

Still Better Than A Warehouse: A SPRUCE Operations Retrospective

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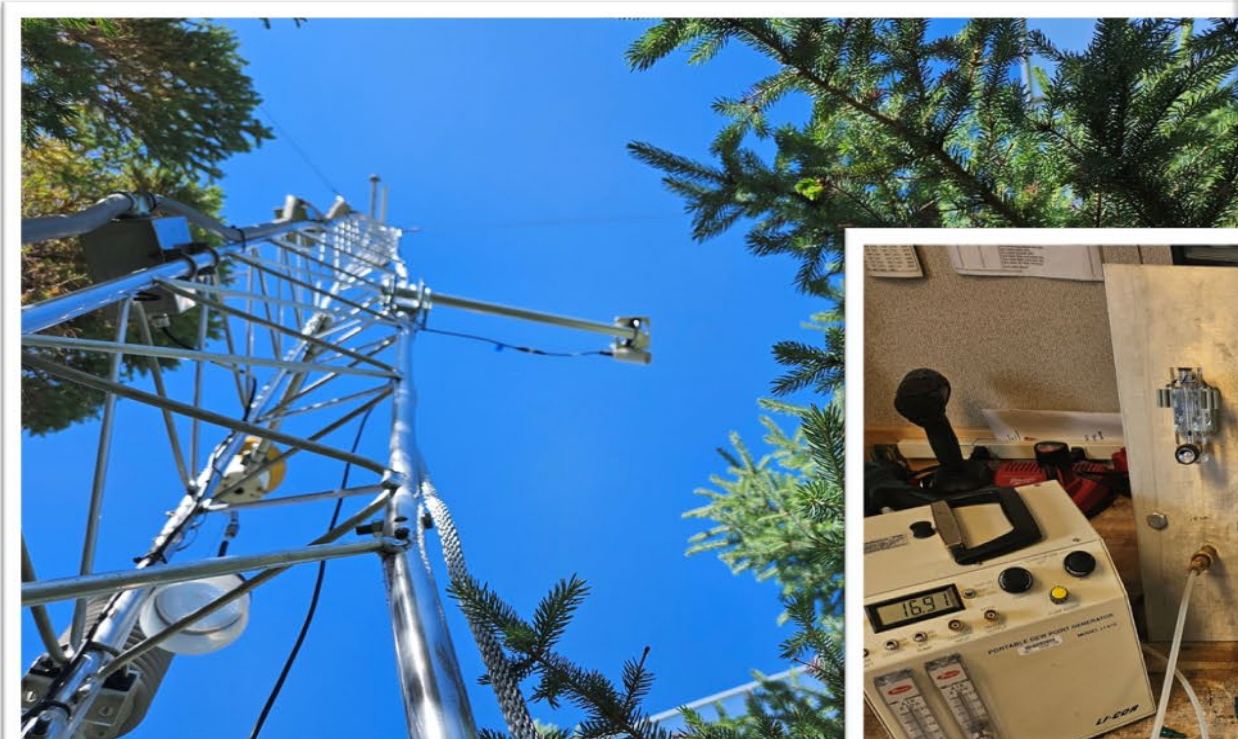
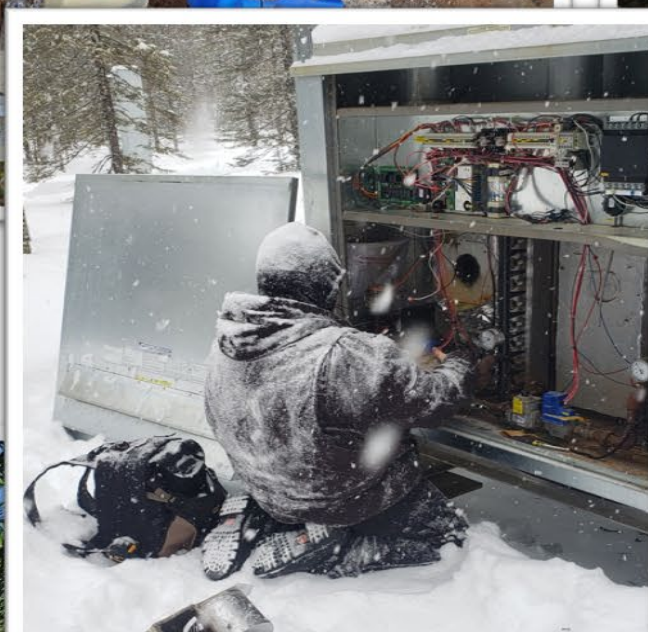
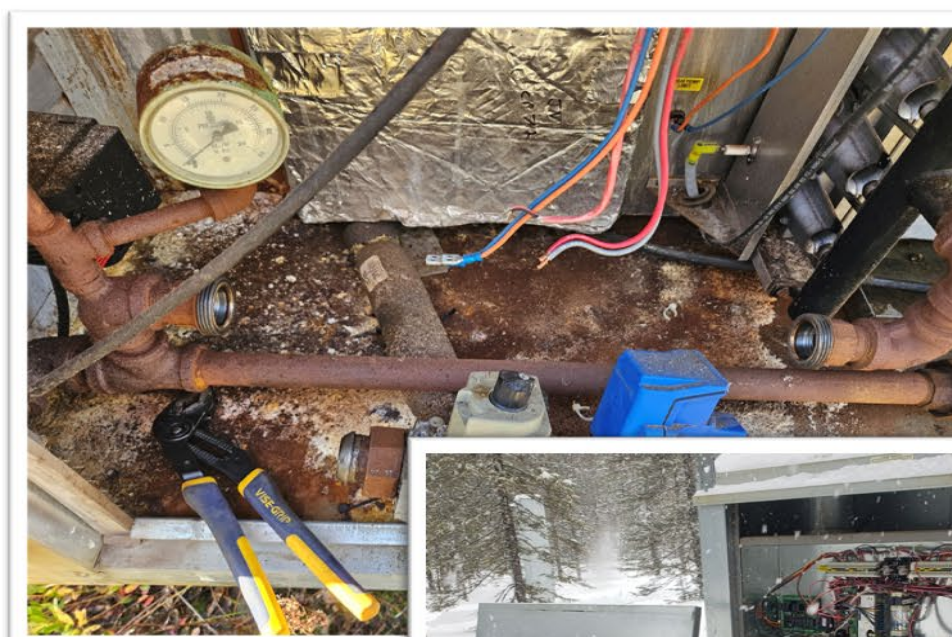
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Repairs and Maintenance

