USDA Northeast Climate Hub

Informing the development of forest climate change indicator-based tools

FEMC Annual Meeting 2025 | Vermont

Alyssa Soucy, ORISE Fellow, Northeast Climate Hub

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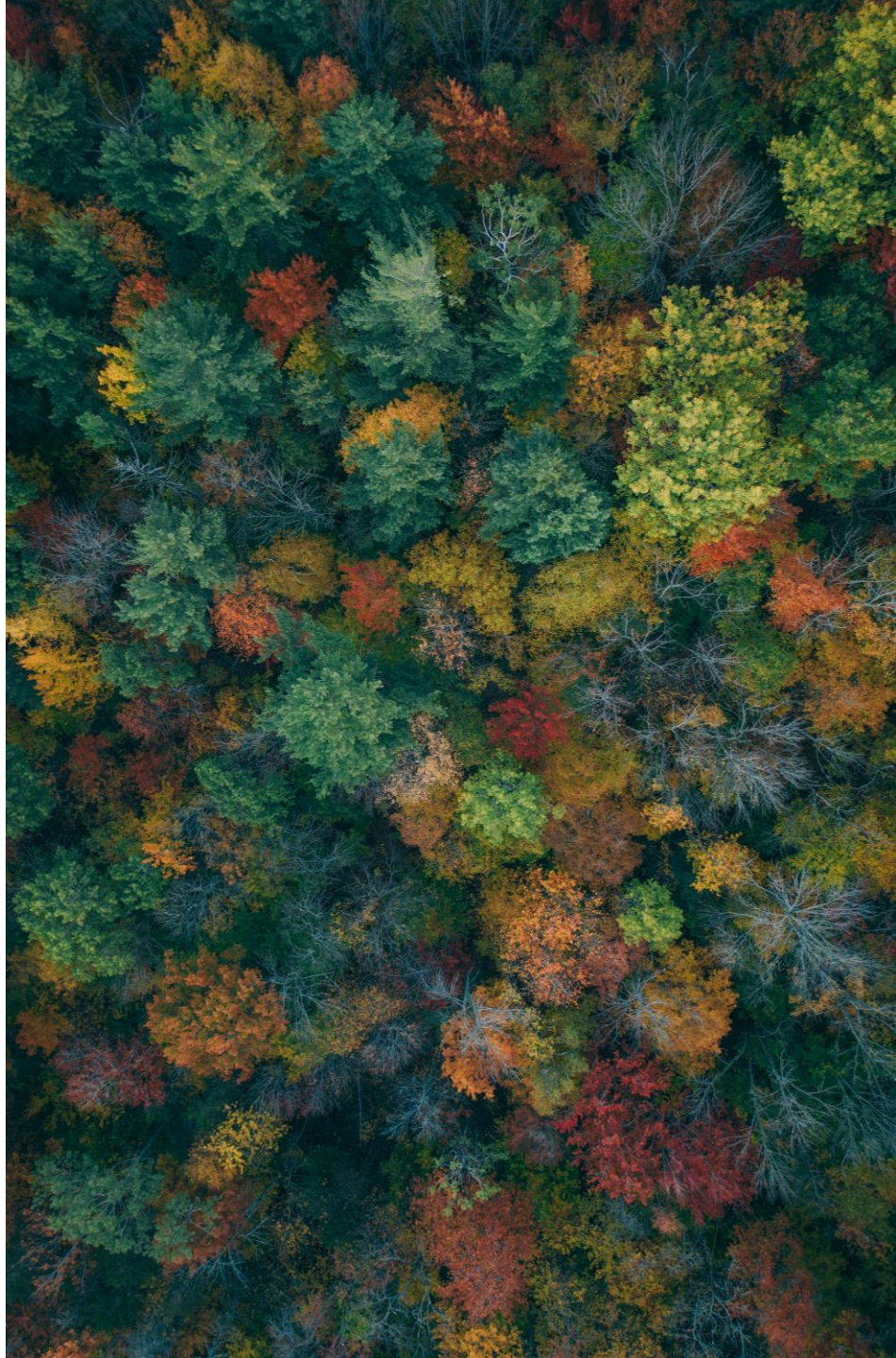
10 YEARS OF CLIMATE HUBS



Our mission is to develop and deliver science-based, region-specific information and technologies to enable climate-informed decision-making.

Partnerships: FS, ARS, NRCS, LGUs, NGOs

Agricultural Research Service
NRCS Natural Resources Conservation Service
FSA Farm Service Agency
RMA
APHIS

