Forest Sciences Project Y09-2200:

Assessing ecosystem vulnerability to climate change from the tree- to stand- to landscape-level

The role of ecophysiological and phenological processes during regeneration in increasing tree species sensitivity to climate change in British Columbia, Canada and south-east Victoria, Australia

Air Pollution and Global Change (APGC) Symposium
'Plant Functioning in a Changing Global Environment'
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Tree species are most sensitive to changes in environmental conditions during the regeneration phase of their life cycle. Climate-driven changes in phenology and resource availability can affect the spatial and temporal breadth of a species regeneration niche which in turn could increase the sensitivity of species to projected climate change. To examine species sensitivity to climate change we investigated the influence of projected change on the ecophysiological and phenological mechanisms that govern the breadth of a species regeneration niche. We used the tree and climate assessment model, TACA, to examine species sensitivity within two regions of British Columbia, Canada and in southeast Victoria, Australia. Although, the species of British Columbia and Australia differ in many ways, similarity was found to exist in the mechanisms that influence regeneration success. The results from the three case studies suggest that similar responses may be exhibited by species within British Columbia and Victoria to projected climate change as warmer conditions allow for the expansion of species regeneration niches into higher elevations but warmer and drier conditions force their contraction from lower elevations and/ or to sites with more suitable edaphic conditions. The results also highlight that multiple factors exist that will cause these shifts which differ between species and species-groups. The findings highlight the need to initiate field trials of tree species across climatic gradients with detailed climatic and soil moisture monitoring to investigate regeneration response and the subsequent roles of competition and biotic factors in order to develop and/ or validate ecological models suitable for assessing species sensitivity.