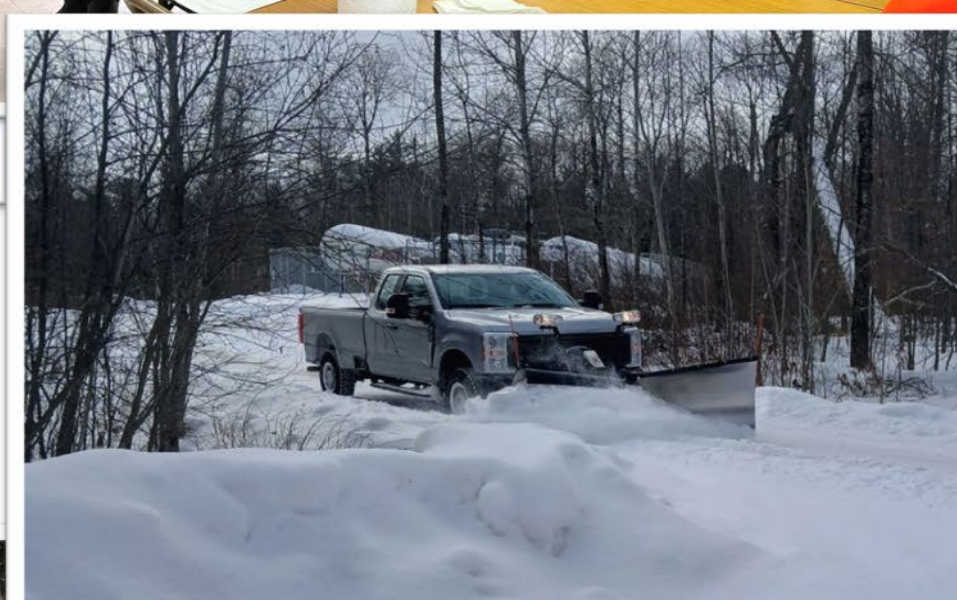
HVAC and Electrical

- Failed Valves
- Broken Induction Fans
- Ice in Everything



