



## Changes in type, cover and production of moss in a fire chronosequence of black spruce in Interior Alaska

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Mosses of boreal forests contribute significantly to ground fuel, soil thermal properties, and biogeochemical cycling of carbon and nutrients. Fire removes live mosses and all or a portion of the surface organic layers. To better characterize the type and production rates of various upland mosses and the relationship between moss cover and organic soil thickness as boreal forests recover, we measured annual net primary production (NPP) in a range of stand ages (fire chronosequence) in well drained (dry) and moderately well drained (mesic) black spruce/feathermoss ecosystems. We measured temperature, moisture, and light to examine post-fire effects of moss regrowth. We found five dominant mosses in stand ages ranging from 1 to 150 years. The type of moss varied greatly over the fire cycle, with *Ceratodon purpurea* dominating the surface in the earliest years after a fire, *Aulacomium palustre* and *Polytrichum spp.* dominating the transition stages at the mesic and dry chronosequences, respectively, and *Hylocomium splendens* dominating the oldest, mature sites. *Polytrichum spp.* was present at all stand ages and was one of the most productive moss; *Rhytidium rugosum* was the least productive moss. Mesic sites had greater diversity of moss species and higher production (NPP) than dry sites. Relationships among moss cover, organic soil thickness, surface temperature, and stand age suggest that mosses and the soil organic layers that they create may have a summer cooling effect, which has important implications for post-burn feedbacks between fire severity and climate. A simple linear model predicted surface temperatures that were  $\sim 0.5^{\circ}$  C cooler for every centimeter depth of organic soil between May and September. Dynamic models could be developed to explicitly incorporate data such as organic soil thickness, ground-level shading, or percent moss cover to improve predictive models for post-fire recovery of black spruce/feathermoss stands in Alaska.