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Workstreams

Science and data syntheses

Translating and delivering relevant information

Tool/technology development and support

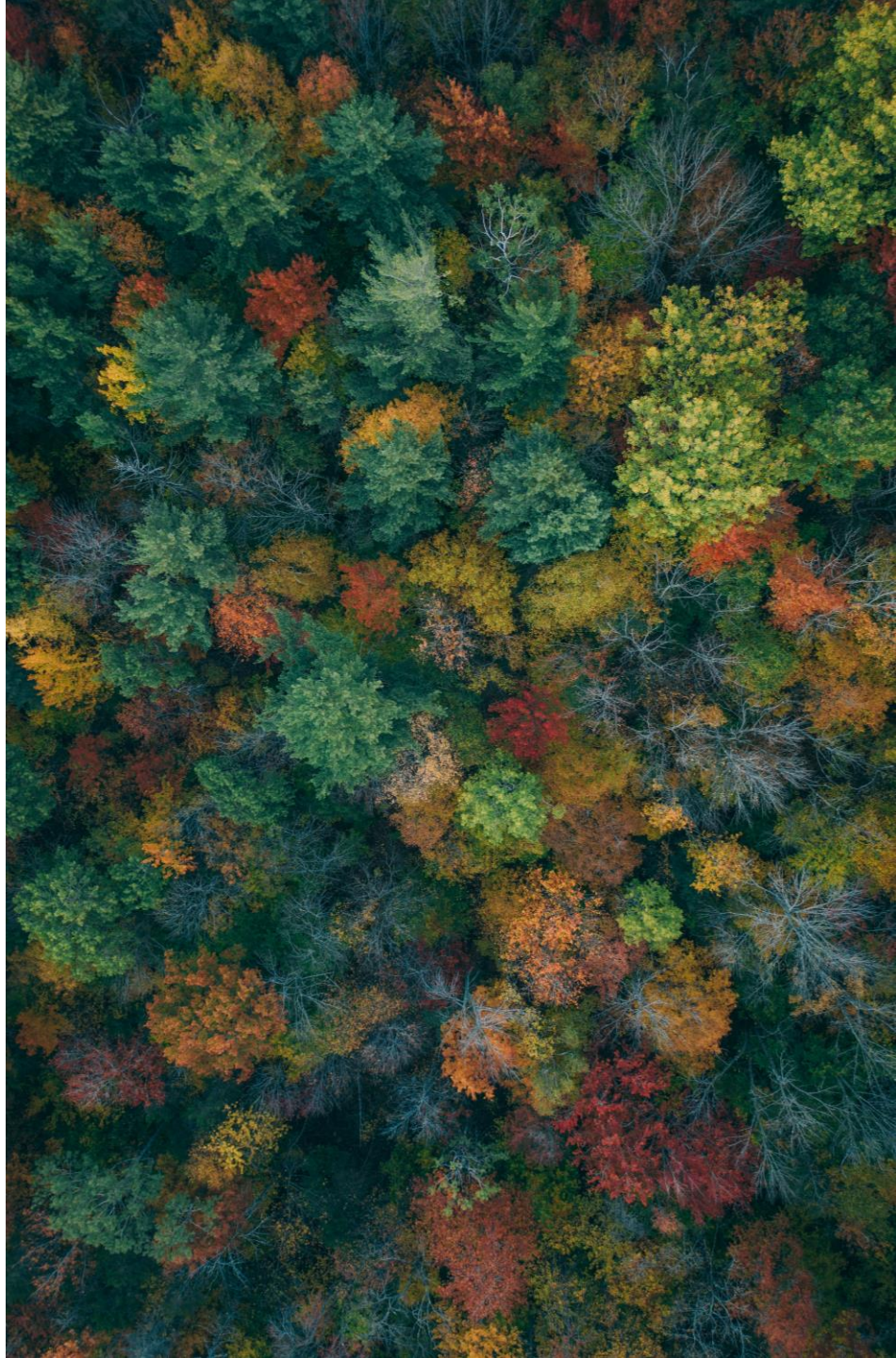
Supporting climate-informed planning and decision-making

Outreach, convening, and training

Facilitating engagement, discovery, and exchange

Working Session Agenda

- Overview of climate change indicators
- Needs assessment findings
- Discussion



Supporting Adaptation Management and Planning in Forestry: Forest Climate Indicators

Goal: Increase availability of actionable and relevant climate change indicators via an interactive online tool to support forest management and planning.

Tool users: State foresters, Private foresters, Tribal foresters forest planners, land managers, extension professionals

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Lindsey Rustad, USDA Northeast Climate Hub
Erin Lane, USDA Northeast Climate Hub
Dennis Todey, USDA Midwest Climate Hub
Art DeGaetano, Northeast Regional Climate Center, Cornell University
Natalie Umphlett, Northeast Regional Climate Center, Cornell University

