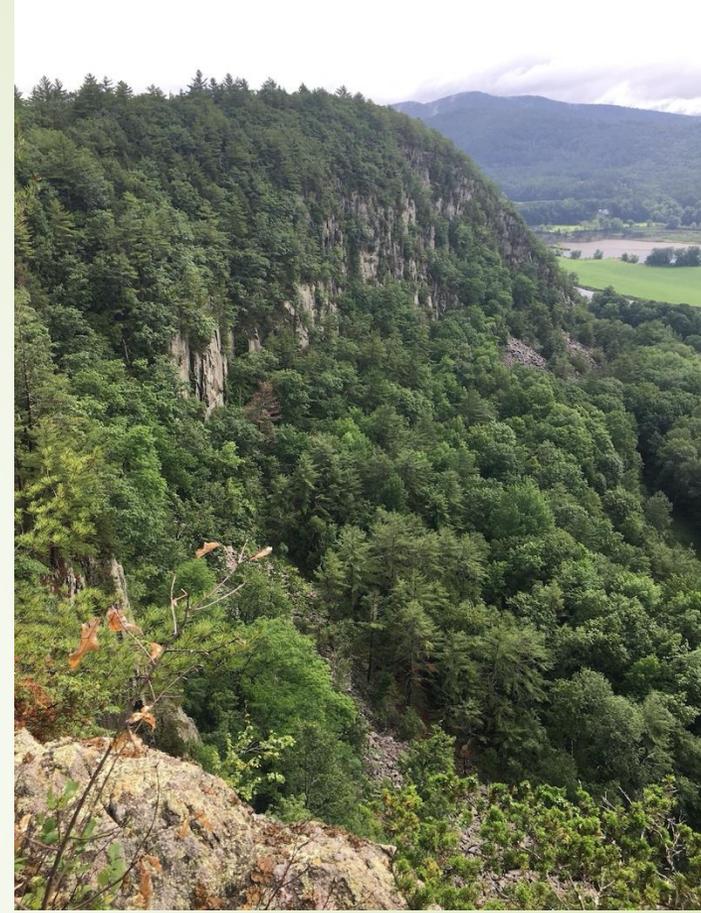


Red Cedar Woodlands in Vermont

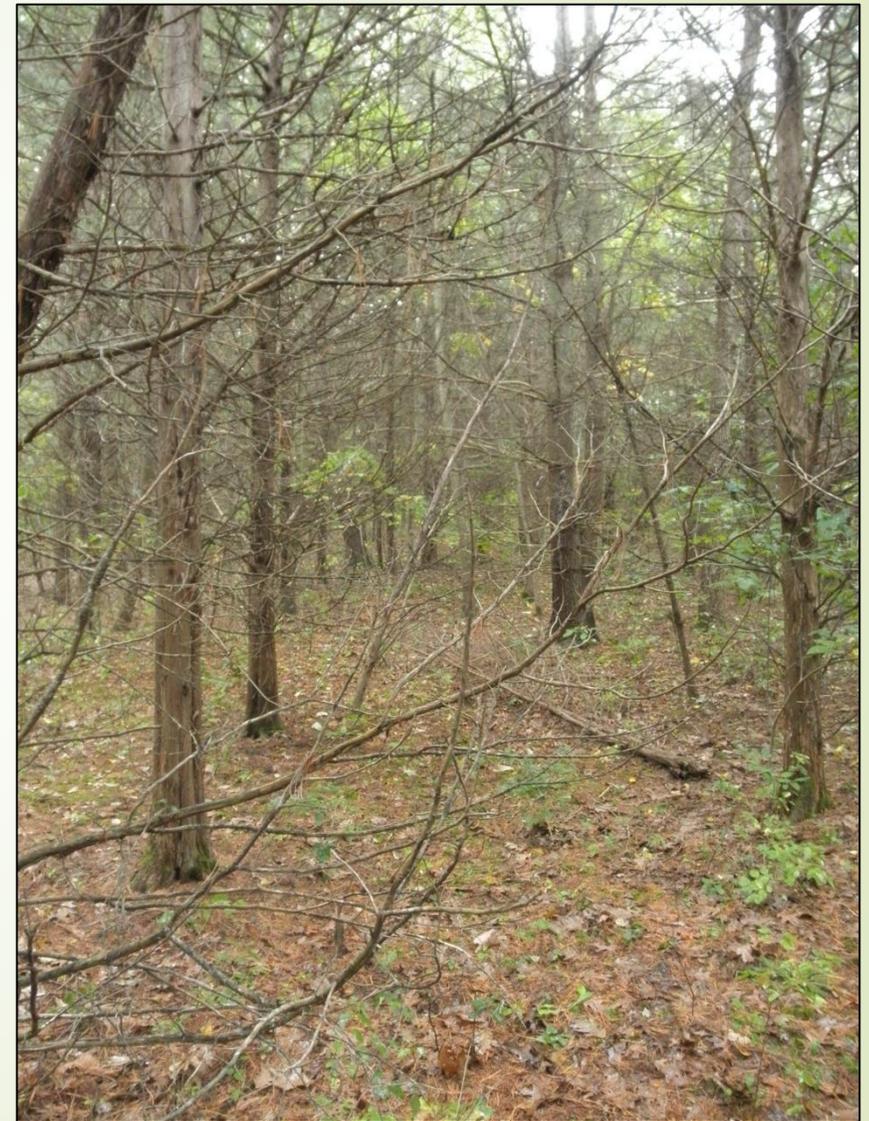


An overlooked form of old growth and potential climate record.



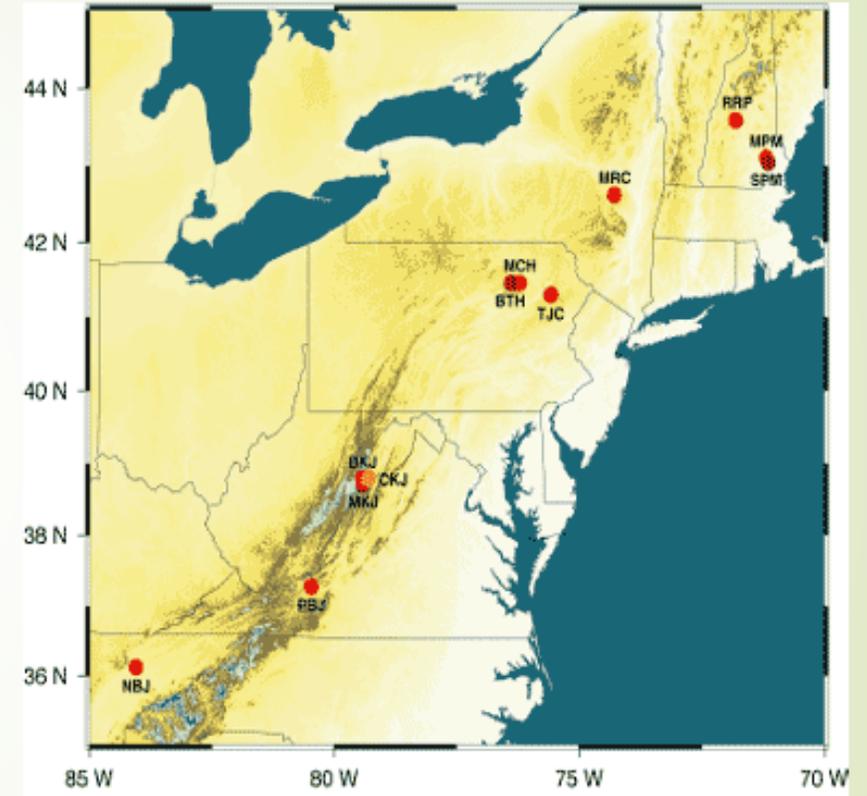
Matt Peters, Independent Ecologist and Botanist
Dec. 16, 2021
Forest Ecosystem Monitoring Cooperative Conference

Old Growth Red Cedar?



Seriously old!

- *Juniperus virginiana* documented up to 940 years in WV
- Third oldest species in Eastern North America (Eastern Oldlist)
- Eastern red cedar dendrochronology work began with Florence Hawley 1937 in TN
- ~1,500 year chronology (Lamont-Doherty Earth Observatory – Tree Ring Lab)



Credit: Lamont-Doherty Earth Observatory – Tree Ring Lab



Most cedars need not apply.

