Method

Developed as an alternative to the more time- and resource-intensive terrestrial laser scanning approach, 3D sampling will be applied to each plot in both sites to record presence/absence occupied volume for each fuel type present in the plot. Fuel type categories are system-specific, and for Interior Alaska, may include 1-10-hour fuels, 100-1000-hour fuels, general spruce litter, deciduous litter, arctic grass and other sedges, shrubs, forbs and mosses.

An additional strength to this approach is that measurements will not be tied to specific plots, and instead will be stand-level metrics. This makes them more generalizable then stem maps, an alternative approach often used to evaluate fuel distributions.

#### Fire behavior modeling

This chapter takes advantage of existing collaboration with a team of fire modelers at Colorado State University. My specific role in this collaboration is to lead the field-based investigation of fuel characteristics, providing both data and insight into the ecological dynamics of fuel on the boreal landscape. Working with Dr. Chad Hoffman and others at the Western Forest Fire Research Center, we intend to apply these insights produced from this chapter into a physics-based computational modelling approach which will enable us to directly investigate the dynamics of fire-vegetation feedbacks in the boreal.

This chapter will use the HIGRAD/FIRETEC system, a combination of physics-based 3-D fuel models, to produce estimates of fire danger and initial surface fire behavior based on empirically estimated spatial fuel distributions. The combination of HIGRAD and FIRETEC models represents interactions between fire, fuel and atmosphere on a landscape scale, allowing specific investigation of how fire may respond to stand-level or even tree-level shifts in canopy arrangement or understory fuel loads (Koo et al. 2012).