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USDA Midwest Climate Hub
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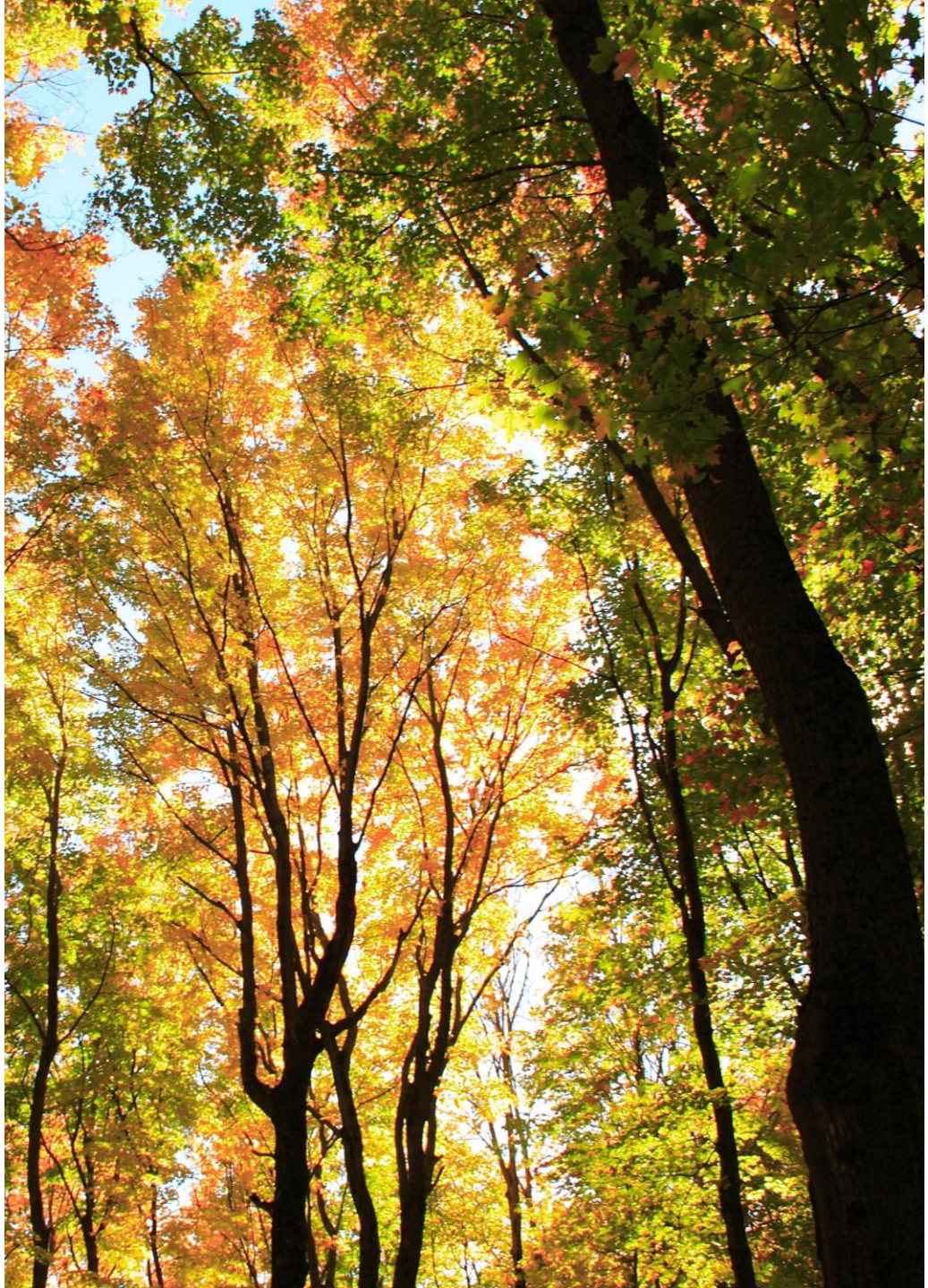
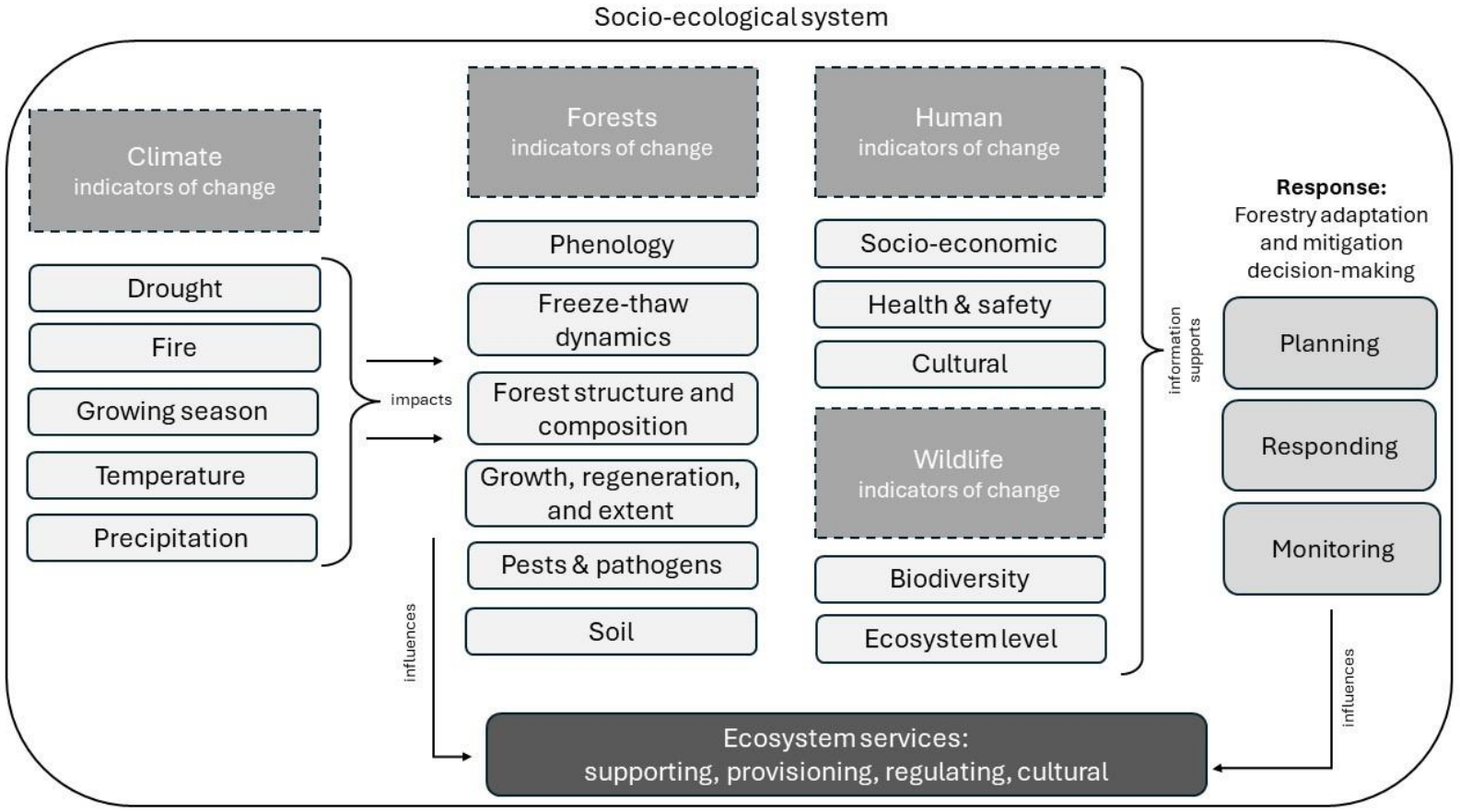
Northeast Regional Climate Center



What are indicators?