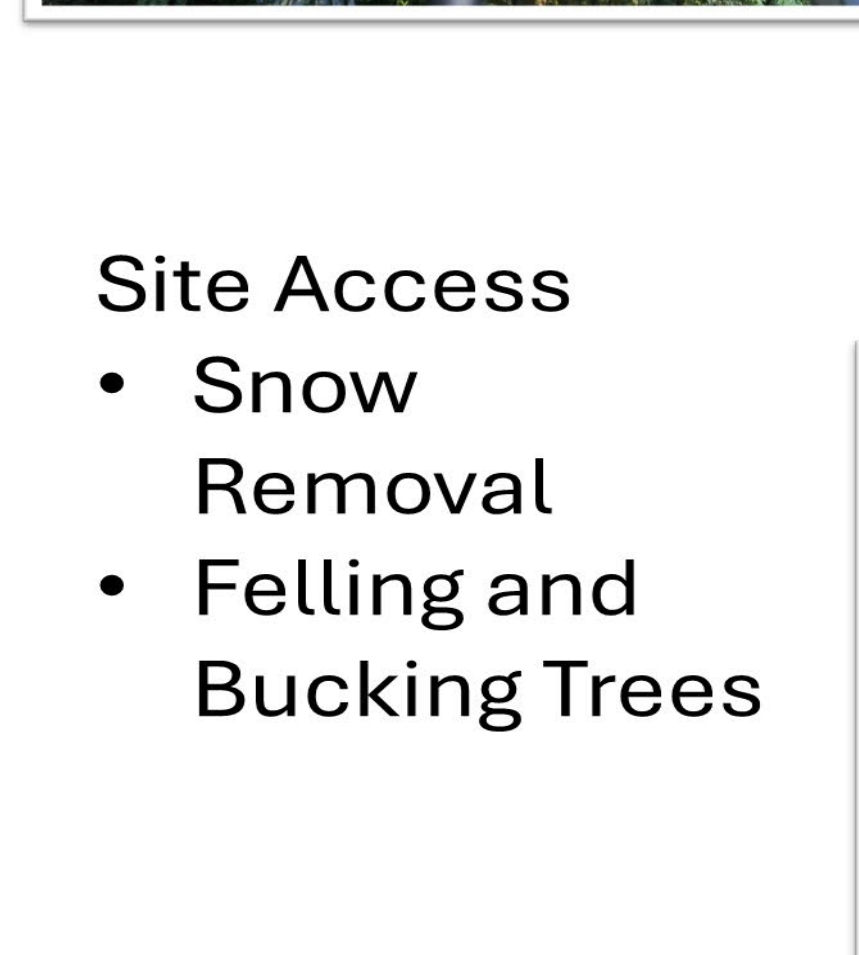
Sensors

- Calibrations
- Installation
- Diagnosis
- Replacement



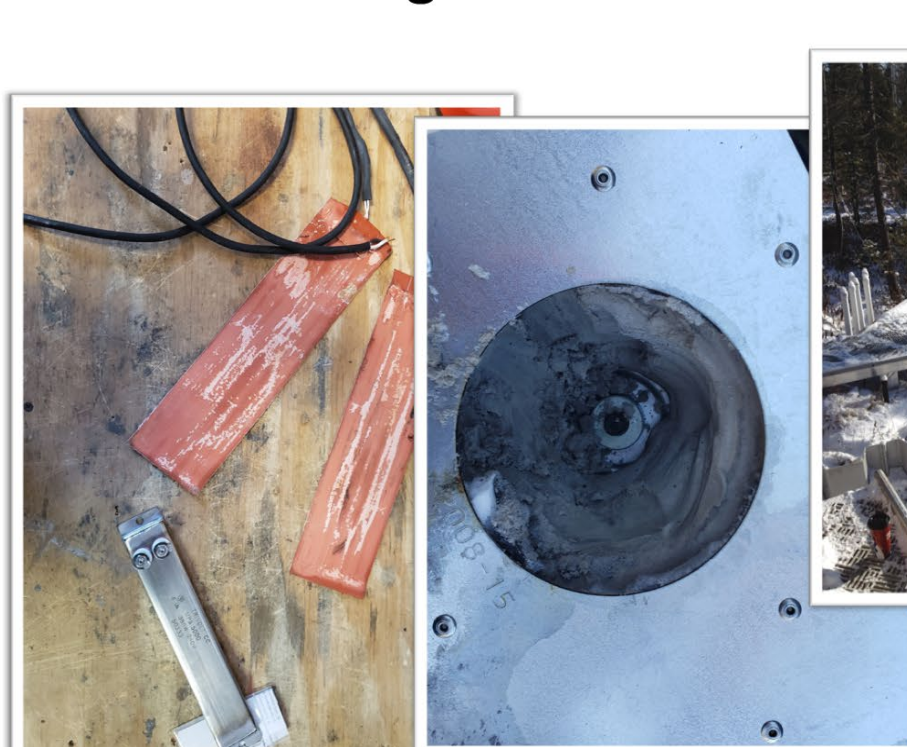
