Forest dieback research program: Overview of research projects

Australian National University

Climate and dieback resilience of tableland and mountain eucalypt species of southeast Australia

Extractive land use and climate change are threatening the persistence of Australia's woodland and forest ecosystems. In the Monaro tablelands and mountains of south east NSW, several keystone eucalypt species are exhibiting severe dieback due to drought, climate change and pests. By applying cutting edge genomics, ANU will identify tableland eucalyptus species and genotypes that cope with increasingly extreme conditions. Outcomes of this research include scientific and practical solutions to restore dieback-affected landscapes in one of Australia's most biodiverse regions.

Environmental drivers, landscape determinants and control of snow gum dieback

Dieback of snow gum forests is diminishing the ecological, hydrological and cultural values of the Australian Alps. Using a multi-disciplinary approach including dendrochronology, remote sensing, soil science and entomology ANU will deliver sophisticated insights to the causes and patterns of snow gum dieback in the Australian Alps and address uncertainties surrounding its current extent and likely future spread. Knowledge gained through the project will offer pathways to plan for and respond to dieback by identifying opportunities to slow its spread, and assist efforts aimed at protecting and restoring affected stands to protect an irreplaceable part of Australia's natural heritage.

CSIRO Land and Water

Untangling the role of mycorrhizal mutualisms in eucalypt dieback to enhance revegetation outcomes

Mutualistic associations between plants and soil microbes, such as mycorrhizae, are vital to native forest ecosystem health. Degradation of mycorrhizal networks has been linked to forest dieback in several ecosystems worldwide but is poorly understood for eucalypt dieback in New South Wales. CSIRO's research will reveal if eucalypt dieback on the Monaro is associated with depletion of mutualistic mycorrhizal networks, using next-generation DNA sequencing from soil collected across a gradient of eucalypt decline. In partnership with restoration practitioners, CSIRO will develop inoculation methods to reconnect nursery-grown seedlings with 'missing' mycorrhizal mutualists to enhance their survival and growth when transplanted into dieback-affected landscapes.

Macquarie University

Characterising the (a)biotic soil factors associated with bell miner associated dieback in eastern NSW

The over-abundance of psyllids that causes bell miner associated dieback (BMAD) poses the most significant dieback threat to eucalypt forests along the eastern seaboard of New South Wales. Despite this, our understanding of the role (a)biotic soil factors play in this phenomenon remains rudimentary. This project will investigate the interaction between soil microbial community health and abiotic soil factors on eucalypt health and resilience to psyllid attack. The knowledge gained as part of this project will provide essential input into developing better management strategies to reduce the impacts of BMAD on NSW eucalypt forests.

University of New England

Causes projections and reversal of eucalypt decline and dieback on the New England Tablelands

New England dieback and recent extreme drought have resulted in the loss of millions of paddock trees across the pastoral landscapes of the New England Tablelands and, consequently, loss of amenity, ecosystem services and biodiversity. Remote sensing and spatial and multi-inference modelling will establish the proximate and ultimate causes of New England dieback. In addition, UNE will develop a risk index to predict the severity and extent of dieback under future climate and land use projection. This will inform best-bet solutions to reverse dieback, increase the resilience and connectivity of endangered communities and threatened species, safeguard ecosystem services and sustain pastoral productivity.

Western Sydney University

Determining the physiological underpinnings of eucalypt dieback in New South Wales

Eucalypt dieback is a major environmental issue facing New South Wales. Although multiple causal factors are associated with dieback, drought stress affects the largest area and has the potential to kill millions of trees over short time scales. Extreme drought events are also projected to become more frequent in future. WSU will determine critical physiological thresholds for dieback associated with water stress and heat stress through a combination of laboratory experiments, ground-based observations, and remote sensing. Knowledge of physiological thresholds will allow us to better quantify future risks faced by eucalypt forests and woodlands, providing objective, data-driven land management and policy decisions.