- Reference tools that that can track rates of change, or trends of a phenomenon using measured data, modeled data, or an index
- Can warn of change, inform decision-making, and communicate and track long-term key social and biophysical changes



Listening sessions with Forest Service staff

- 12 listening sessions with Forest Service personnel (ecologists, resource managers, foresters, climate change coordinators, etc.), totaling 76 staff across the northeast and Midwest
- Brainstorm climate change indicator needs for forest planning and management
- Developed a list of 7 thematic needs (5 of which are related to indicators), along with ~55+ related indicators

Key themes

Theme	Challenge	Example Indicators
Timber operations	Winter operations	Snow depth Soil moisture Soil temperature Soil moisture
	Summer operations	
Climate extremes and storms	Ice storms	Tree ice loads Ice storm thickness
	Frost damage	Length and severity of spring cold event
	Flooding and extreme precipitation	Extreme single-day precipitation events River flooding frequency/magnitude (projections)
	High wind events	Straightline wind events
	Drought	Palmer drought severity index Soil moisture index Drought forest damage
Winter recreation	Snowmobiling, skiing, and ice fishing days impacts	Snow depth Soil temperatures
	Shifting visitation	Outdoor recreation revenue (trends and projections)
Pest and pathogens	*Invasive* insect/pathogen outbreaks (e.g., hemlock woolly adelgid, EAB, spotted lanternfly, spruce budworm)	Insect survival and distribution (current and projected) Insect/pathogen severity
	Native insect/pathogen outbreaks (white pine diseases, southern pine beetle, among others)	
	Oak decline	Drought indices (see above) Spring precipitation
Fire	Increased wildfire risk	Start of fire season End of fire season
	Timing prescribed burning	Soil moisture Fire Weather Index

Key themes – feasibility and novelty

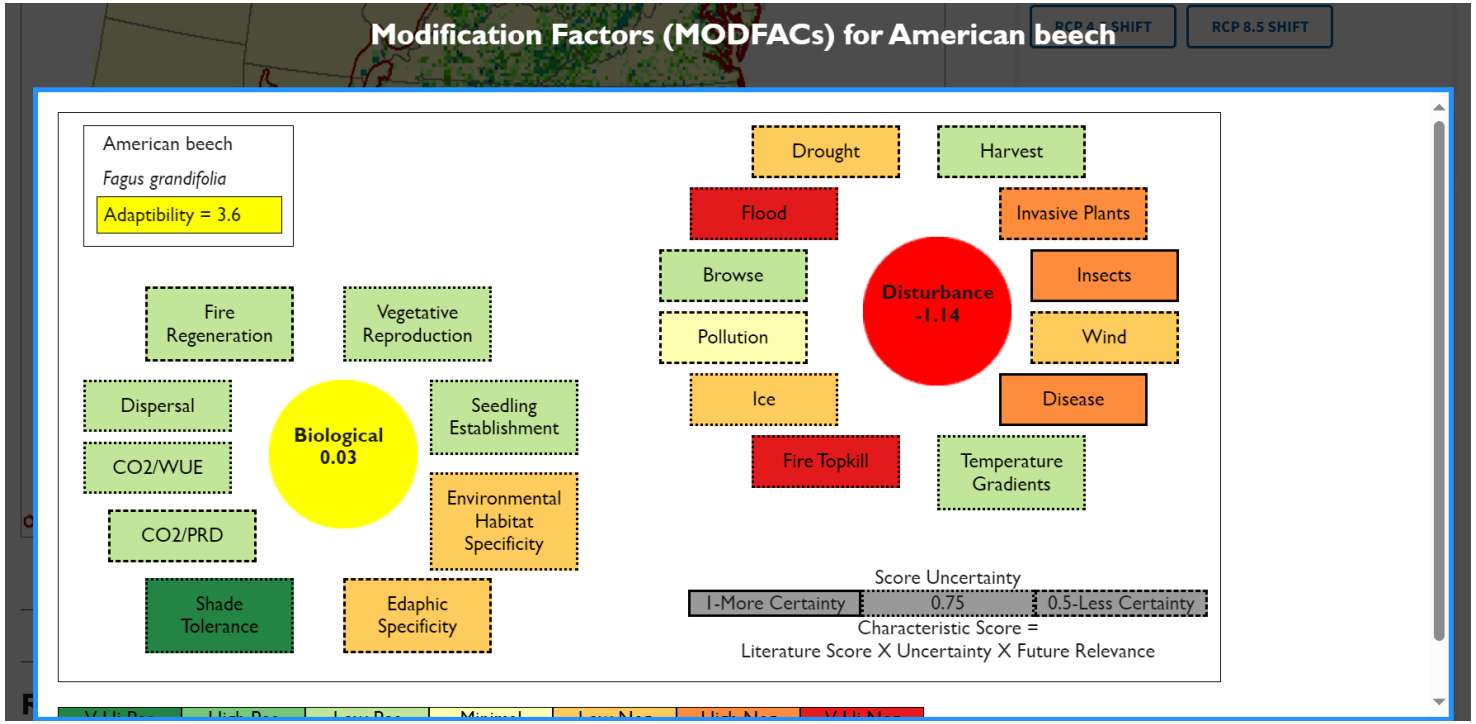
[add a graphical figure that displays our feasibility and novelty rankings, then allow time for comment/discussion]

Then – facilitate a discussion on what would be most useful – when looking at this list of forest-related climate change challenges, what is most urgent? What tool would be most useful for forest management and planning?