Site Access

- Snow Removal
- Felling and Bucking Trees



Modifications

MAU Freezing Issue



Corral Sealing

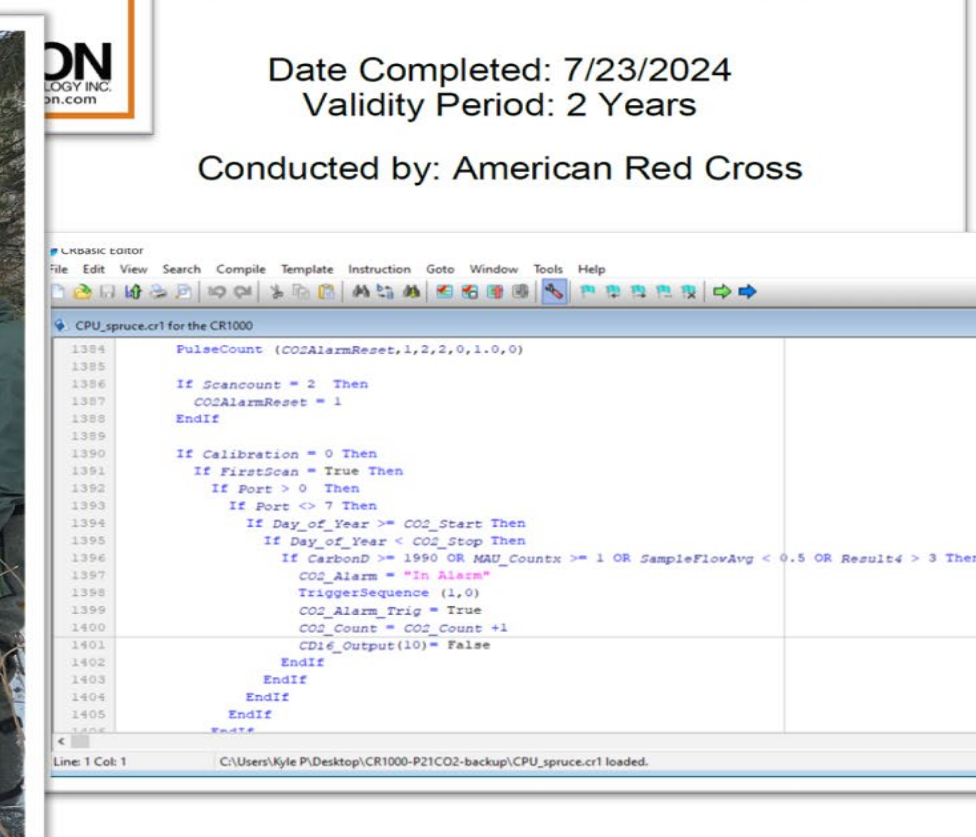
