individual, community, and national scales through its various projects.