Let’s dive deeper into a potential tool for pests…

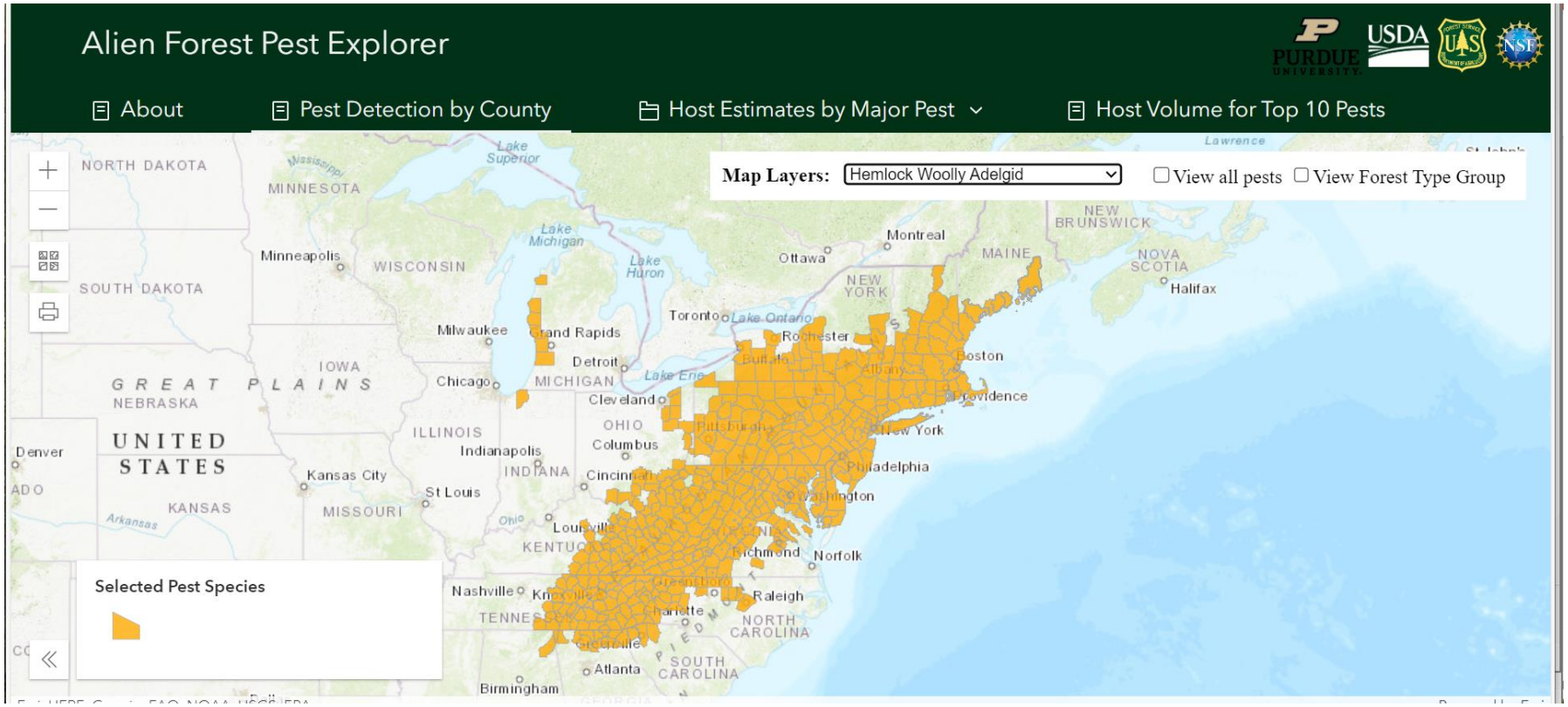
Tools and resources for pests and pathogens

Climate change tree atlas



Tools and resources for pests and pathogens

Alien Forest Pest Explorer



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Tools and resources for pests and pathogens

Pheno forecasts

JUNE 2024

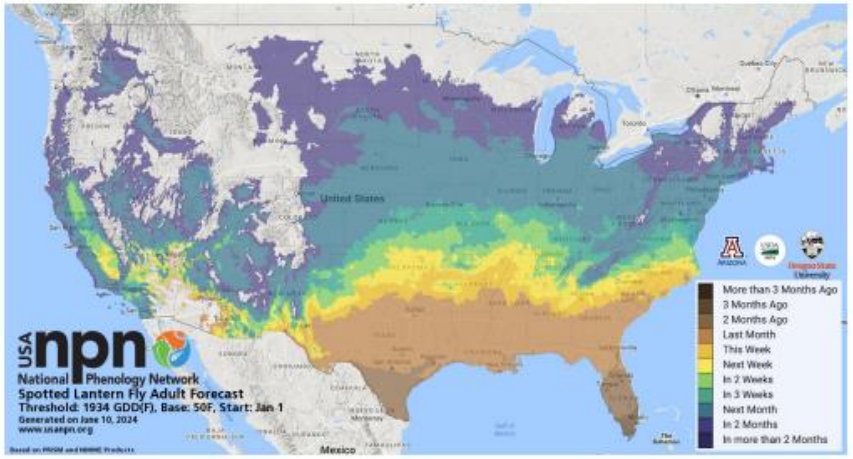


Figure 2. Spotted lanternfly Pheno Forecast, June 10, 2024. Colors indicate the status of adult lanternfly. Dark purple indicates activity is predicted more than 2 months in the future, green: adults expected to emerge in 2 weeks, yellow: adults expected to emerge in 1 week, gold: adults emerging, brown: adults emerged last month, dark brown: adults emerged more than 3 months ago.

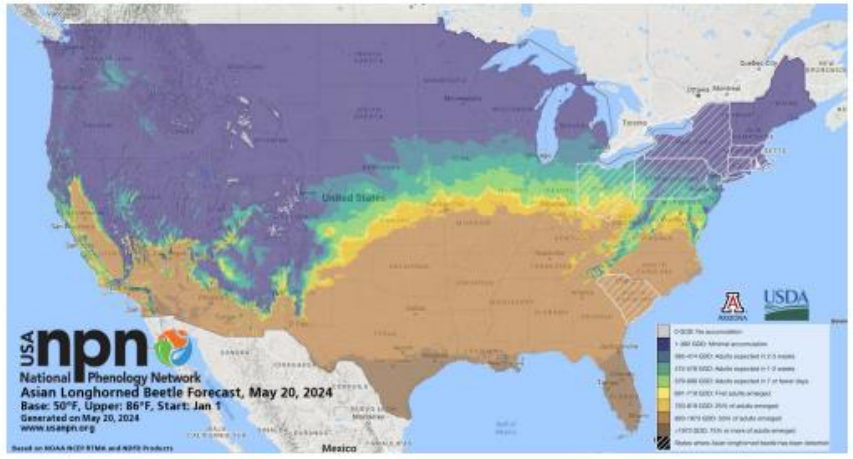


Figure 3. Asian longhorned beetle Pheno Forecast, March 20, 2024. Colors indicate the status of adult emergence. Dark purple indicates minimal accumulation, dark blue-green: adults expected to emerge in 2-3 weeks, dark green: adults expected to emerge in 1-2 weeks, light green: adults expected to emerge in seven or fewer days, yellow: first adults emerging, gold: 25% of adults emerged, brown: 50% of adults emerged, dark brown: 75% or more of adults emerged.

