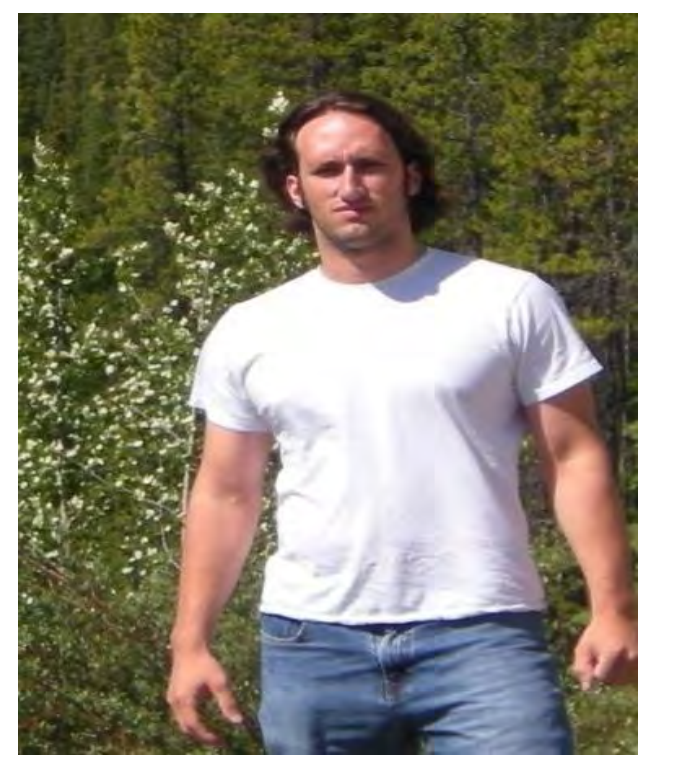


LIMITED MIGRATION: WILL SUGAR MAPLE TAP OUT TO CLIMATE CHANGE?

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Introduction

An increase in temperature of 5°C has been projected by the end of the 21st century (IPCC 2012). As a result, an increasing concern surrounds the ability for species to adapt or migrate in the face of certain climate change.

Sugar Maple (*Acer saccharum* Marshall.) is a wide spread dominant tree species found across ~12.4 million Ha⁻¹ of NE North American, and provides a variety of end-uses; high quality timber and veneers to maple syrup; which supports an industry with sales of upwards of \$100 million annually (Allen 1999). However, while possessing very specific requirements (extended stratification period) to break seed dormancy, the natural regeneration of sugar maple could become significantly impaired.

Essentially, the project will focus on identifying the variables (abiotic and biotic) which limit and/or facilitate the successful germination and subsequent survival of sugar maple.

Hypothesis

Seed origin affects germination rates due to the species' local adaptation to temperature.

