~~Fire severity in most systems is often measured as a metric of canopy or overstory mortality; however, even moderate severity fires in the boreal can cause full canopy mortality (Kasischke et al. 2006). Substrate consumption, or the amount of soil consumed during fire, is often used as a more sensitive alternative (i.e., Turetsky et al. 2011). Not only does organic layer consumption as a metric of burn severity encompass higher severity events, it also captures potential resilience within topographic contexts that may mediate or negate the effects of fire. Specifically, poor drainage and generally higher soil moisture characteristic of lowland topographies indicates two fires in different topographic positions may produce different levels of organic soil consumption, culminating in ultimately different fire severity in terms of effects. Here, we use the term “cumulative severity” to indicate not the severity of individual events, but the difference in severity observed more generally between topographic position due to underlying drainage conditions.~~

~~Burn severity is primarily measured through organic layer consumption in Alaska (Keeley 2009), and poorly drained soils in lowland topographies may mediate initial severity by preventing full combustion.~~

Here, we use soil organic layer depth as a proxy for severity and infer accordingly that the lowland site experienced milder burn severity since less soil was consumed during each fire (Hayes and Buma 2021).

Methods

Regeneration strategy was distinguished based on rooting style: we categorized individual stems as sexual reproduction and treated clumps of stems as an initial single sexual reproduction event, while each stem thereafter we recorded as asexual reproduction. We determined the relative abundance of each strategy by dividing the abundance of a given trait by the total number of stems on a plot.

One current challenge in the modeling approach is the possible collinearity between the independent variables of number of fires and organic layer depth. A solution to this problem would be to collect additional species-level data in the lowland site. Lowland plots have an identical number of fires, but their organic layer depths are known to be different (I.e., Fig. 7B in Chapter 1). Including species-level data from the lowland site would introduce variability, potentially resolving any issues of collinearity. Furthermore, including the lowland site in the analysis would help resolve any potential problems related to small sampling size.

Furthermore, if additional species-level data is collected from the lowland site, comparisons can be made between upland and lowland plots.

~~To investigate the prevalence of different regeneration strategies in post-fire communities across the reburn sequence, we intend to use a permutation test to create a null distribution in which the relative abundance of asexual reproducers is distributed randomly across reburn history and topographic position. This approach will allow us to quantify the difference between the null distribution of randomly distributed asexual reproducers and the observed distribution of asexual reproducers across reburn history, essentially comparing between the mean across all samples, and the means of each reburn history (0, 1, 2 and 3). A p-value of mean difference between the pooled sampled mean and means of each reburn category will be calculating using a two-tailed t-test.~~ [Not doing anymore, need to revise]

#### Regeneration strategies

Presence of asexual reproducers appears to increase across increasing reburns (Fig. 2).

Chart, scatter chart

Description automatically generated

**Fig. 2. Relative abundance of regeneration strategies across reburn history.**

## Proposed Timeline

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Summer 2018-19** | | **Fall 2018-19** | | | | | **Spring 2020** | | | | |
| June | July | Aug | Sept | Oct | Nov | Dec | Jan | Feb | March | April | May |
| Field Sampling | | Literature Review | | | | | Literature Review / Exploratory Data Analysis | | | | |
| Data entry / processing | | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Summer 2020** | | **Fall 2020** | | | | | **Spring 2021** | | | | |
| June | July | Aug | Sept | Oct | Nov | Dec | Jan | Feb | March | April | May |
| Comps | Data Analysis: conduct for Upland site | | | | | | Writing: draft introduction, methods, upland results | | | | |