Pest and pathogen indicators

Potential tool features could help to understand:

- Insect survival, distribution, and severity (current and projected)
- Insect/pathogen severity
- Novel non-native pest probabilities (projected)
- Host species distribution
- What else?

Based on the following *indicators*:

- ➢ Cold winter temperatures, spring precipitation, stand density, temperature variations, etc.

Let’s dive deeper into a potential tool for winter recreation…

Winter recreation indicators

Potential tool features could help to understand:

- Cross country and snowmobile trail maintenance based on long-term trends in snowpack and snow depth
- Trends in ice-fishing dates
- What else?

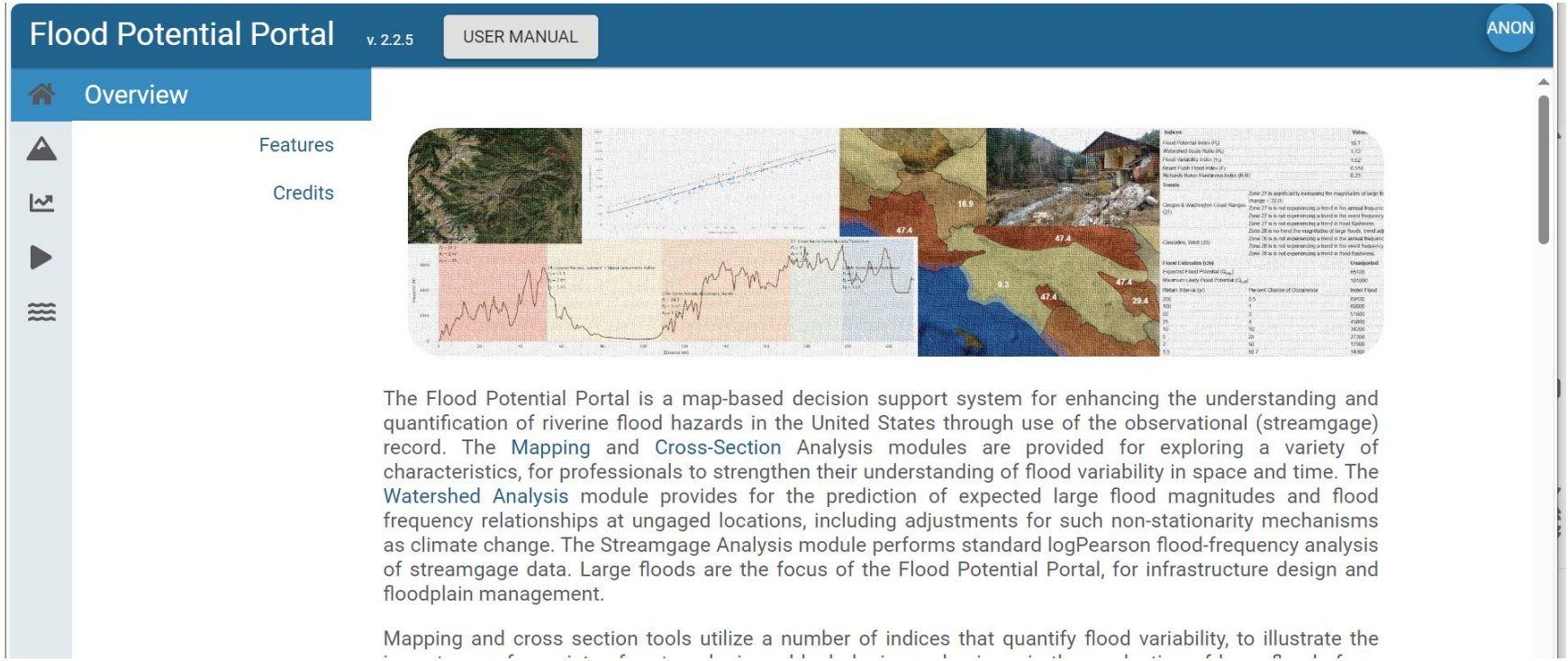
Based on the following *indicators*:

➢ Snow depth, Soil temperatures, Ice-in/ice-out dates, First and last freeze, Soil frost depth

