Establishment and growth of trees encroaching into a boreal peatland in the central Adirondacks, New York State

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Introduction

- Boreal peatlands are of high biodiversity value, serve as buffers to flood events, and are major carbon sinks.
- Tree encroachment into peatland ecosystems is a leading driver of biodiversity loss, and may also lead to losses of carbon stores and ecosystem function.
- Boreal peatlands located at their southern range limits may be highly susceptible to climate warming.
- Through the use of dendrochronology, we assessed establishment dates and annual growth of four tree species (*Picea mariana* (black spruce), *Larix laricina* (tamarack), *Abies balsamea* (balsam fir), and *Thuja occidentalis* (eastern white cedar)), within the Shingle Shanty Preserve (SSP) boreal peatland complex in the central Adirondacks of New York State (Fig. 1).

Objectives

- To determine the timing of tree encroachment into different peatland community types.
- To understand growth trends of encroaching tree species.
- We hypothesized that there would be an increase in encroachment and growth of trees over the past century due to anthropogenic warming, and increased nitrogen deposition.

Methods

- Increment cores were taken from 25 balsam fir, 17 tamarack, 64 black spruce, and 17 eastern white cedar trees from SSFP in 2011 (Fig. 1).
- Cores were mounted and sanded (Fig. 2) and annual growth rings were measured using a Velmax measuring bench and MeasureJ2X software.
- Measured cores were crossdated and establishment dates were determined for each tree (Fig. 3).
- To determine climatic effects on growth, annual ring widths were detrended and will be modelled against a suite of regional climate and deposition data.

Conclusion

- Tree encroachment into the peatland complex increased steadily over the first half of the 20th century, peaking in the 1950’s, and was predominately black spruce.
- Since the 1950’s black spruce establishment has fallen significantly, while balsam fir and tamarack have increased establishment rates.
- Variation in growth patterns will be further assessed for relationships with climate and deposition data.
- Patterns observed may provide insight into ecosystem response to anthropogenic warming and deposition.

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