

Eastern hemlock (*Tsuga canadensis*)
as an alternate host for spruce
budworm, or: stumbling upon new
research questions

FEMC Conference

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December 12, 2024

eastern hemlock core



significant
growth
reduction


1918



1920

Hemlock is already a species in decline





Known as alternate host for spruce budworm,
but...

Severity, spatial and
temporal patterns
unknown

Post budworm
recovery patterns
unknown

Objectives



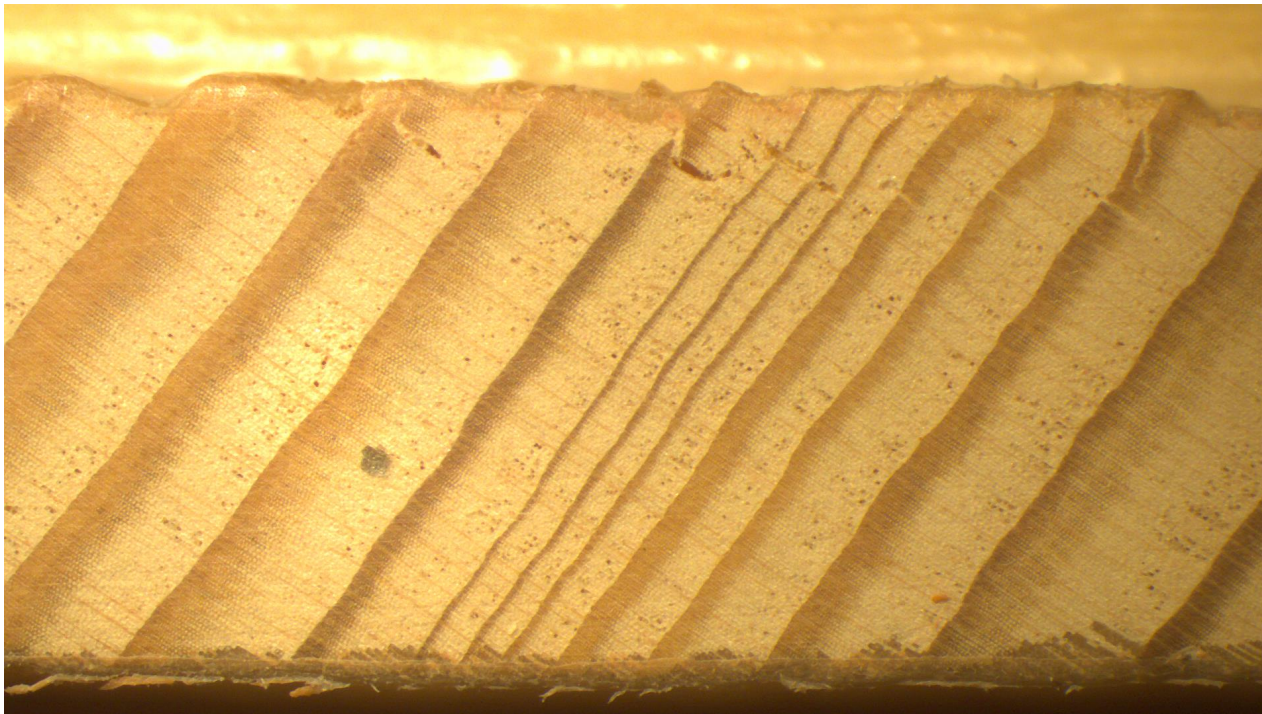
(1) Determine the extent to which eastern hemlock has served as an alternate host during spruce budworm outbreaks in Maine.



(2) Examine the post-outbreak growth and recovery patterns in eastern hemlock.