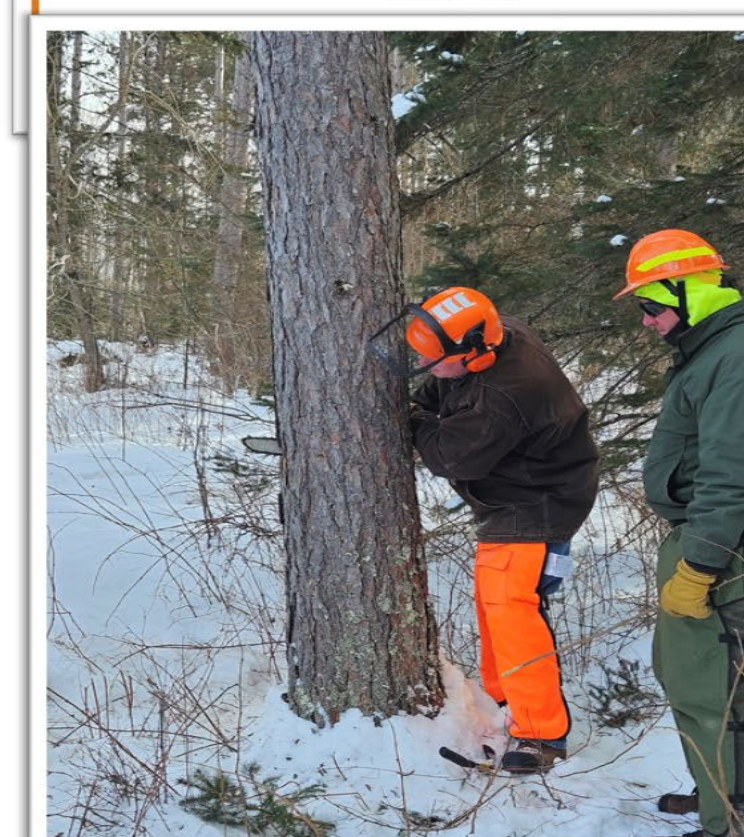
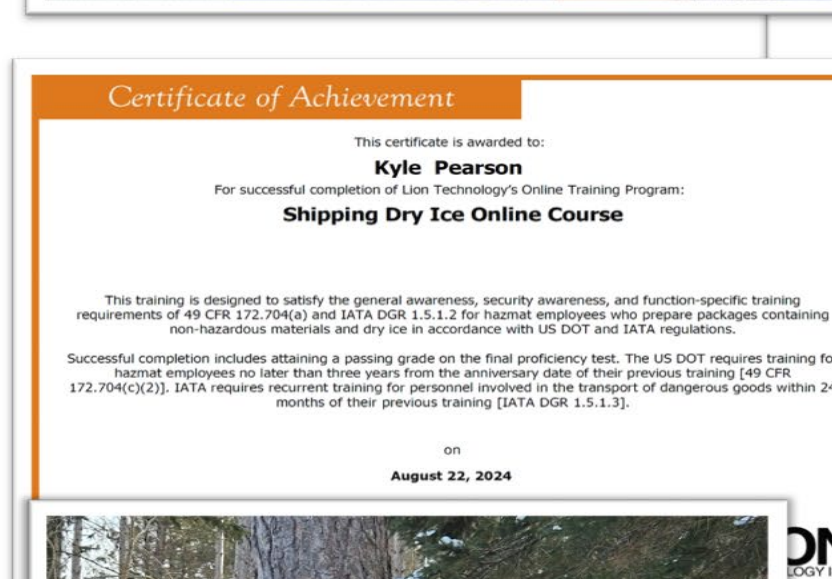
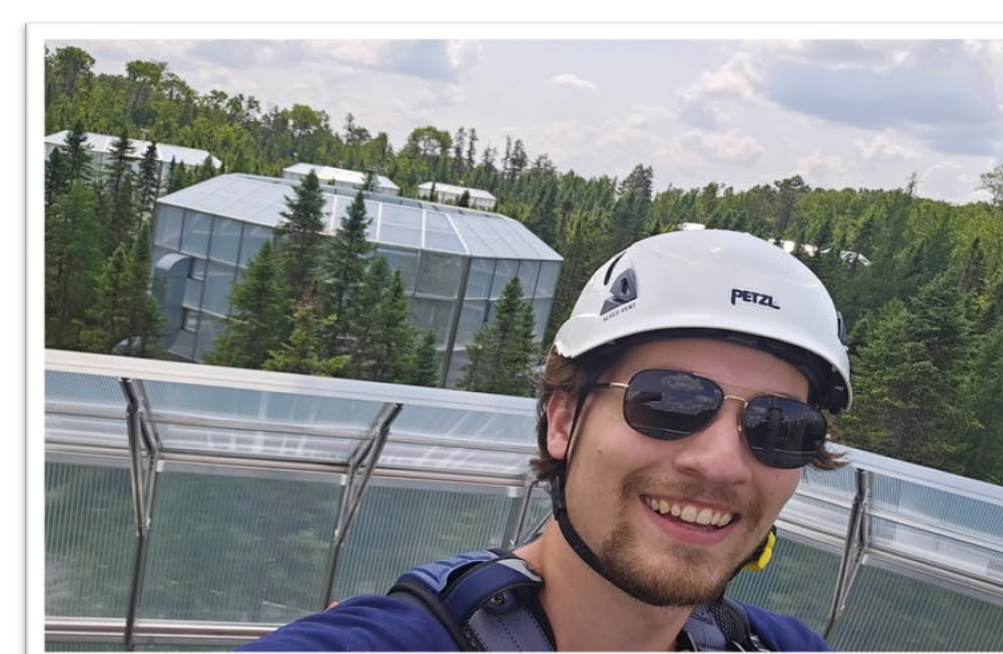