Let’s dive deeper into a potential tool for extreme precipitation…

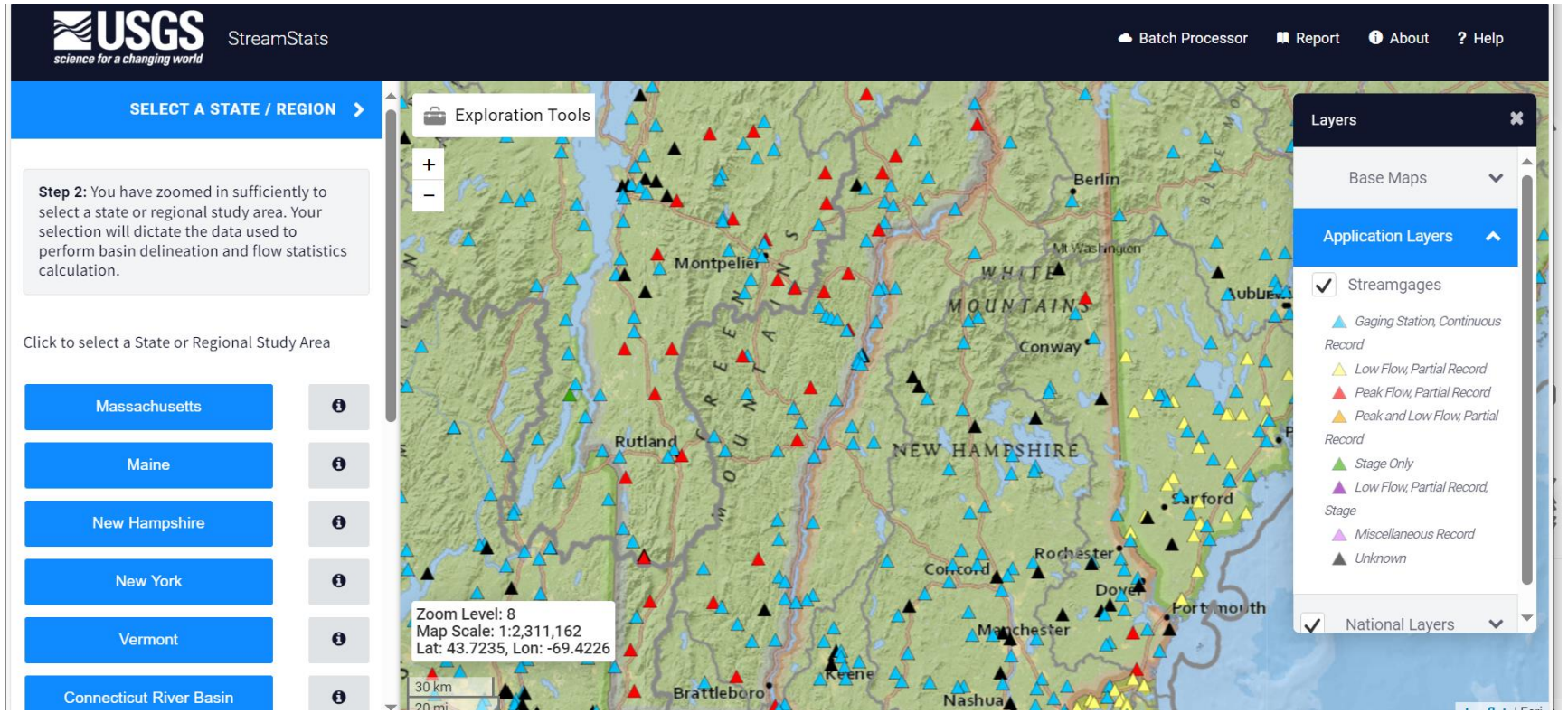
Tools and resources for extreme precipitation

Flood Potential Portal



Tools and resources for extreme precipitation

Stream Stats



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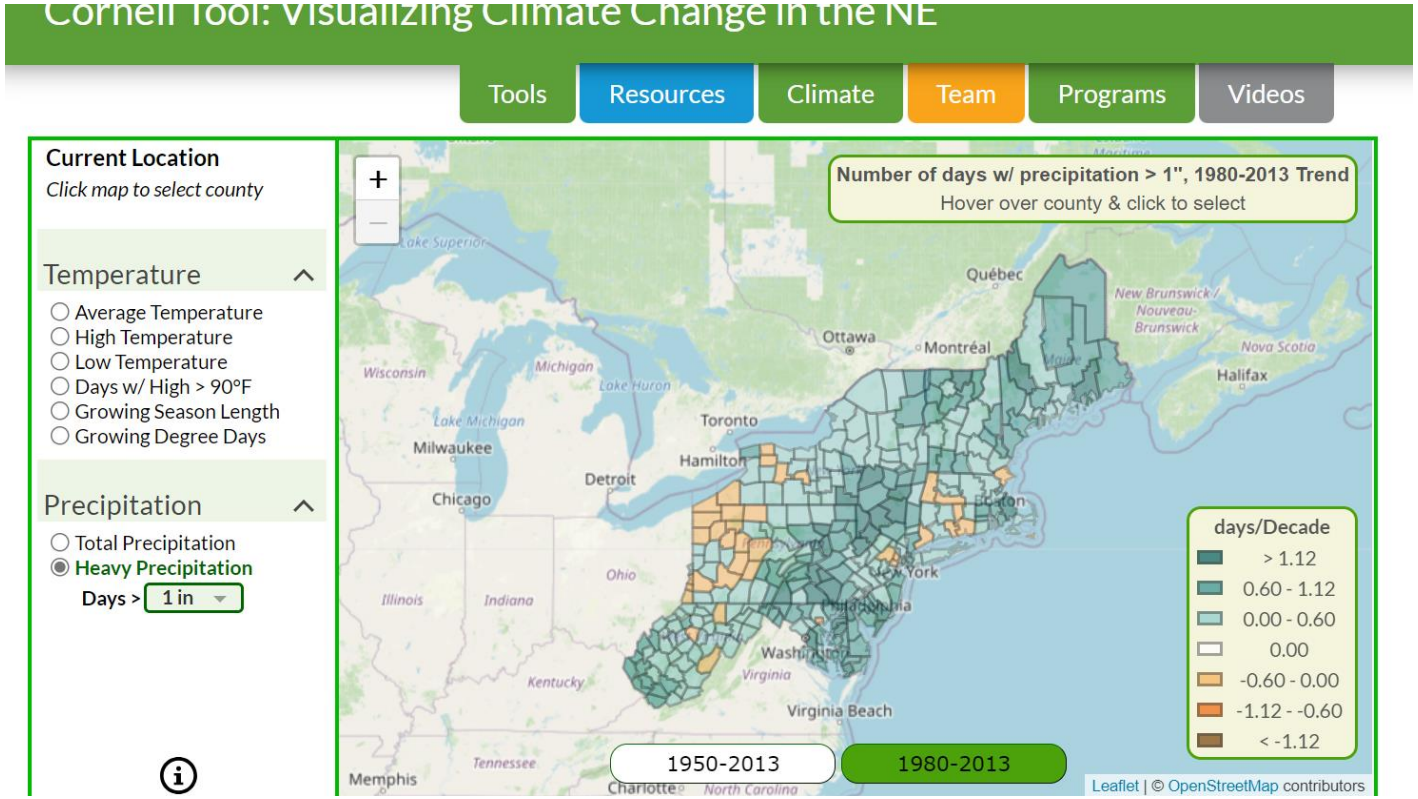
Tools and resources for extreme precipitation

NRCC – heavy precipitation



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Extreme precipitation indicators

Potential tool features could help to understand:

- Risk of flooding within forests
- Understanding likelihood of forests being impacted by extreme precipitation
- What else?

