

Title: Forest type influences ecosystem response to bark beetle disturbance

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Abstract:

Western North American forests are currently experiencing widespread outbreaks of multiple native bark beetle species. Though bark beetle disturbance initiates similar changes in canopy condition and forest structure, forests dominated by different tree species have unique biogeochemical properties, which may result in different ecosystem responses to this common disturbance. We compared changes in forest structure, litter-soil microclimate, and the nitrogen (N) cycle of lodgepole pine (*Pinus contorta*) and Douglas-fir (*Pseudotsuga menziesii*) forests following outbreaks of the mountain pine beetle (*Dendroctonus ponderosae*) and the Douglas-fir beetle (*Dendroctonus pseudotsugae*), respectively. Both disturbances reduced live stand basal area by >50% and initiated a pulse of litterfall, yet only in lodgepole pine did this alter litter-soil microclimate. In both forest types bark beetle disturbance increased the N content of needle litter, the total litter N pool size, and approximately doubled soil inorganic N pools and fluxes. In the canopy of both forest types, N pool size declined with beetle-killed basal area, but the N content of composite foliage in unattacked trees increased approximately 20%. However, only in lodgepole pine forests were increases in soil N positively related to the foliar N of current year needles. Our results suggest that beetle disturbance causes similar changes in litter and soil N cycling within both forest types, but has differing effects on litter-soil microclimate and the response of undisturbed vegetation to increased nutrient availability. These differences in ecosystem response to a similar disturbance likely result from differing pre-disturbance N capital, N-limitation status, and understory vegetation dynamics.

Key words: Disturbance; Rocky Mountains; Greater Yellowstone Ecosystem; *Pinus contorta*; *Pseudotsuga menziesii*; *Dendroctonus* bark beetles; nitrogen cycling

Topics: Forest Ecology; Disturbance

Oral presentation