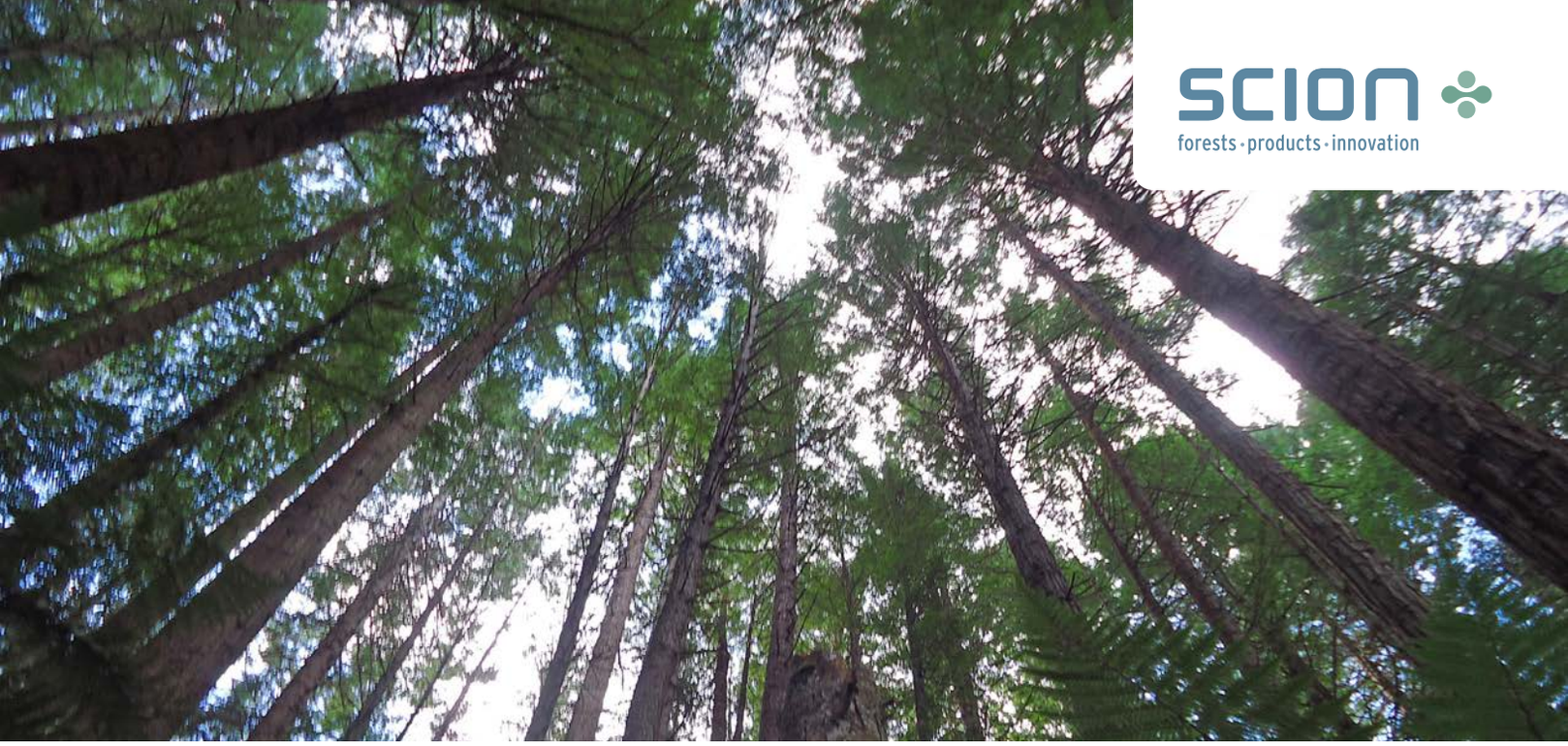


COMMERCIAL COAST REDWOOD

Durable or semi-durable timber for external use can be produced from coast redwood *(Sequoia sempervirens)*. Good growth in New Zealand, coupled with restrictions on supply from native Californian stands, has increased focus on locally grown coast redwood.

GROWING CONFIDENCE IN REDWOOD

There are currently over 6,300 hectares of coast redwood in New Zealand, the majority of which originates from select clones from various introductions.

First planted in the 1860s, large plantings in both the North and South Islands followed between 1920 and 1945, which mostly failed due to siting and weed control. This caused redwood to fall from favour, with planting continued only by a few enthusiasts. Interest in planting redwood was rekindled in the 1990s.

Once established, coast redwood stands are capable of yielding in excess of 45 m^3 per hectare per year on warmer sites. Our research, in conjunction with Future Forests Research Ltd (FFR), has focused on comparing genotypes, creating productivity growth models and silviculture practices.