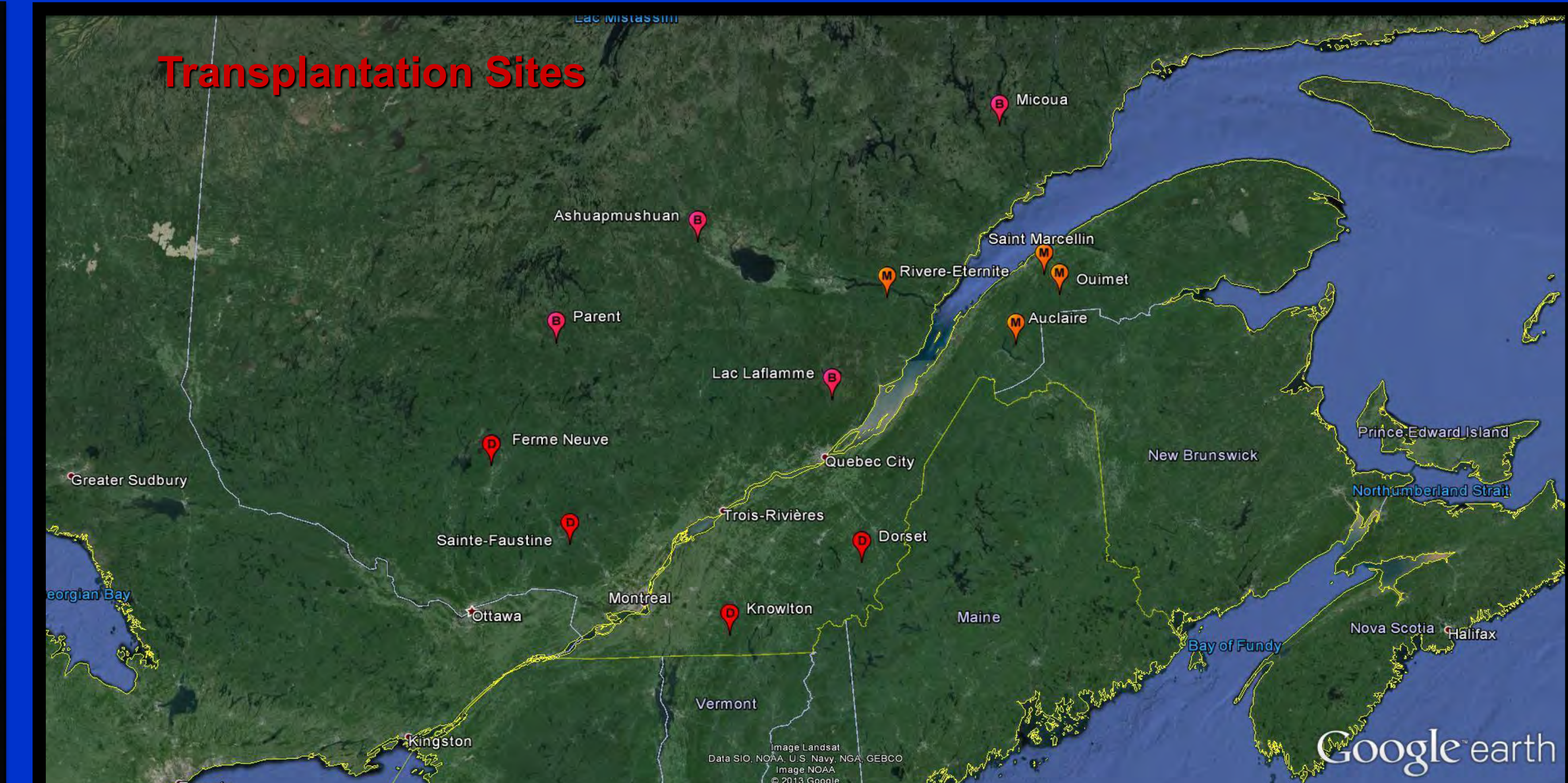
Research Objectives

Transplantation Study

- Determine if a link exists between seed source and germination potential:
 - Within present range (Deciduous)
 - At present range limit (Transition-Deciduous/Boreal)
 - Beyond present range (Boreal)
- Identify the a link between germination and abiotic/biotic factors

Laboratory Study

- Determine the fundamental stratification temperature for sugar maple
- Identify the possible link between germination and seed source location.
- Investigate the impact(s) of + and - temperature shocking on seed germination.