Analyzer Enclosures

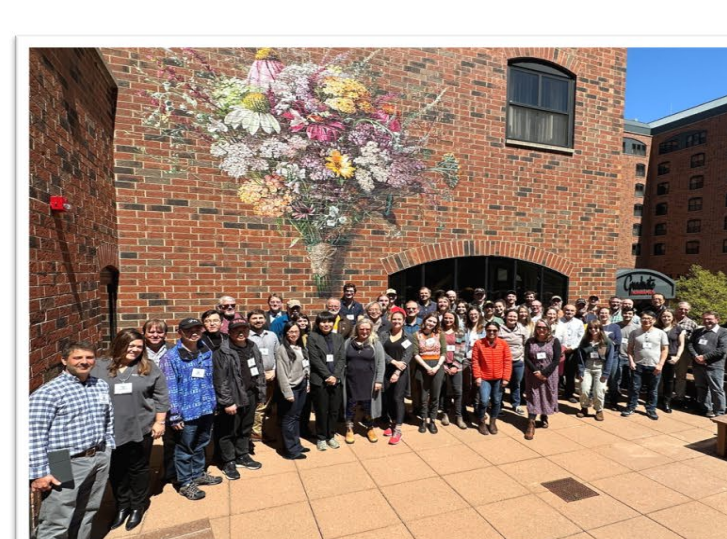


Trainings

- Qualified Electrical Worker
- Lock/Tag/Verify
- National Association of Tower Erectors
- CPR/First Aid
- Dry Ice Shipping
- Chainsaw
- Campbell Scientific CRBasic