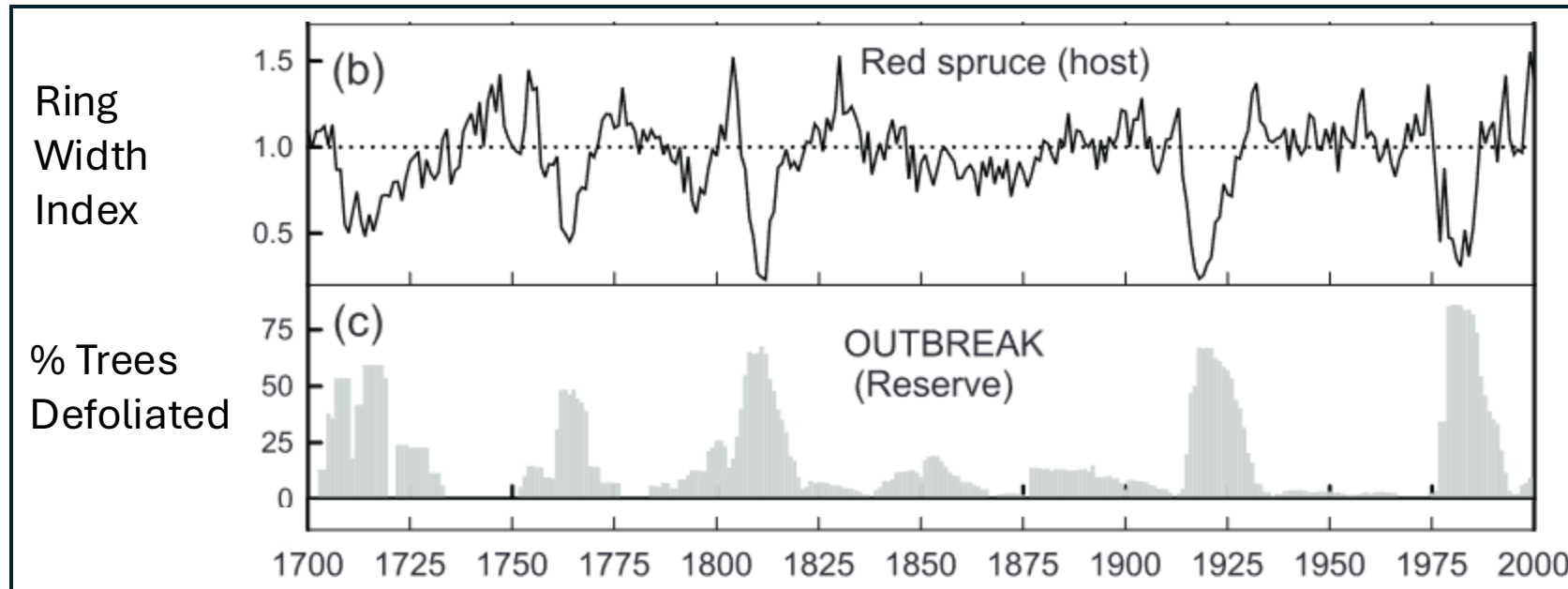
How do we know when budworm outbreaks occurred?