Based on the following *indicators*:

- ➢ Extreme single-day precipitation events, River flooding magnitude (projections), River flooding frequency (projections)*

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The Pulse

A weekly digital newsletter sharing forest, climate, and carbon related news clips from a wide variety of sources aimed at forestry professionals. The newsletter content includes science-based information and reflects a balanced variety of perspectives.

Partners: Northeastern Loggers' Association

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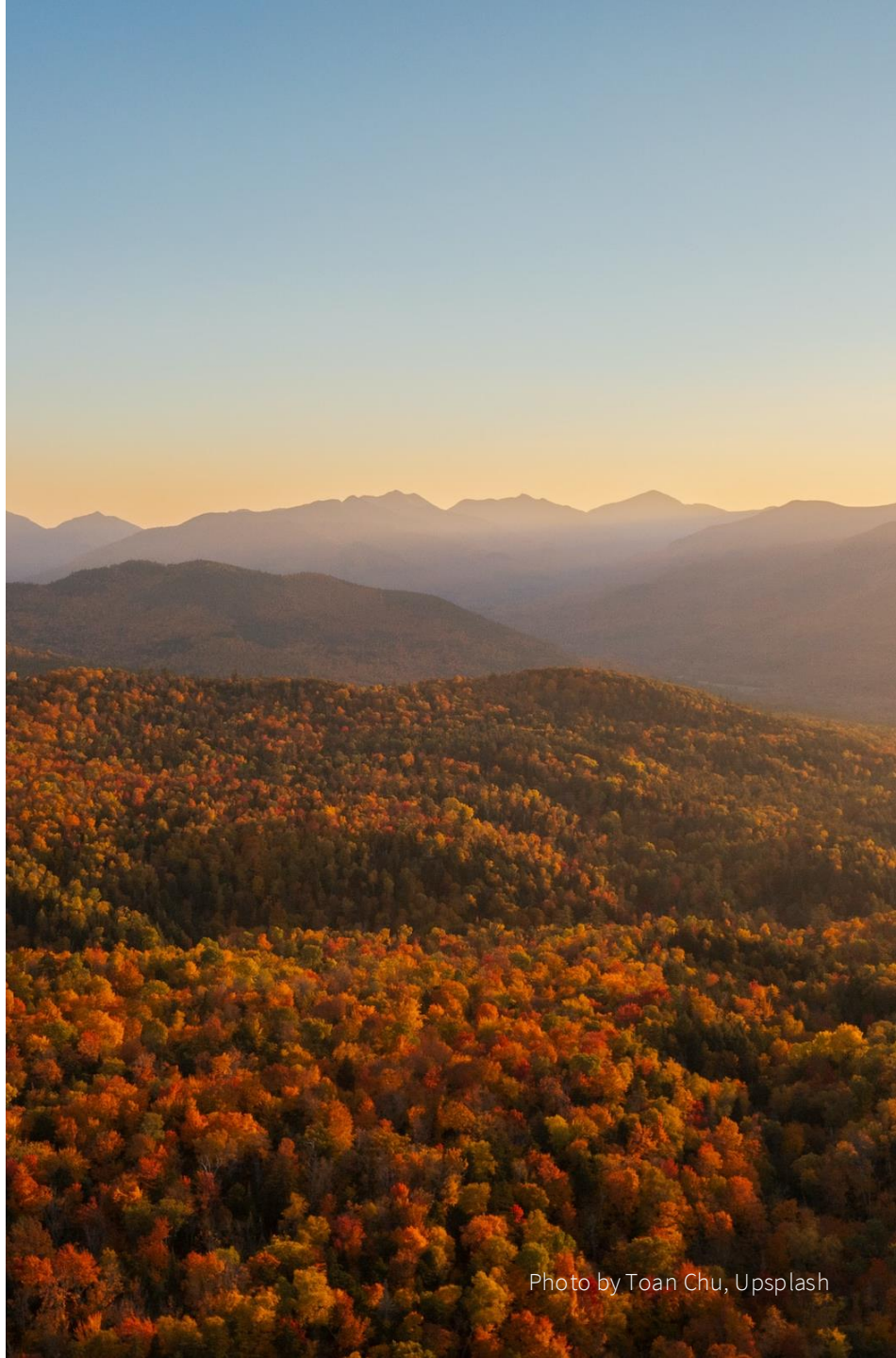

Photo by Toan Chu, Upsplash

The Quarterly Harvest

In order to share project updates and promote climate-informed decision-making with stakeholders, the Northeast Climate Hub produces a quarterly newsletter. The purpose of this digital newsletter is to share stories and information concerning Northeast Climate Hub projects, climate science, and solution-based practices in the Northeast.

Partners: University of New Hampshire

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Photo by Karrah Kwasnik

Rooted in Research Webinar Series

Rooted in Research is a webinar series focused on communicating the latest science for land management needs and highlighting key science findings for people who make and influence land management decisions. The Northeast Climate Hub assists in webinar ideation, production and promotion.

Partners: USDA Forest Service - Northern Research Station, Northern Institute of Applied Climate Science, USDA Northeast Climate Hub, USDA Northern Forests Climate Hub

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Photo by USDA Forest Service

Questions?

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