Advancing Progressive Rehabilitation through Research and Innovation

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# ABSTRACT

300 word maximum

Through decades of collaborative research and site-based experience, Alcoa has developed many innovative approaches to progressive mine rehabilitation. These advancements have contributed to improved ecosystem restoration, informed future practices, and inspired global best practices for creating sustainable and resilient post-mining landscapes. This long-term commitment to research and innovation has enabled the refinement of techniques and significant progress in restoring diverse and self-sustaining ecosystems.

This has been achieved through a combination of pioneering rehabilitation techniques including optimised deep ripping, topsoil management, tailored seed mixes incorporating ecologically significant plant species, and the development of innovative tissue culture and germination pre-treatment techniques. Combined with optimised seeding, enhanced plant survival, reduced fertiliser use, and lower tree density stocking rates, this approach has enabled successful re-establishment of diverse flora communities and fauna habitat.

Recent innovations include remote sensing tools for rehabilitation integrity assessments and erosion detection, enabling early intervention. The return of key species of amphibians, invertebrates, mammals, birds and reptiles reveals positive ecosystem recovery. Ongoing trials focus on preserving cultural heritage through the establishment of ancient grasstrees (*Xanthorrhoea preissii*) to rehabilitated areas and understanding forest resilience in a changing climate, including the influence of fire and drought. A range of knowledge-sharing activities are prioritised, including regular open-access research publications, symposiums, public site tours and student education programs.

Alcoa is accelerating the pace and raising the bar for mine rehabilitation. The newly established Forest Research Centre, a company-wide collaborative initiative, is driving this transformation. Central to its mission is the integration of Aboriginal cultural knowledge, recognising the irreplaceable value of traditional ecological knowledge for sustainable and culturally sensitive outcomes. This paper presents initiatives showcasing how the integration of research, innovation and cultural considerations leads to improved mine rehabilitation outcomes and redefined best practices.