The response of the vegetation to a range of alternatives to clearfelling of tall wet eucalypt forests at the Warra silvicultural systems trial, Tasmania, Australia.

by

Mark Geoffrey Neyland

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School of Plant Science, University of Tasmania; and Co-operative Research Centre for Forestry, Hobart, Australia

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Declaration

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Mark Neyland

School of Plant Science, University of Tasmania
and the Co-operative Research Centre for Forestry

May 2010
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Abstract

Clearfelling of wet eucalypt forest followed by high intensity burning and aerial sowing, a silvicultural system used for the last 50 years in Tasmania and designed to mimic the natural dynamic of sporadic regeneration following cataclysmic disturbance, has attracted criticism for not maintaining the structural or floristic diversity that is associated with natural disturbance. To address these concerns, a silvicultural systems trial was established at the Warra Long-Term Ecological Research site in southern Tasmania to quantify the effect on these values if variable-retention harvesting systems are applied to tall wet eucalypt forest. The harvesting treatments were clearfell, burn and sow with understorey islands, a patchfell, stripfell, dispersed retention, aggregated retention, single-tree/small-group selection and group selection. High intensity burning, low intensity burning and no burning were variously applied as part of these treatments. Stocking, density and growth of the eucalypt seedling regeneration, floristic changes and the structural integrity of retained forest areas were monitored for up to ten years after harvesting and regeneration treatments were applied from 1998 to 2007.

The nature of the seedbed in each coupe was related to the harvesting and regeneration treatment. Where high intensity burns were applied there was a higher proportion of burnt seedbed available than in coupes where low intensity burns were applied. The highest eucalypt seedling densities and fastest early growth rates occurred on the hottest burnt seedbeds. The lowest seedling densities occurred on unburnt and undisturbed seedbeds and the slowest early growth rates occurred on unburnt and compacted seedbeds. Treatments that created the most burnt seedbed had the highest eucalypt seedling densities and mean seedling growth rates.

The floristic response in any given coupe following the harvesting and burning disturbance was related to the pre-harvesting floristics and not to the silvicultural system. Rainforest species present in the understorey prior to harvesting were also present in the post-harvesting vegetation, albeit at lower levels. Sclerophyll dominated understoreys regenerated with a very similar species composition to that pre-harvesting. Damage to the edges of retained forest areas was minimal, except for the smallest
areas, which were prone to windthrow and were often burnt during the regeneration burn. Larger areas persisted intact throughout the harvesting and burning operations and for the first few years after those disturbances.

Of the silvicultural systems examined in this study, aggregated retention is considered the most promising alternative to clearfelling. High intensity burns as applied to clearfell burn and sow coups cannot be conducted in aggregated retention coups as they would probably burn the aggregates. The lower proportion of burnt seedbed resulting will, on average, lead to lower seedling density and growth rates, and may compromise longer term productivity compared to clearfelled and high-intensity-burnt coups. If aggregated retention is to be successfully applied, as measured by the density and height growth of the regeneration, finding ways of successfully and consistently burning such coups post-harvesting will be essential.

Keywords: Australia, *Eucalyptus obliqua*, regeneration, silvicultural systems, variable retention, seedbed.
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Publications arising from this thesis

Journal papers

Chapter 3 has been published as:

Chapter 7 has been published as part of the Old Forests New Management conference proceedings, a special issue of Forest Ecology and Management:

Related papers:


Poster papers


Conference presentations


Technical reports


Neyland, M.G. (2004). Seedling regeneration, growth and density of *Eucalyptus obliqua* following partial harvesting in the Warra silvicultural systems trial. 5. The second “clearfell, burn and sow with understorey islands” coupe, Warra 8H and a brief comparison with the first understorey island coupe Warra 8B. Technical Report No. 148, Cooperative Research Centre for Sustainable Production Forestry and Forestry Tasmania, Hobart.