- Stressful conditions are required to reach great age. (A common theme in the world of old trees.)
- Hot, droughty sites with shallow soils on cliffs and knobs of calcareous or circumneutral bedrock, typically S or SW aspect.
- Plus rugged sites to avoid people.



Red Cedar Woodlands

- Recognized as Very Rare (S1) in VT and NH
- Globally Imperiled to Vulnerable (G2 to G3) Ecosystems
- Two NVC types (Associations):
 - Northeast Red Cedar Calcareous Rocky Summit (*Juniperus virginiana* - *Ostrya virginiana* / *Carex eburnea* Woodland) – G2
 - Northeast Red Cedar Circumneutral Rocky Summit (*Juniperus virginiana* - *Fraxinus americana* / Poverty Oatgrass Woodland) – G3



A Red Cedar Woodland in New Hampshire

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AN OLD CIRCUMNEUTRAL RED CEDAR ROCKY OUTCROP COMMUNITY IN THE PAWTUCKAWAY MOUNTAINS, NEW HAMPSHIRE

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ABSTRACT. Red cedar woodlands on circumneutral outcrops are a rare type of natural community in New Hampshire (S1—Critically Imperiled) and across its global range (G3—Vulnerable). The most studied example in the state, first observed by New Hampshire Natural Heritage Bureau ecologists over 15 years ago, was surveyed and formally documented in 2016 and 2017 from three adjacent slopes of the ring-dike complex known as the Pawtuckaway Mountains in Nottingham and Deerfield, NH. Stand-age studies suggest the red cedar woodland may have existed as a stable community at this site for many centuries. Since examining this site in the Pawtuckaway Mountains, one other circumneutral red cedar rocky outcrop community with similar plant species composition and cover in a comparable physical setting has been documented in southern New Hampshire. Here, we newly describe the circumneutral red cedar rocky outcrop community in New Hampshire.

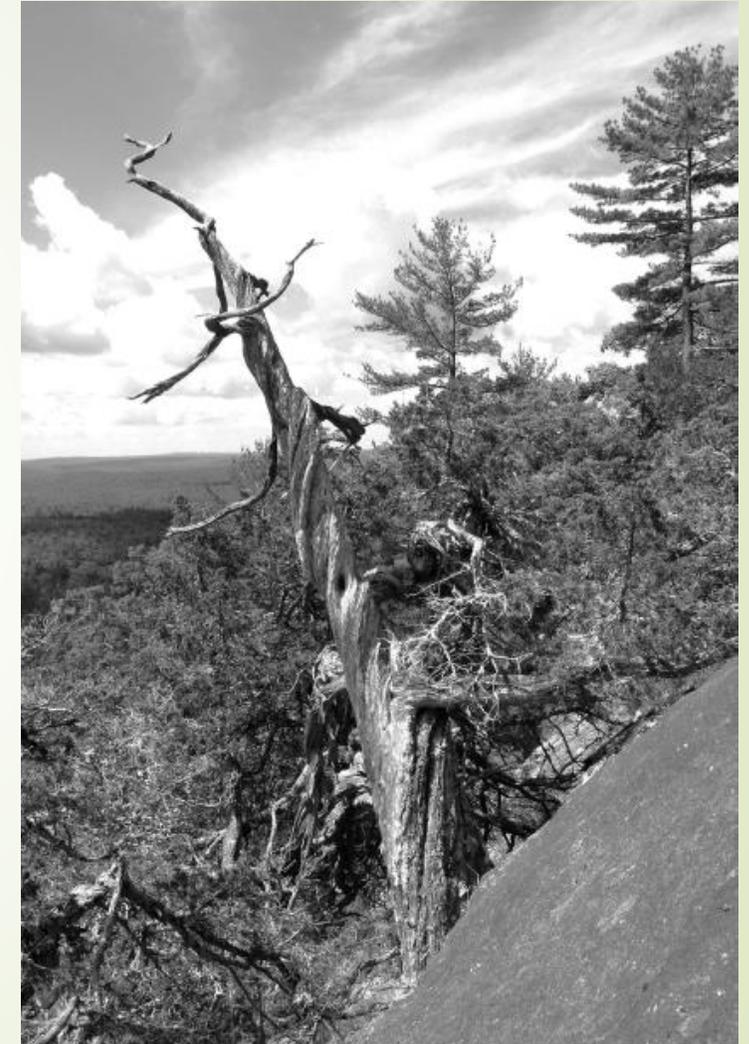
circumneutral red cedar rocky outcrop community, globally rare, old growth, ring-dike complex, Pawtuckaway Mountains, Nottingham and Deerfield, New Hampshire