- Visual evidence of growth reductions in tree rings during known outbreaks



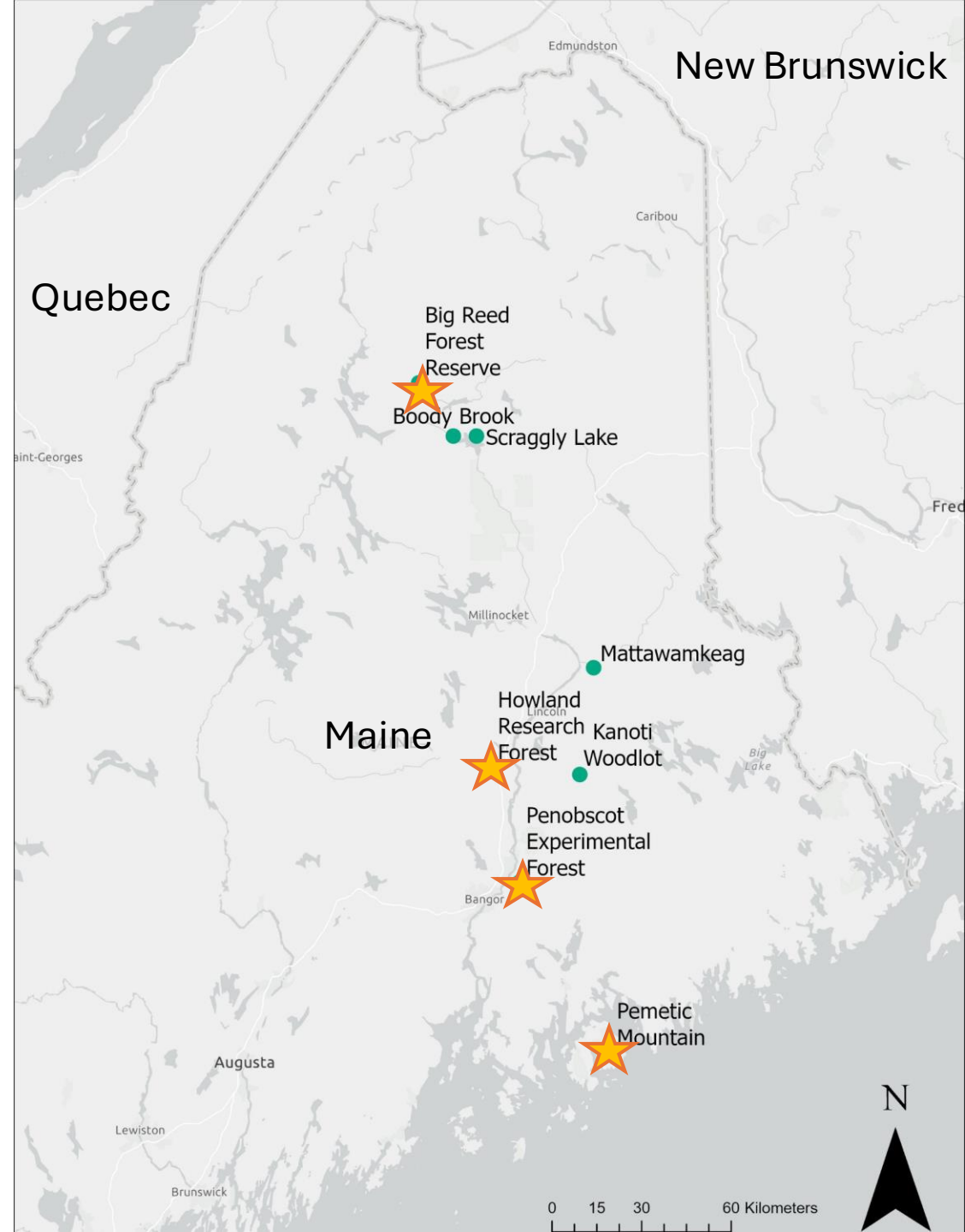
How do we know when budworm outbreaks occurred?

