Winter Climate Change in the Northern Forest: Scientific Synthesis and Management Implications

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This project is using scientific synthesis informed by stakeholder engagement to determine how winter climate change impacts winter ecology and biogeochemistry, and how this changing winter landscape affects Northern Forest communities.

Scientific Synthesis

Figure 1. Common research themes from review of literature on winter and winter climate change across Northeastern North America

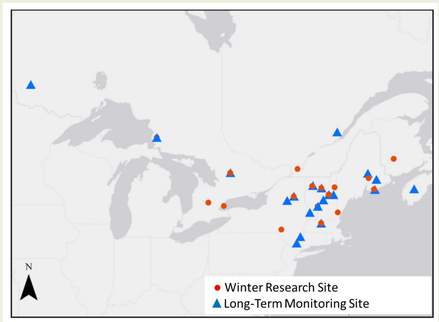


Figure 2. Location of winter research and long-term monitoring sites. Other work has occurred at multiple sites or has been region-wide.

Emerging Consensus and New Questions

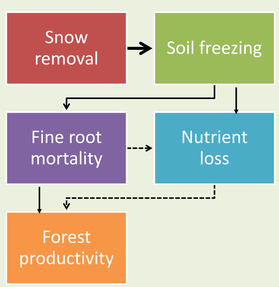


Figure 3. Example of emerging scientific consensus for snow removal impacts.

How far have we come in understanding winter biogeochemistry and ecology? What questions do we still have to answer? How do these questions fit with stakeholder concerns?

What is winter?

Winter is a period of sustained **low temperatures** and **snow accumulation** that together regulate **biogeochemical** processes and the **ecosystem services** they provide, both during winter and throughout the rest of the year.

How is winter changing?

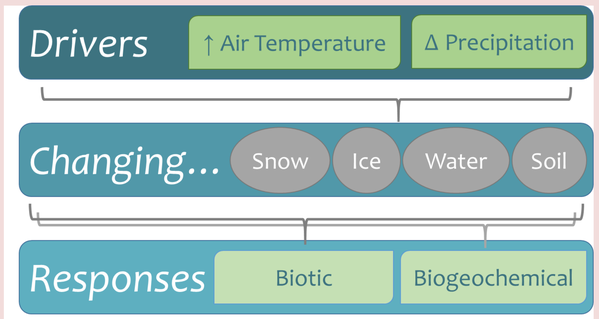


Figure 4. Conceptual model of winter climate change drivers and impacts.

Integrative framework to understand winter climate change impacts

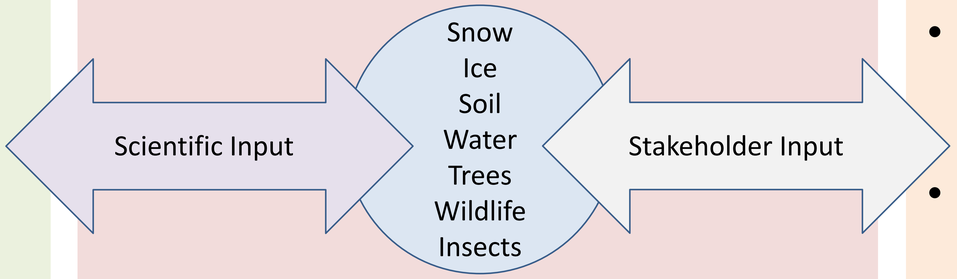


Figure 5. Integration of scientific and stakeholder perspectives

Stakeholder Engagement

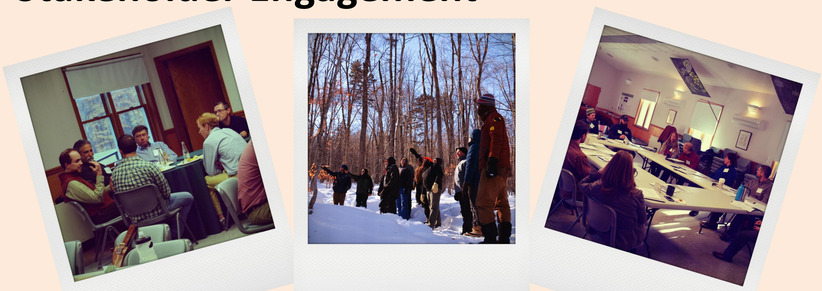
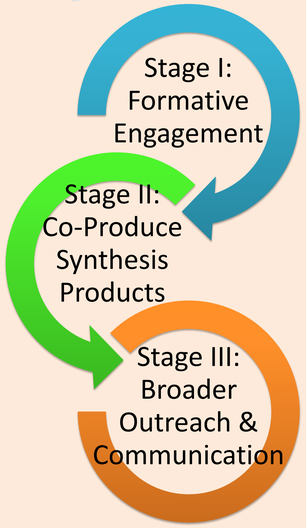


Figure 6. Roundtable discussions with stakeholder groups.



Our process involves iterative roundtable dialogues and one-on-one interviews to identify themes and questions that cross-cut the interests, needs, and knowledge of scientists and Northern Forest stakeholder and practitioner groups. We are developing partnerships with existing stakeholder networks for co-producing and disseminating our results.

We are hearing:

- What are the trends? What are changes in seasonality and natural cycles?
- What is happening with wildlife? Wildlife is a big driver for land management decision making.
- Important to connect what we know to what actions people can take: e.g., examples of innovative adaptations.