Red cedar woodlands on circumneutral outcrops are a rare type of natural community in New Hampshire (S1—Critically Imperiled) and across its global range (G3—Vulnerable). Across eastern North

154

“ages of 250 or more years are common in the canopy”

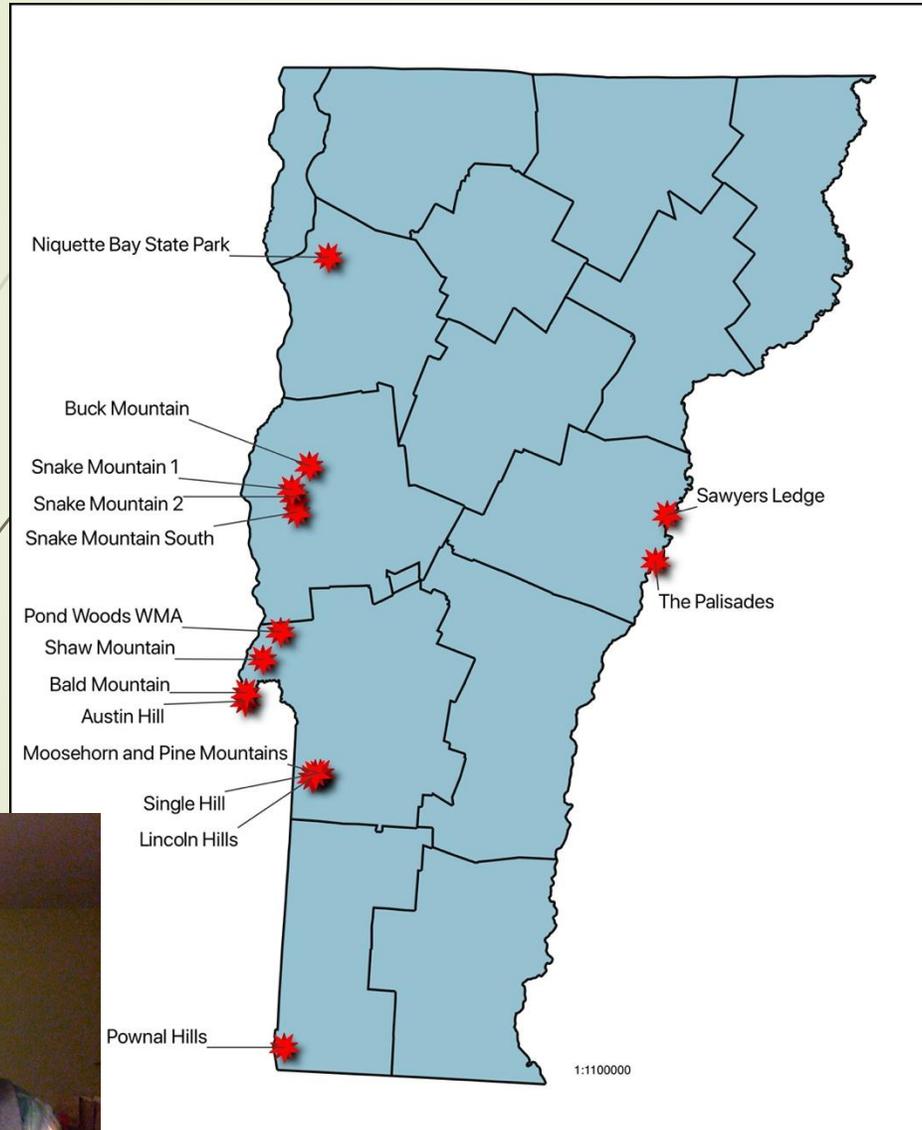
“Gnarlwhal”:
estimated age 575 years



Credit: Nichols et al. 2018



What about Vermont?