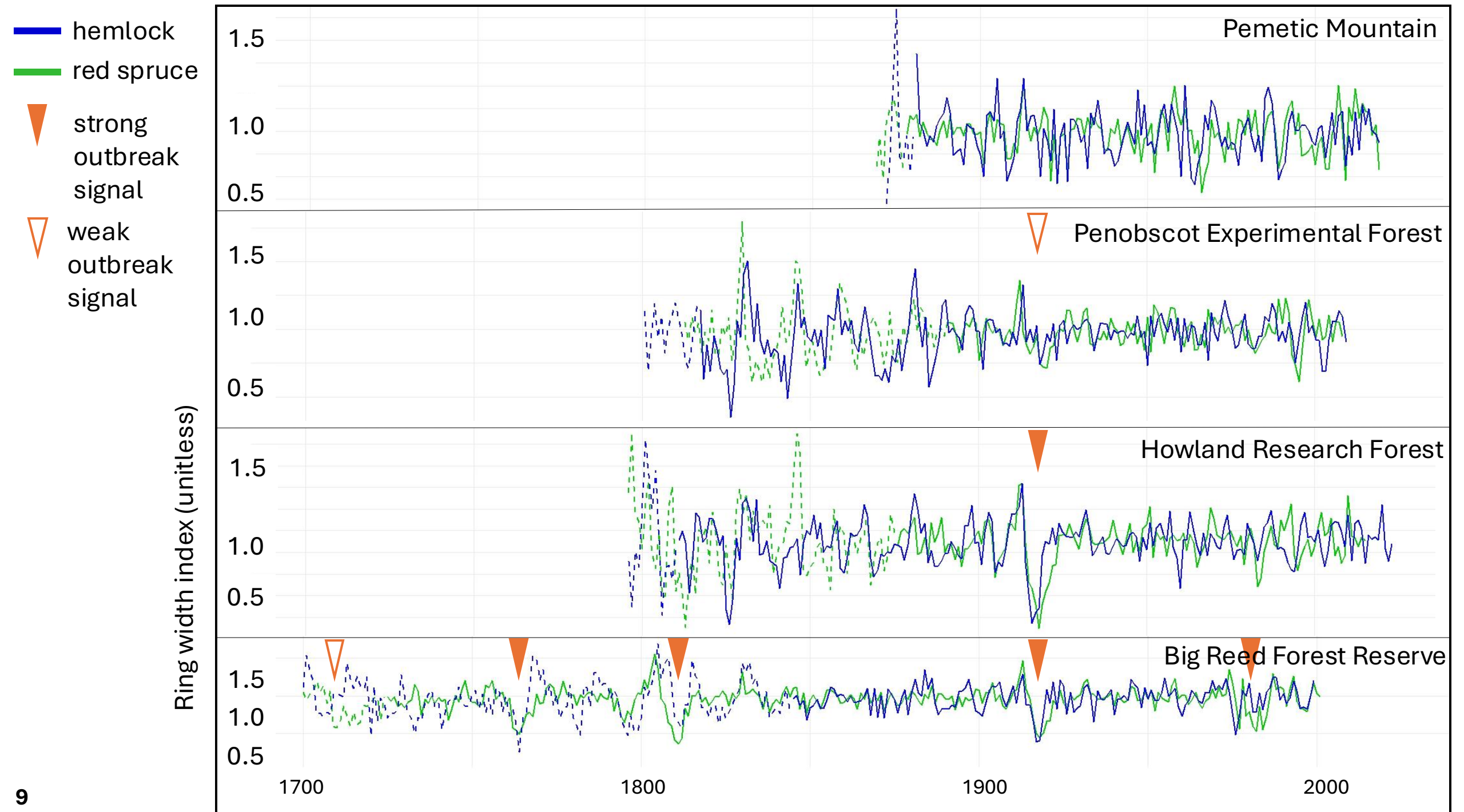
- Visual evidence of growth reductions in tree rings during known outbreaks
 - Budworm outbreaks in Maine: 1976, 1914, 1808, 1762, 1709



