Thermal Calendars to Inform Management in a Changing Climate

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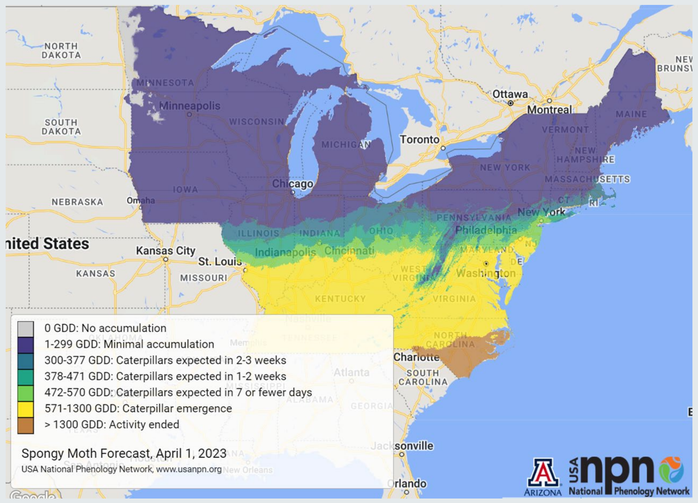
What are Thermal Calendars?

- Climate change is shifting the seasons: events like flowering don't necessarily occur at the same time now as they have in the past.
- In the Northeast, climatic variations can shift phenophases across locations by several weeks
- Old survey guides based on the calendar like "*scout for spongy moth in late May"* may no longer hold.
- Timing seasonal activities such as scouting for spongy moth can be improved using phenology based methods and tools, where local conditions (primarily temperature) are integrated to estimate and forecast life history stages for key forest species.
- **Thermal Calendars** are dynamic maps that can describe when and where species are meeting key developmental thresholds.



Example Thermal Calendar map indicating the date that Spongy Moth caterpillars emerged across states in the northeastern U.S. in 2023.

Successful management of invasive species requires monitoring/control actions to coincide with life stages when the target species are most vulnerable to treatments. Land managers have requested location-specific action treatment dates from USA-NPN. Thermal Calendars are a tool to support them.

How might this help me?

High quality data and tools are critical to land management, but their utility is limited if they are not delivered and communicated in ways that make them readily available to a wider audience of practitioners. By understanding and integrating the social and cultural values that managers, agencies and organizations bring to management, tools may be more effectively delivered and applied.

We will engage decision makers, Tribal representatives, and natural resource managers in an effort to better understand what shapes their decisions and in co-producing data products to support on-the-ground management.

Example events indicated by Thermal Calendars

Management of Insect Pests:
Best timing for biocontrol agents, monitoring life stages for targeted survey and management activities:

- Emerald Ash Borer
- Hemlock Woolly Adelgid
- Spongy Moth

Emerging Pests/Pathogens:
Optimal timing for surveillance of other pests and pathogens of interest:

- Elm zigzag sawfly
- Spotted lanternfly
- Oak wilt

Native Plants of Interest:

- Seed ripening/optimal time to harvest seeds in native plants such as ash, beech, oak
- Bloom time for key nectar plants such as serviceberry, milkweed, red maple
- Sap flow in sugar maples

Next steps

Winter-spring 2024
Interviews, surveys and stakeholder workshops to solicit input and to learn about the values shaping management decisions - we need land manager input from all sectors!

Spring-summer 2024
Draft maps available for feedback

Fall 2024-winter 2025
Final maps live through USA-NPN website, visualization tool, data download

- Day of year GDD thresholds met each year, 1990-2023
- Average day of year thresholds met (1990-2020)
- Day of year GDD thresholds met in current year - maps updated nightly

Spring 2025
Trends in timing of thresholds mapped across study region

How can I help?

If you would like to be a part of the co-production of knowledge for this project and the eventual products, please add your email and phone number to the google form connected to the QR code and indicate what level of engagement you are interested in!

QR code to Google Form

Or sign up for USA-NPN newsletters to keep up!

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