

**Spatio-temporal variability in boreal forest disturbance regimes:
insights from the Very, Very Late Holocene** Andrea H. Lloyd

Although disturbance is widely recognized as a driver of vegetation and ecosystem properties in the interior boreal forest, the long-term dynamics of disturbance regimes remain very poorly known. Fire is ubiquitous in the boreal forest: the long-term presence of fire has been confirmed by paleoecological research at the boreal forest's southern margins on the Kenai Peninsula (Devolder 1999, Lynch et al. In press), on the floodplain (Mann et al. 1995, Fastie unpublished data), in the uplands (Mann and Plug 1999, Fastie et al. In press), and at treeline (Fastie and Lloyd, unpublished data). Estimates of fire frequency are still sufficiently variable *within* a particular component of the boreal forest, however, that no clear patterns emerge in how fire regimes vary among components (e.g., floodplain versus upland). Reconstructions of fire history from fire-scarred trees (Fastie et al. In press; Figure 1) and sediment charcoal (Lynch et al. In press) suggest that fire frequency in upland forests is approximately 200 years. These reconstructions also indicate that the arrival of gold miners was accompanied by an increase in the number of fires, and thus that the boreal forest structure in many areas of Alaska is the product of a human-modified fire regime.

Future and ongoing research is concentrating on investigating the causes and consequences of spatial variation in fire regime. In the Brooks Range, there is some evidence that the recruitment of black spruce and the competitive balance between black and white spruce may depend on fire frequency. White spruce appears to be more successful than black spruce at recruiting into unburned stands, and thus black spruce is highly under-represented in young age classes in stands that have not burned for 100 years (A. Wilson, unpublished data; Figure 2). In upcoming field seasons, we will be developing fire histories and records of species composition from tree rings and from lake sediment charcoal, and will use these to explore the relationship between fire frequency and species composition at the northern limit of the boreal forest.



Figure 1. Map of 20th century fires in the Caribou-Poker Creek Research Watershed (CPCRW). (A) The P6 watershed and (B) C4 watershed. Letters indicate location of sampling sites; dates indicate stand initiation dates. From Fastie et al. (In press).

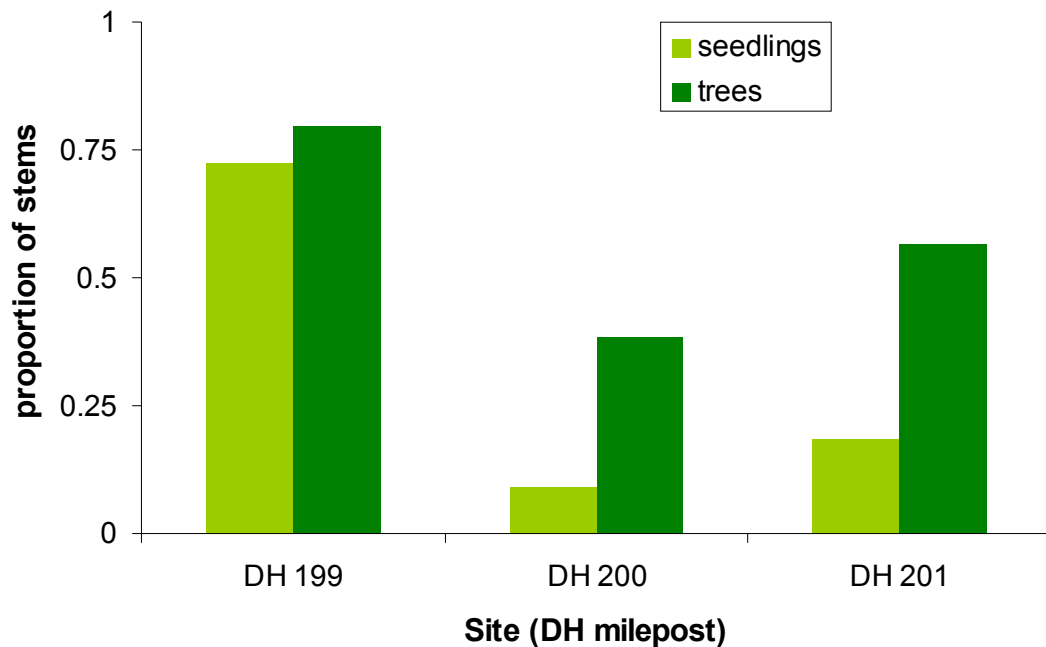


Figure 2. Relative abundance of black spruce in two size classes (seedlings= ≤ 1.3 m tall; trees = > 1.3 m tall) at three sites along the Dalton Highway in the Brooks Range (A. Wilson, unpublished data)

References

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