

ABSTRACT

Dynamics of plant community flammability in Cockayne's Arthur's Pass Plots over nine decades

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Changes in plant community composition and traits can be used to infer changes in community-level flammability. In subalpine ecosystems, we expect higher community flammability in the decades after fire due to the dominance of grasses (fine fuels) and other high-flammability species like bracken and *Dracophyllum* spp. This would be followed by a decline in flammability, due to a shift to lower-flammability species. In this study, I aimed to determine the plant community flammability of different subalpine vegetation types over 86 years since fire. I used vegetation monitoring data of nine permanent transects established by Leonard Cockayne in 1932 at Arthur's Pass and remeasured four times until 2018. I explored how plant morphological and chemical traits predict community flammability in different vegetation types (grassland, shrubland, forest). Combined with existing trait and flammability data, I examined the interrelationships among community composition, shoot flammability (n = 67 species), plant morphology (n = 57) and leaf chemistry (n = 29). I show that community flammability was highly variable across the nine transects in the 86 years since fire. This contrasts with my original hypothesis. However, I show that flammability is strongly related to plant traits, such as leaf specific area and plant dead material. Therefore, I conclude that although post-fire vegetation dynamics are highly variable, changes in plant community flammability are predictable when considered in a trait framework.