Despite having the same ecological community, the wetter soils in the more poorly drained lowland location may provide a mechanism of resilience to continued disturbance events. A key unknown is if continued accrual of disturbances at frequencies higher than historic norms will eventually overwhelm even the more resilient topographic positions, “homogenizing” previously variable locations.

Fires are one of the most significant drivers of ecosystem change; on average 464 Mha burn each year (Randerson et al. 2012, Forkel et al. 2019), though the loss is not permanent if the forest recovers. Fire is the primary disturbance in boreal systems (Kurkowski et al. 2008), driving an overall loss in forest cover second only to deforestation in the tropics in terms of area (Hansen et al. 2013). Globally, there is a strong expectation for increased wildfires, and subsequent concern about ecosystem viability, in Europe, Africa, and North America (IPCC 2014).

Under shortening fire intervals, black spruce self-replacement may be further disfavored by the interactive effect of soil consumption (a metric of burn severity) and deciduous seed characteristics (Brown and Johnstone 2012, Johnstone and Chapin 2006, Johnstone et al. 2009).

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This hypothesis relies on the assumption that continued short-interval fires will erode the theorized resilience mechanism of wetter, poorly drained lowland topographies.