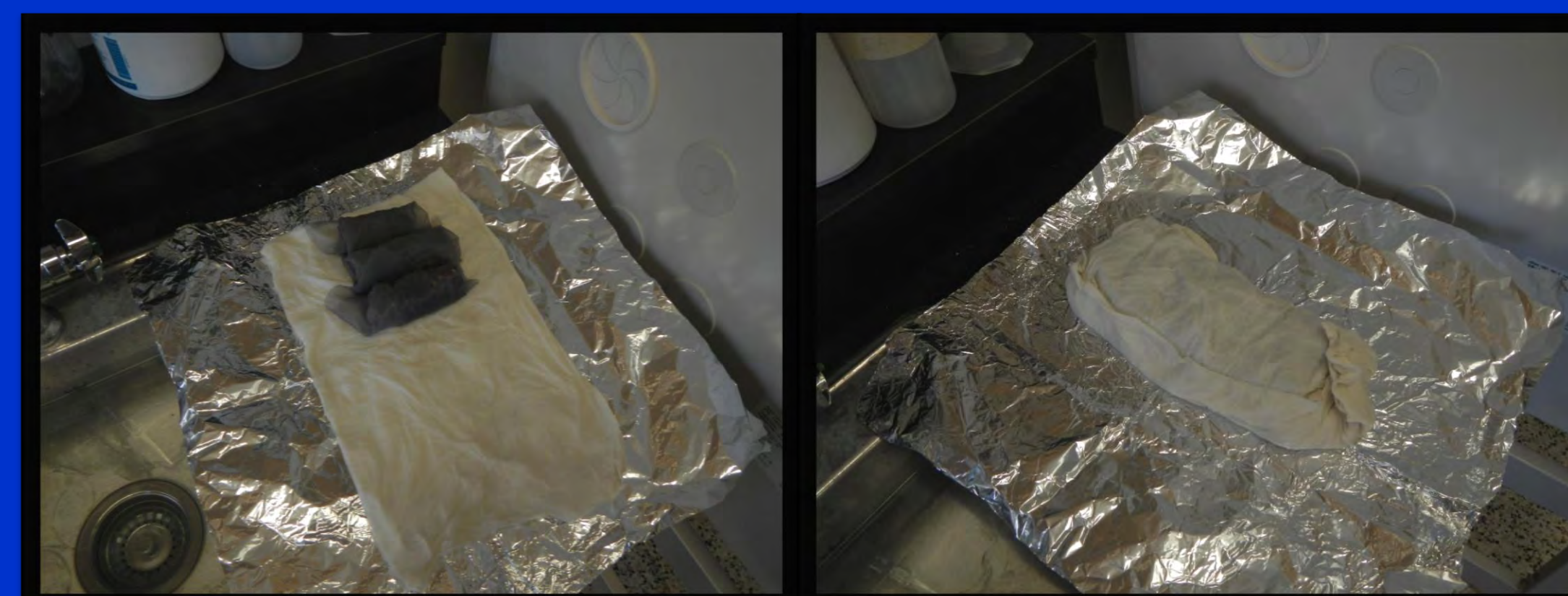
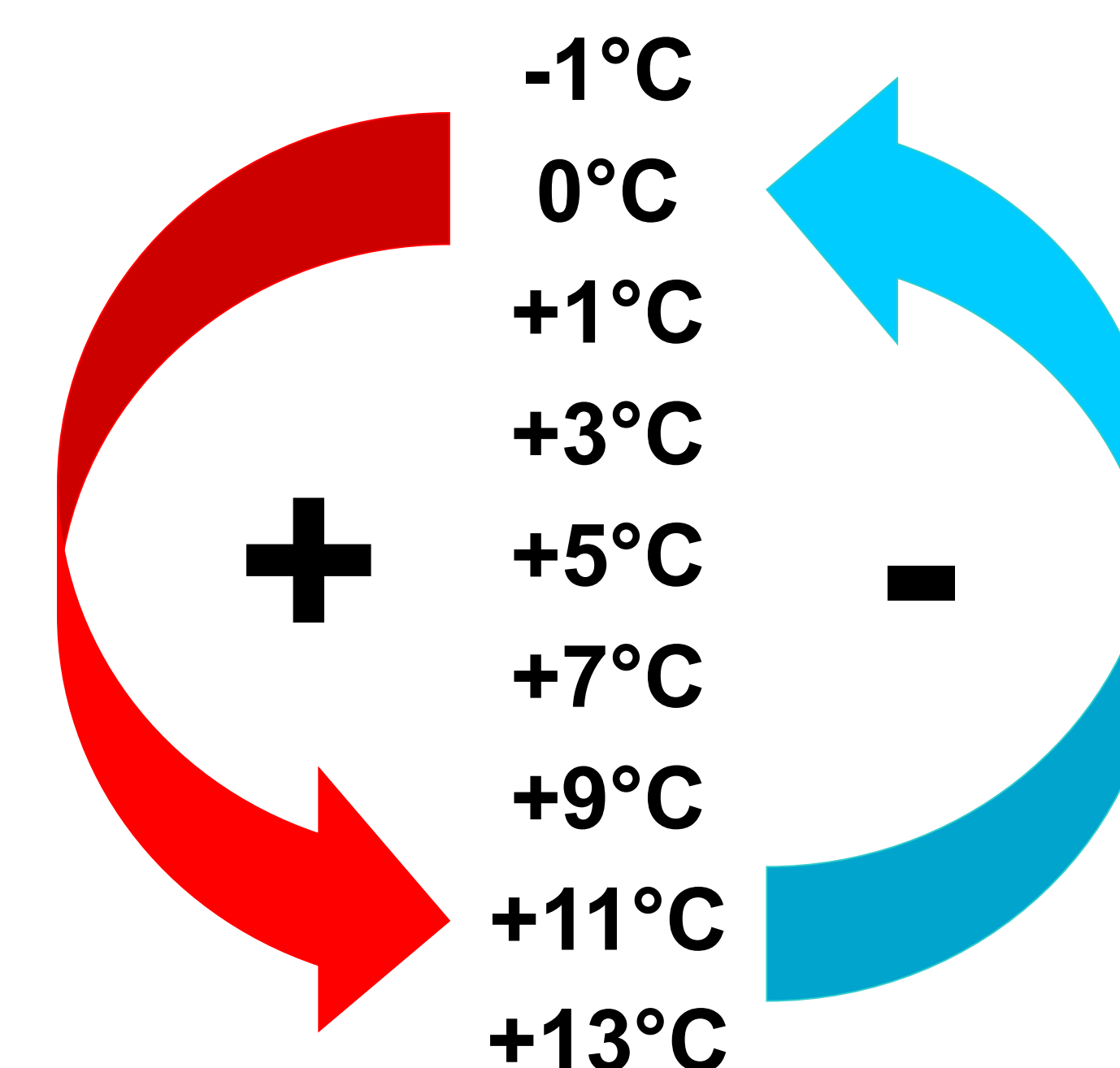


Lab

- 28,700 Total Seeds Used
- 7 Seed Sources x 42 Temperature Treatments
- 100 Seeds x Seed Origin x Temperature
- Weekly Germination Measurements (Up to 90d)



Stratification Temperatures



Field

- 32,400 Total Seeds Used
- 12 Sites (4x Boreal, 4x Transition, 4x Deciduous)
- 6 seed sources x 3 replicates (216 Total Plots)
- 150 seeds/Plot
- Protection from Seed Predation – Cages
- Scarified Forest Floor
- Temperature and Light Monitored (Hobo Sensors)
- First Year Germination and Survival



Early Predictions

- Seed germination will be affected by both seed origin and temperature.
- Northern Seed Sources will experience higher germination success outside present species range, where southern sources will have the poorest success.