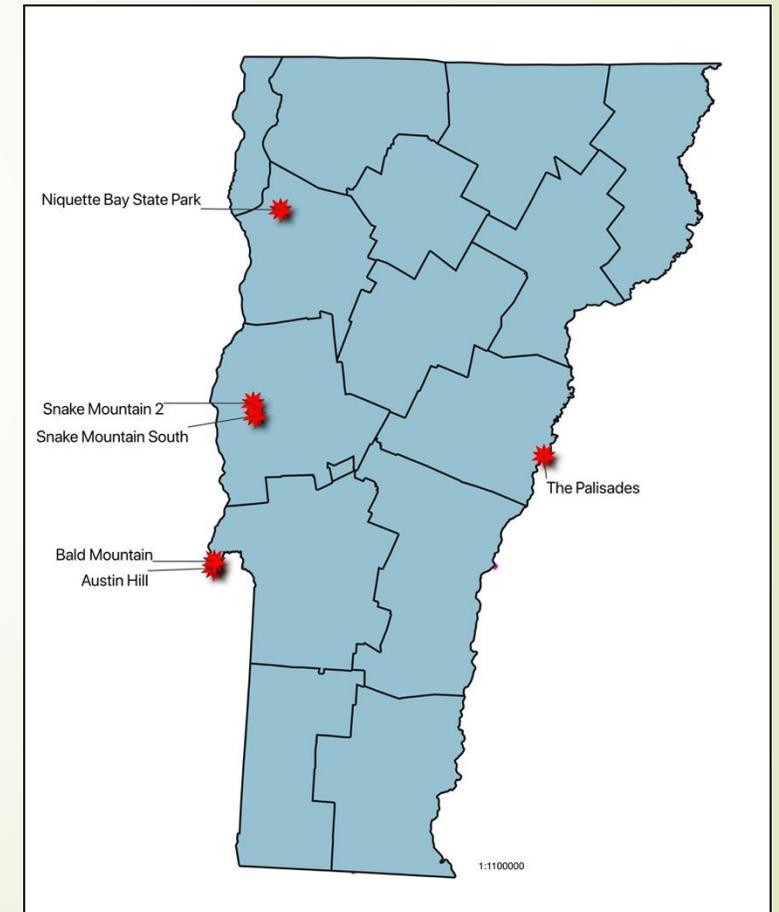
- 12-15 known RCW sites
- ~32 acres total mapped (VNHI)
- Lots of notes of 'old gnarly trees'...
- But almost no data.

- 1 tree core= 153 years in RCW
- 172 (NBSP), 183 years in LBCPF sites



This study:

- ▶ 52 cores from 50 trees across 6 sites
- ▶ State & TNC lands +1 new site (Fairlee Palisades)
- ▶ Selectively cored a few 'oldest looking' trees
 - ▶ Gnarled, stunted form, strip-bark, lobed trunk, top dieback, spiral grain, larger limbs, challenging microsite
- ▶ Supporting data: core height, DCH, DBH, circumference, live circ., height, sex, photos, GPS location
- ▶ Additionally, documented rare species & collected bryophytes



Austin Hill, TNC Buckner Preserve West Haven



Snake
Mountain 2,
Addison

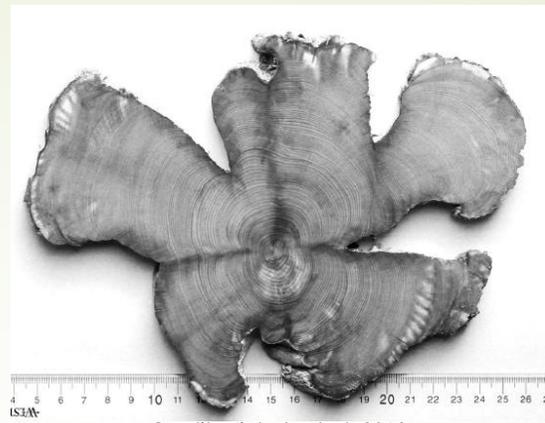


Site Tour: The Palisades, Fairlee



Challenges

- Physical complexity of microsite
+ tree architecture
+ irregular cross section
+ heart rot
= Difficult coring
- False rings



Preliminary Results

- Rough ring counts, cores not prepared
 - Niquette Bay S.P.: 135+, average looking tree 90+
 - Bald Mtn: 150+
 - Snake Mtn: 266+
 - Austin Hill: 287+
 - Fairlee Palisades: 318+
 - Snake Mtn South: 320+



