



# Phenology Forecasts predict pest seasonal activity to support decision making

The USA National Phenology Network (USA-NPN) produces and distributes daily national phenology maps – or Pheno Forecasts – indicating when key pest species may be most susceptible to management as part of a growing suite of phenology map products.

The USA-NPN’s Pheno Forecast maps show when key pest species, including emerald ash borer (*Agilus planipennis*), apple maggot (*Rhagoletis pomonella*), lilac borer (*Podosesia syringae*), hemlock woolly adelgid (*Adelges tsugae*), and winter moth (*Operophtera brumata*), are most susceptible to management treatments (Figures 1, 2, 3). These maps, available at 2.5 km spatial resolution, are updated daily and are available six days into the future.

Pheno Forecasts are based on published growing degree day (GDD) thresholds for points in pest life cycles when management actions are most effective. Using the USA-NPN daily accumulated growing degree day maps, which display heat accumulated above a base temperature from Jan 1<sup>st</sup>, these thresholds are calculated and locations are shaded as not yet approaching time to treat, approaching time to treat, time to treat, and past time to treat by their heat accumulation status relative to the threshold for a specific pest.

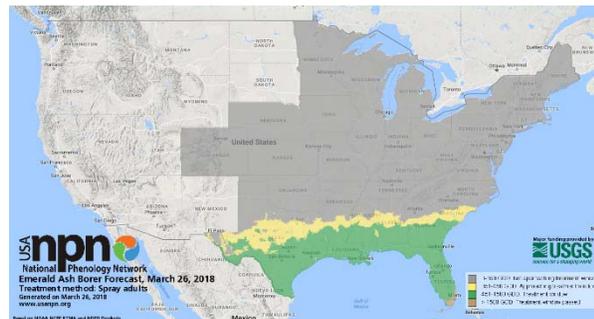


Figure 1. Emerald ash borer Pheno Forecast, March 26, 2018

**Pheno Forecast maps estimate the appropriate time to treat insect pests. For example, for emerald ash borer, the maps forecast when to manage adult beetles to reduce the spread of this pest.**

### Access the maps

Pheno Forecast maps are available on the USA-NPN website ([www.usanpn.org/data/forecasts](http://www.usanpn.org/data/forecasts)) and through the USA-NPN visualization tool ([data.usanpn.org/npn-viz-tool/](http://data.usanpn.org/npn-viz-tool/)).

These maps are intended to provide a broad-scale prediction of when management action may be necessary and are intended to supplement local knowledge. Forecast accuracy may vary locally based on microclimatic variation. In addition, thresholds may perform with variable accuracy across species ranges. For more information about these pests and others, specific to your state, contact your local Cooperative Extension program.



Figure 2. Hemlock woolly adelgid forecast, March 26, 2018.

Accessing the Pheno Forecasts through the USA-NPN visualization tool offers additional information on site-specific patterns of heat accumulation. This information can be used to evaluate whether suggested treatment times might occur earlier or later than usual. Clicking on a location on the map yields a plot of heat accumulation since Jan 1 (in blue) relative to average patterns of heat accumulation (in black; Figure 4).

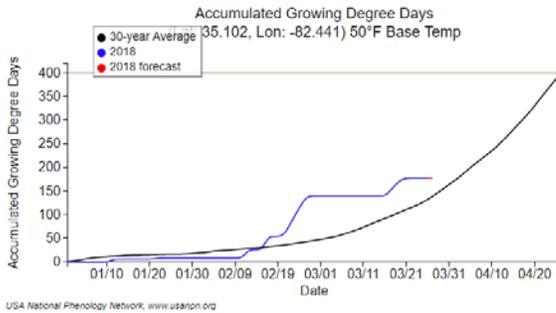


Figure 4. Growing degree day accumulation from Jan 1, 2018 for Charlotte, North Carolina.

**Receive updates**

Sign up to receive notifications on Pheno Forecast maps. Messages are delivered 2-3 times per month from March to June and provide six-day forecasts of the locations that are expected to reach key thresholds for pests and invasive species. Sign up at [www.usanpn.org/data/forecasts](http://www.usanpn.org/data/forecasts).

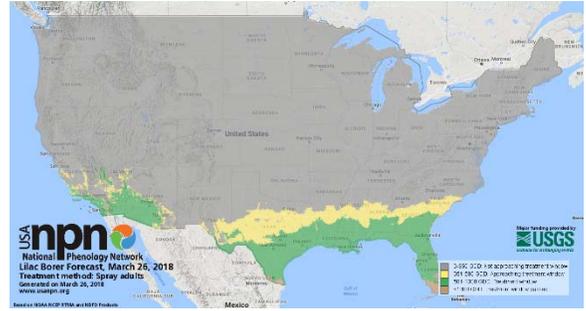


Figure 3. Lilac borer forecast, March 26, 2018.

**Track insects, plants, and animals in *Nature's Notebook***

You can report observations of hemlock woolly adelgid, lilac borer, and dozens of other insects as well as hundreds of plants, mammals, fish, birds, reptiles, and amphibians in *Nature's Notebook* ([www.naturesnotebook.org](http://www.naturesnotebook.org)), the USA-NPN's plant and animal phenology observing program. Observations submitted to *Nature's Notebook* are used to verify the accuracy of the Pheno Forecast maps.

The USA-NPN is a national-scale monitoring and research initiative focused on collecting, organizing and delivering phenological data, information and forecasts to support natural resource management and decision-making, to advance the scientific field of phenology, and to promote understanding of phenology by a wide range of audiences.

**Feedback welcome!**

We invite your feedback on the performance of these forecasts at your location. You can help us improve the accuracy of these forecasts by letting us know when pests undergo life cycle stages at your location. Provide your feedback at [www.usanpn.org/data/forecasts](http://www.usanpn.org/data/forecasts).



This info sheet has been peer reviewed and approved for publication consistent with USGS Fundamental Science Practices (<http://pubs.usgs.gov/circ/1367/>).

**References**

1. Crimmins et al. 2017. USA National Phenology Network gridded products documentation. U.S. Geological Survey Open-File Report 2017-1003. DOI: 10.3133/ofr20171003.
2. USA National Phenology Network. Daily accumulated growing degree day and Spring Index maps. Info sheet. [www.usanpn.org/files/reports/USA-NPN\\_AGDD-and-Six.pdf](http://www.usanpn.org/files/reports/USA-NPN_AGDD-and-Six.pdf)

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