Sites

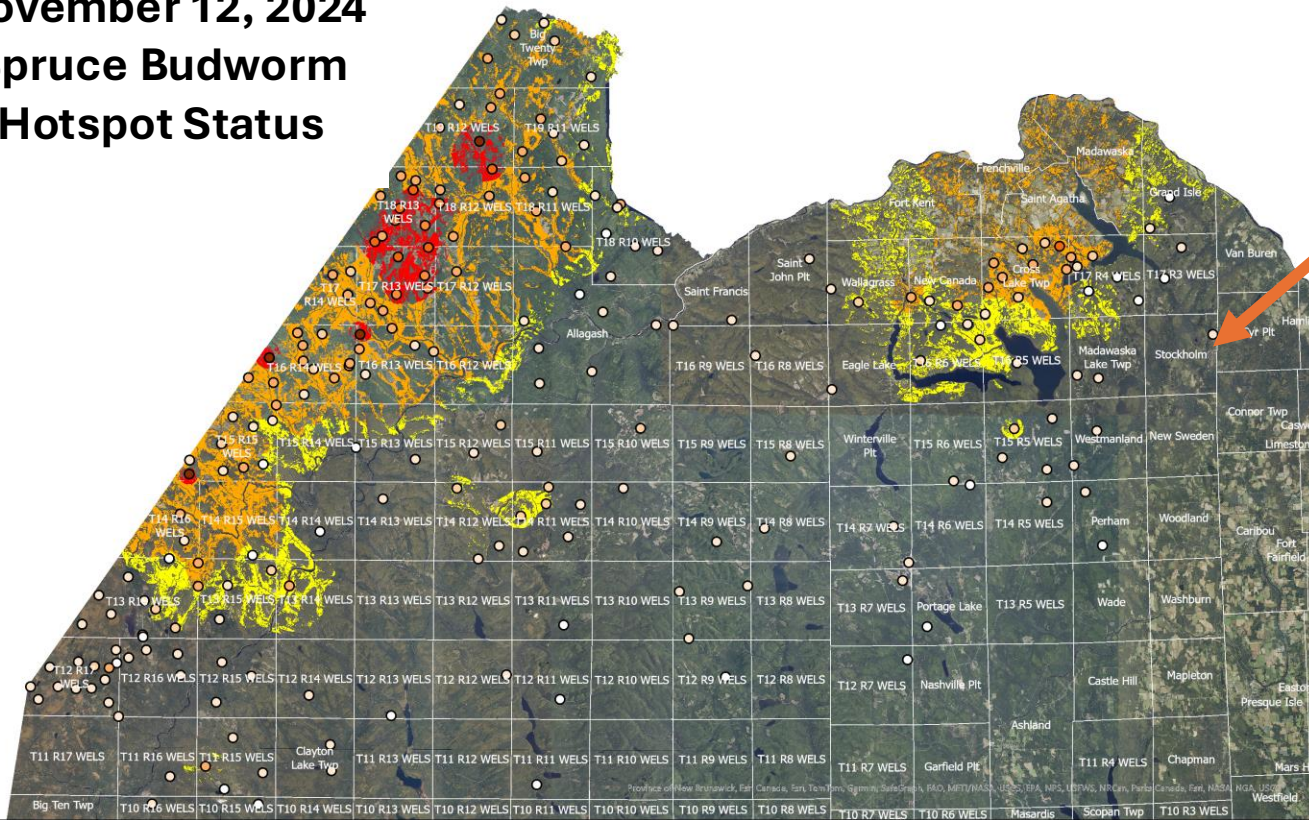
- Red spruce and eastern hemlock
- Compiled existing dendrochronological data with additional coring in fall 2023 and summer/fall 2024