- Core height: mean 30.5cm
- DCH: mean 19.9cm (7.1-42.3cm)
- Live circumference: mean 73% (26-100%)
- Tree height: mean 4.8m (2-11m)
- Sex: (n=29) 18M / 11F
- Additional RCW acres mapped: ~32



Other Observations

- ▶ Surprising frequency of past human disturbance – all sites had some.
 - ▶ Likely mostly fence post cutting and pasture clearing
 - ▶ Trails, view clearing?
 - ▶ Cutting for I-91 rockfall management
- ▶ Some signs of past fire, but not much
- ▶ Evidence of 2020 drought stress on vegetation



Rare species

- Vascular plants: 103 occurrences of 52 species documented
- New occurrences for 34 species and new subpops. for others
- In RCW: 63 occurrences of 29 species
- Bryophytes TBD, but include several 'rare' species across multiple sites.

Cetraria arenicola



Dicranum spurium S1

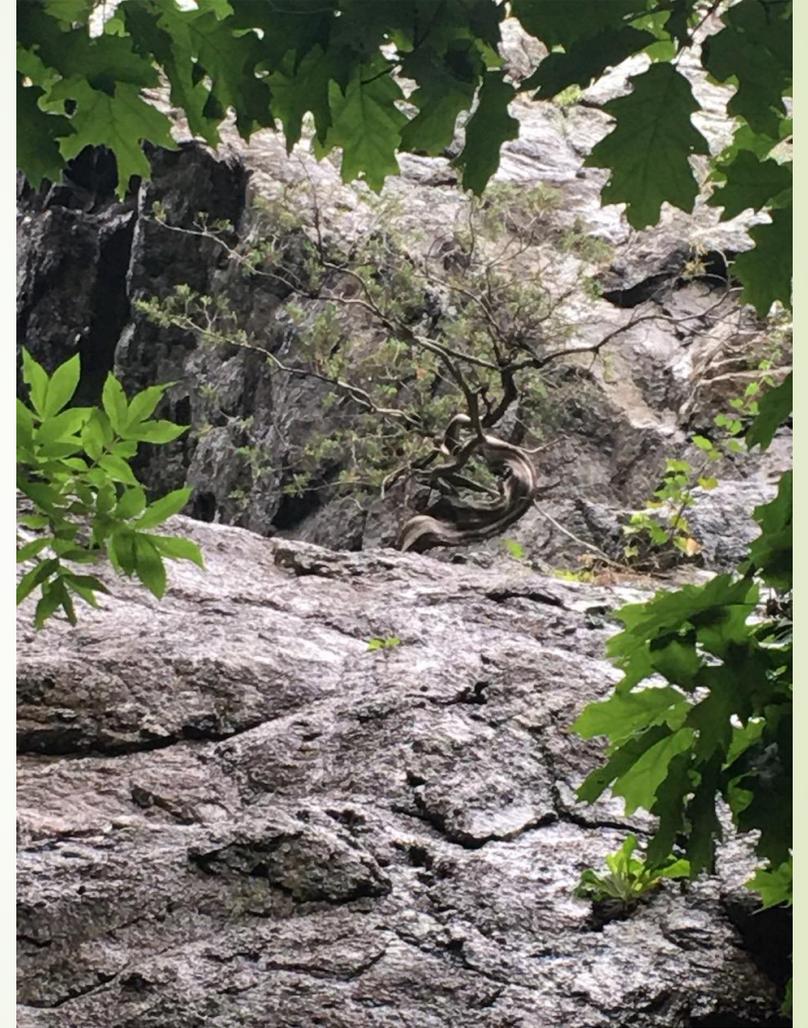


Fogg's Goosefoot (*Chenopodium foggii*) G2



Implications

- Many, if not all, of VT's RCWs are in fact old growth habitats, though not without some human impacts.
- In addition to being a rare ecosystem type, RCWs host dozens of rare species, underscoring their biodiversity value.
- These sites may have untapped value as local climate proxy records of relevance for research.
- VT's RCWs should be protected from further human impacts such as view clearing, trails, and cutting.
- There are more sites deserving more in depth study!
- These are beautiful and mysterious places and home to ancient beings!



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