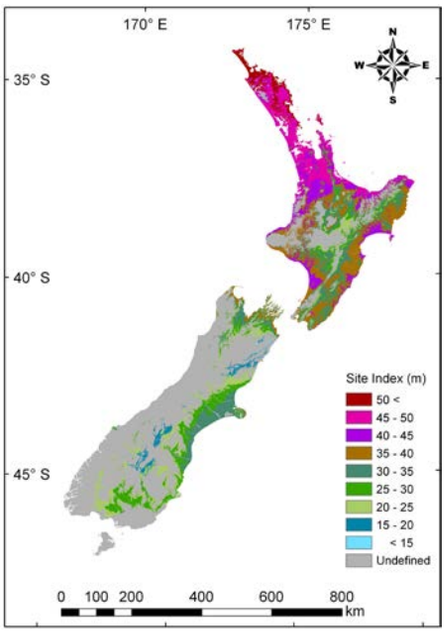
Genetics. Current redwood material came from a number of introductions, notably the Rotuehu provenance trial, the Kuser collection and some commercially imported collections. Benchmarking trials have been planted to compare the various clones.

A study on the Kuser clones across two sites has shown the growth and wood density of both the best and worst clones remain consistently so, giving us confidence that clonal selection and breeding programmes will be effective.

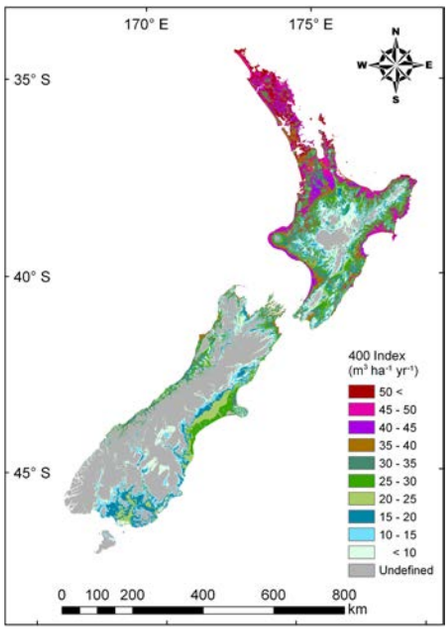
These trials are currently about 11 years of age and will be monitored for heartwood quality and quantity in due course. We also aim to develop a breeding population with redwood growing industry partners.

Site productivity and growth models. Understanding how site influences coast redwood productivity is important, as it is sensitive to frost, soil water, soil fertility and mycorrhizal associations.

A redwood growth model has been developed by industry and improved through FFR, along with an initial taper equation. A predicted productivity surface has been produced *(Figure 1)* but more data is needed before predictions and models can be used with confidence.



(a) site index



(b) 400 index

Figure 1: Coast redwood productivity surfaces as measured by (a) site index, and (b) the 400 index. (Palmer, D.J., Watt, M.S., Kimberley, M.O., and Dungey H.S. (2009) Predicting the spatial distribution of Sequoia sempervirens productivity in New Zealand.)

Silvicultural practices. Research in the last 20 years has improved our understanding of redwood establishment and management practices although a number of knowledge gaps remain.

Thinning: trials indicate coast redwood can grow vigorously at stockings greater than 1,000 stems/ha due to its high shade tolerance, and the growth rate of young stands will increase for several years after thining on productive sites. Due to costs, current commercial stockings are generally low (<700 stems/ha).

Pruning: necessary to maximise the value of merchantable volume at harvest. Trials show the key determinants of log value are small end diameter, quality of the pruning, heartwood content and branch status. On productive sites, heavy pruning does not have a long term impact on growth rate. The development of epicormic shoots after pruning is common and must be controlled by manual removal. This is most likely due to genetics and location rather than a species response.

The impacts of tree stocking and growth rate on wood quality are unknown. Further thinning trials are required, and the establishment of more pruning trials is a research priority.

Erosion mitigation and carbon. Root systems of vegetation contribute to slope stability. Coast redwood has wide-spreading lateral roots that can interlink and graft with roots from neighbouring trees. Its strongest trait in erosion mitigation is its ability to coppice after harvesting, retaining the interlinking root biomass. It is uncertain how much of this biomass remains alive after harvesting.

At present, there is limited understanding of how much redwoods contribute towards stablising erosion-prone slopes, and what contribution their biomass may have towards carbon sequestration.

Markets. Gaining the confidence of the marketplace for New Zealand-grown coast redwood, and overcoming the perception that it is a low quality product, are the key to its sucess. The timber market holds promise due to the potentially shorter rotation necessary to get a product comparable to Californian young-growth redwoods, and other substitute products such as western red cedar.

Research is ongoing to ensure the quality of New Zealand-grown redwood is well understood and marketed.

Wood quality. By selecting material for quality, density and durability, markets will become more disposed to embrace coast redwood timber products. Improving wood durability will be a priority. Tests have confirmed there is a high variability in durability due to the relatively young age (durability increases with age up to several hundred years) and genetics.

There are good prospects for genetic improvement, particularly if protocols are developed for NIR screening of progeny and validation in standard ground-contact field tests. Without the latter, durability ratings are unlikely to change for some time.

ABOUT SCION

Scion is a Crown Research Institute that specialises in research, science and technology development for the forestry, wood product and wood-derived materials and other biomaterial sectors. Scion's purpose is to create economic value and contribute to beneficial environmental and social outcomes for New Zealand.

We offer research and development services across the entire forestry value chain, including forest and climate change, forest health and biosecurity, rural fire research, forest management and tree improvement.

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