Differential contribution of post-fire habitat legacies towards beta-diversity components of saproxylic beetles

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The attraction of Saproxylic beetles towards recently burned boreal forests is well known. Yet, explaining how variations in post-fire habitats drive beta-diversity patterns remains a central question for both ecology and conservation. A range of indices have been devised to measure different aspects of beta-diversity. We adopted a recently proposed framework that distinguishes the pure "spatial" turnover and nestedness components of beta-diversity, and examine how tree species, gradients in tree size, and burn severities contributed to beta-diversity of saproxylic beetles emerging from tree boles. We simultaneously model both the within- and between habitat classes variation of betadiversity. Our results show that the turnover and nestedness components of beta-diversity of saproxylic beetles are dependent upon different habitat attributes. The turnover component of beta-diversity was primarily explained by tree species, turnover within jack pine as well as between jack pine and black spruce being higher than within black spruce stands. Among tree size classes, turnover was higher among mid-sized trees (12-16cm and 16-20cm) than within smaller (8-12cm) or larger (20-24cm) trees and between them (8-12 vs. 20-24cm). However, the nestedness component of beta diversity was primarily driven by variation in tree size, with highest scores being obtained between the smallest and largest trees, and the lowest scores within and among the largest and mid-sized trees. The two beta diversity components also responded differently to burn severity.

Keywords: Beta diversity, boreal forest, forest fire, habitat gradients, species composition