

Rehabilitation in the Jarrah Forest after mining

summary of recent scientific evidence (2023, 2024)

Bauxite mine site rehabilitation is failing to restore a self-sustaining Jarrah forest ecosystem. Bauxite mining has already cleared over **37,000ha** of the Northern Jarrah Forest (NJF). If all planned mining proceeds, about 120,000 ha (1,200 square km of the NJF), will be gone in the next 20 years.

ALCOA claims that it has “world class – 5 star rehabilitation” that restores plant diversity and forest ecosystem after clear felling and mining. They agree that 5-star rehabilitation is needed.

Is Alcoa's rehab really 5 star?

Scientists have scored Alcoa's mine site rehabilitation over the **last 35 years** at **2-stars** using internationally accepted standards for mine site restoration. In the journal *Restoration Ecology* **WA scientists Campbell et al** (September 2024)¹ reviewed Alcoa's rehabilitation outcomes against a set of *International Principles and Standards for Ecological Restoration and Recovery of Mine Sites*.

These independent scientists have given Alcoa's rehab 2-stars - Why only 2 stars? It's because:

- 1. The mining removes the deep, multi-layered bauxite layer and re-planting is done 'on shallow topsoil over a more uniform clay soil layer'** that restricts water movement and use by plants. Topsoil storage and handling has also encouraged overgrowth of native peas and invasive weeds.
- 2. Rehab land has significantly lower plant species richness** (the number of species) and **change in the species**, particularly after 25 years.

How did the review determine 2 stars?

21 different restoration outcomes were used to determine the score. The Ecological Recovery Wheel was used with measured or estimated levels of restoration quality. The overall score was based on the 35 years of rehabilitation since 1988 when Alcoa changed their rehab to aim at reinstating a self-sustaining Jarrah forest ecosystem.

In the past **Alcoa has assessed the quality of their rehabilitation using a limited number of measures and at one timepoint.** After planting, 89% rehabilitation quality was found at 18 months but this **decreased to 49% at 25 years.** So early rehabilitation results **do not** seem to be maintained. Compared with unmined forest, rehabilitated Jarrah trees fork closer to the ground, showing that the tall straight mature Jarrah tree form is not being achieved, even over time.

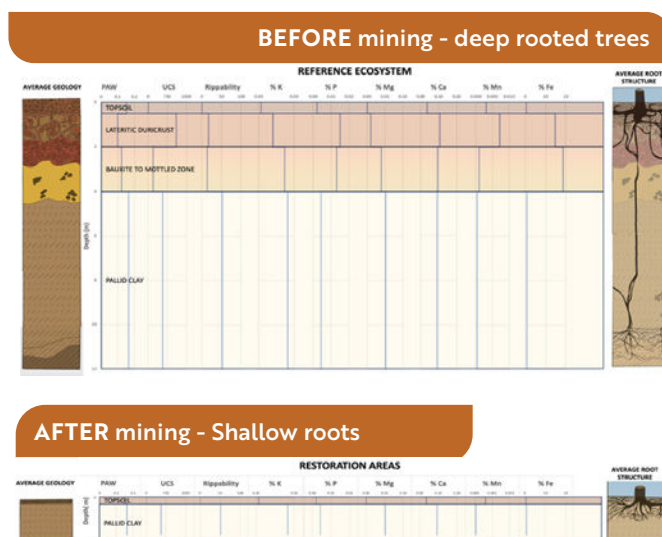


Figure 4. Typical pre- and post-mining geological, geochemical and jarrah root structure profiles. Data compiled from Anand et al. (1991), Kew et al. (2007a, 2007b); Kimber (1974), Soltangheisi et al. (2023), and Szota et al. (2007). PAW is plant available water (kPa), UCS is uncompress strength (kN/m²).

Issues with Rehabilitation found in the review by WA scientists Campbell et al (September 2024).

1. **Biodiversity of flora and vegetation** – Rehabilitation cannot reinstate the specific plant types that were cleared because of changes to the soil profile and landscape.
2. **Animal biodiversity – 16 conservation significant animal species** are likely to occur in or around the proposed mine areas. The forest provides important breeding and feeding habitat for them. We don't fully understand how well these animals use rehabilitated areas.
3. **Soil** – pit floor ripping is important for long-term rehabilitation, but does not always occur (2018), despite being signed off by Alcoa and DBCA as completed. This shows flaws 'in the self-certification process and importance of effective monitoring/evaluation by external regulators'.
4. **Recreation** – While rehabilitation eventually matures into 'a' forest it isn't 'the' Jarrah forest, with large hollow-containing trees and grasstrees that make the jarrah forest so unique. Ripping of the surface makes the land seem 'not natural' and less 'walkable' than non-mined forest'.
5. **Heritage values** – 'indigenous peoples' expectations have rarely been considered or adequately taken into account in site clearing activities or mine completion criteria...'
6. **Resilience to further disturbance, regional pressures and climate change** – Alcoa claims its rehabilitation is adapting to climate change, but this is limited to future, not past, rehabilitation.
7. **Fire** – 'further research is needed to understand the long-term implications of differences in rehabilitated areas compared to unmined forest'
8. **Drought/water stress** – '..no information about resistance or resilience of current rehabilitation to drought/water stress, it will be several years before assessment of late-stage rehabilitation is possible'.

Another independent review of Alcoa's rehabilitation in 2023 by consultants Stantec found:

- Marri trees are important for ecological resilience and development of fauna habitat. Marri rehabilitation has not met expectations in recent years and has needed remedial infill planting.
- At 25 years, **understorey cover in rehabilitation areas is about 50% of non-mined forest areas.**
- Key species - **Bull Banksia, Forest Sheoak, Grass Trees are not included** in rehabilitation targets
- **All plant biodiversity measures differed between unmined forest and 25-year-old rehabilitation.**

Monitoring of rehabilitation

The EPA has asked Alcoa to develop 'adequate and scientifically robust Biodiversity Indicators (BIs) and a supporting detailed monitoring framework' to assess the consistency of its mining operations with the ongoing ecological integrity of the NJF. **Alcoa has proposed 12 BIs to drive improvement, but the independent review could not find 'explicit evidence ... to show how this will occur'.** The review concluded that Alcoa's proposed Biodiversity Indicators do not adequately address current rehabilitation performance deficiencies.

For these reasons the DDFD believes that Alcoa's mining proposal for expansion of mine sites (Holyoake, Myara and O'Neil) and Pinjarra refinery should be rejected by the EPA.

Have your say by signing on to WA Forest Alliance's submission with a quick and simple form or find out more about writing your own at endforestmining.org.au/alcoa. The comment period is now open and closes on 21 August 2025.

1. Campbell et al. Standards-based evaluation inform ecological restoration outcomes for a major mining activity in a global biodiversity hotspot. Restoration Ecology 2024-11, Vol 32(8) p.n/a, Article e14236
2. Stantec (2023) Alcoa Jarrah Forest Rehabilitation – Peer Review, Prepared for GHD, November 2023, p. 28. (Alcoa MMP 2023-2027, Appendix 6).