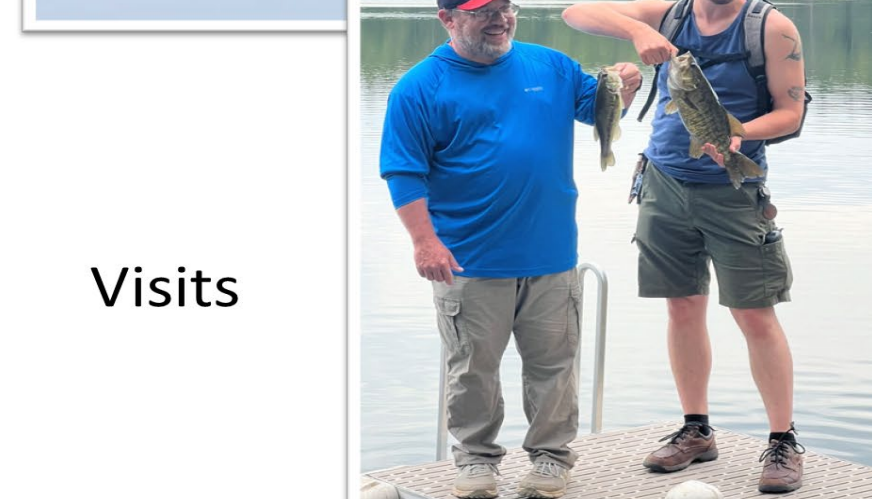
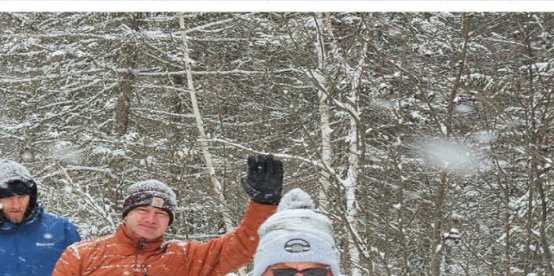
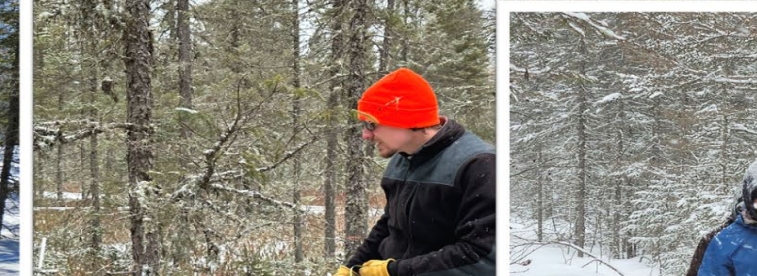
Activities



Field Campaigns



Meetings and Conferences



Visits



Materials (through FY 2024)

- **3,051,805 kilograms of liquid CO₂**
 - There's about 2.2 grams of CO₂ in a can of Coke
- **2,616,580 gallons of liquid propane gas**
 - A typical gas grill might last 18-20 hrs on a 4.6gal tank
- **9,375,278 kWh of electricity**
 - The average US home uses 10,500 kWh/year
- **76 LP line valves replaced**
 - That's about once every 43 days
- **78 induction fans replaced**
 - The process takes about half an hour (if you're good)
- **576 MAU filters replaced**
 - Filters are good for 3 years but require annual washing
- **More than 800 hours spent on snow removal**

Comments, Lessons, and Acknowledgements

- Don't tighten anything until you can tighten everything.
- When you're plowing snow, bring both trucks.
- Good subcontractors support good technicians support good scientists produce good science.
- The first day of the year you spot a deer fly is a dark day indeed.
- It breaks outside in the winter, and inside the warmest chamber in the middle of summer.
- "If God says there ought to be 6 inches of snow on the roads, I don't know who I am to disagree anymore."
- Photograph credits: W. Robert Nettles, Kyle Pearson, Mark Guillems, Brandy Maki, Paul Hanson, Misha Krassovski, Verity Salmon, and Joshua Birkebak