Why it matters

November 12, 2024
Spruce Budworm
Hotspot Status



Areas Regulated for Hemlock Woolly Adelgid in Maine

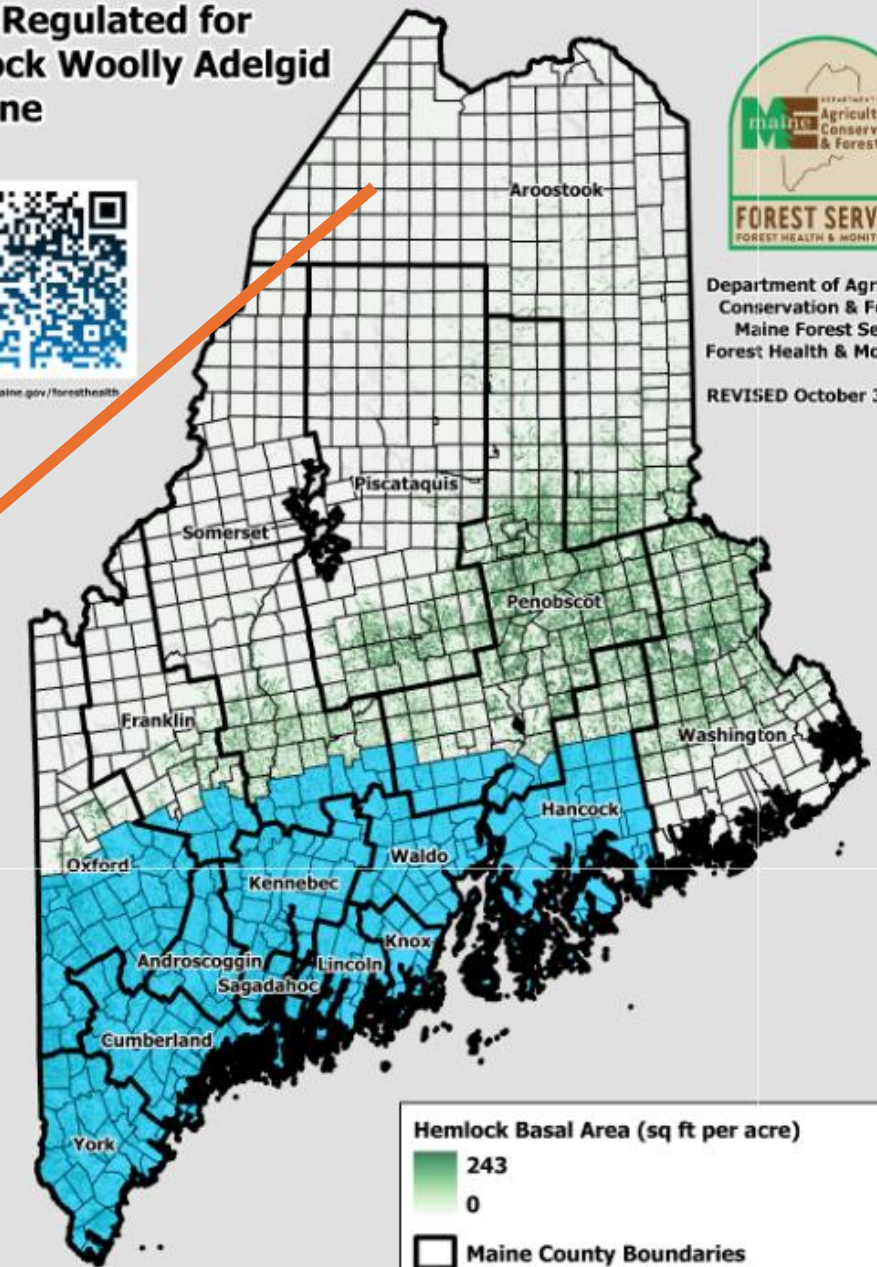


www.maine.gov/foresthhealth



Department of Agriculture,
Conservation & Forestry
Maine Forest Service
Forest Health & Monitoring

REVISED October 30, 2023



Hemlock Basal Area (sq ft per acre)

243

0

□ Maine County Boundaries

■ Hemlock Woolly Adelgid Quarantine Zone

0 10 20 40 60 80 Miles

Path: O:\MFS\FHM\Parisio\HWA\Parisio Hemlock Woolly Adelgid 2023 Quarantine Revision.aprx

Next steps

Analyze outbreak
patterns on
remaining 4 sites

Analyze post
outbreak growth
patterns in hemlock

Thank you!

Graduate Committee: Shawn Fraver, Andrew Ouimette, Jay Wason

Data: Stacy Birch, Colby Bosley-Smith, John Bradford, Unna Chokkalingam, Shawn Fraver, Keith Kanoti, Evan Larson, Dave Orwig, Neil Pederson, Camilla Seirup, Aaron Teets

Fieldwork: Colby Bosley-Smith, Shawn Fraver, Megan Grega, Chris Hettwer, Peter Howe, Roel Ruzol



Bonus Slides

Site and Chronology Metrics

Site	Basal Area m ² ha ⁻¹	Density trees ha ⁻¹	Hemlock rBA (%)	No. of Hemlock Cores	Hemlock Int.Corr	Spruce rBA (%)	No. of Spruce Cores	Spruce Int.Corr
Howland Research Forest	46.05	1271	21	108	0.512	48	105	0.532
Penobscot Experimental Forest	42.7	624	50	115	0.531	19	36	0.493
Big Reed Forest Reserve	31.6	618	6	25		21	755	0.525
Pemetic Mountain	49.2	885	23	23	0.526	68	30	0.526

Budworm Preferred Host Species

1. balsam fir, red spruce, white spruce, black spruce
2. eastern larch, eastern hemlock, eastern white pine, Engelmann spruce, subalpine fir