

## **Improving cooperation among researchers, citizen scientists and resource managers through the Northeast Regional Phenology Network**

Principal Investigator: Ellen Denny

Affiliation/Institution: USA National Phenology Network

Email: edenny22@gmail.com

Mailing address: 4 Tenney Hill Rd., Kittery Point ME 03905

Co-Principal Investigators: Abraham Miller-Rushing

Affiliations/Institutions: National Park Service

Emails: Abe\_Miller-Rushing@nps.gov

Completion date: August 2013

Following up on the initiation of the Northeast Regional Phenology Network in 2007, this project expanded the activities of the network to include a workshop focused on improving coordination of citizen science efforts in the region and defining a set of core species for phenological monitoring in the Northeast region.

Funding support for this project was provided by the Northeastern States Research Cooperative (NSRC), a partnership of Northern Forest states (New Hampshire, Vermont, Maine, and New York), in coordination with the USDA Forest Service.

<http://www.nsrcforest.org>

# Project Summary

Following establishment of the Northeast Regional Phenology Network (NE-RPN) in 2007, network members made an effort to better coordinate and focus phenology monitoring activities in the region. A citizen science workshop was held in Nov 2010 to share lessons learned by the different efforts and to discuss the sharing of regionally-specific training materials and resources. They also identified the need for a list of target species in the region in order to focus monitoring efforts on a few important species, rather than collecting dilute information on too many species. Subsequently, a list of 46 Northeast target species was developed by researchers and land managers, and was incorporated into the USA-NPN's *Nature's Notebook* species list. Since that time, a number of Northeast citizen science groups have contributed many observations to *Nature's Notebook*, some of which have been used in a published analysis of forest budburst in the temperate deciduous forests of the US.

Additionally, many phenology researchers in the Northeast region continue to participate in coordinated national and international phenology research efforts, especially in regards to remote-sensing, to better understand the role of phenology of Northeastern forests in a global context.

Northeast Regional Phenology Network website: <http://www.nerpn.org/>

USA National Phenology Network website: <https://www.usanpn.org/>

*Nature's Notebook* website: [https://www.usanpn.org/natures\\_notebook](https://www.usanpn.org/natures_notebook)

*Note that the full scope of the original proposal was not carried out due to unforeseen personal time limitations of the PI, and only one year of funding was utilized. The research conference was not held, the website was not updated due to some technical snags, and although the Northeast-specific training materials were not fully developed, similar materials are being developed through the USA-NPN at a national level that will serve the same purpose.*

# Background and Justification

- Phenology is the study of seasonally recurring biological stages and is increasingly recognized as a vital aspect of understanding how ecosystems will respond to climatic change
- Variation in how different species respond makes it difficult to predict the overall pattern
- Coordinated effort to document and interpret these different responses at a regional scale is critical to understanding, adapting to, and managing for potentially dramatic impacts in the Northern Forest
- Building on prior efforts to support the USA National Phenology Network, as well as a general mounting enthusiasm for citizen science efforts, the NE-RPN sought to foster more coordination and focus to citizen science phenology groups operating in the region

# Project outcomes

- Citizen science workshop held in Nov 2010
- List of Northeast target species created
  - 24 plants
  - 15 birds
  - 3 amphibians
  - 4 insects



## Search Plants and Animals to Observe

Search Species Home

Sort by:

Common Name

Name contains:

State or Province:

All States & Provinces

Partner:

Northeast Regional Phenology Network

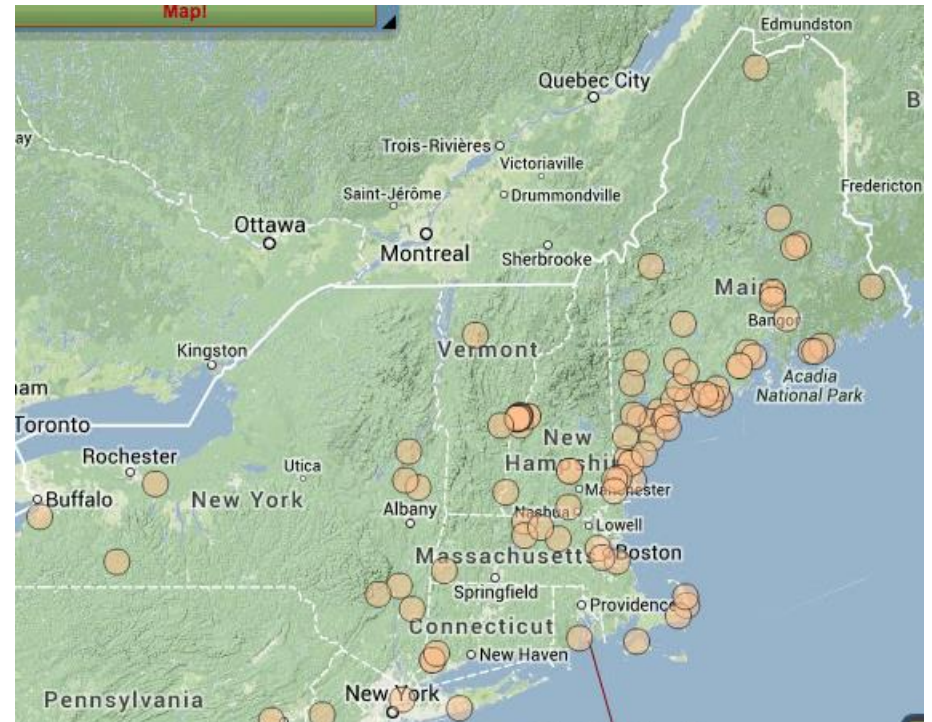
American black duck (*Anas rubripes*)  
American robin (*Turdus migratorius*)  
American woodcock (*Scolopax minor*)  
balsam fir (*Abies balsamea*)  
beach pea (*Lathyrus japonicus*)  
black-throated green warbler (*Dendroica virens*)  
bobolink (*Dolichonyx oryzivorus*)  
bog Labrador tea (*Ledum groenlandicum*)  
bumblebee (*Bombus* spp.)  
bunchberry dogwood (*Cornus canadensis*)  
common dandelion (*Taraxacum officinale*)  
common eider (*Somateria mollissima*)  
common lilac (*Syringa vulgaris*)  
common loon (*Gavia immer*)

# Project outcomes

- Contributions of Northeast citizen science groups to *Nature's Notebook*
  - ✧ Signs of the Seasons (U. Maine Coop Extension)
  - ✧ National Park Service, Northeast Temperate Network (in 12 National Parks)
  - ✧ Appalachian Mountain Club

Map shows *Nature's Notebook* sites with observations of red maple trees. Many of these sites are from the groups listed above.

Screenshot from <https://www.usanpn.org/data/visualizations>



# Project outcomes

- Published analysis of forest budburst using *Nature's Notebook* data

✧ Jeong, S. J., Medvigy, D., Shevliakova, E., & Malyshev, S. (2013). Predicting changes in temperate forest budburst using continental-scale observations and models. *Geophysical Research Letters*, 40(2), 359-364.

Although not a direct outcome of this project, this analysis was built on many of the observations contributed by member groups of the NE-RPN. Several other manuscripts using *Nature's Notebook* data are in various stages of prep and submission.

- Northeast researchers continue to participate in national and international phenology-related collaboration efforts

# Implications and applications in the Northern Forest region

- Although it may be several years before meaningful patterns can be discerned, the effort to collect and analyze phenology data in a coordinated fashion should allow us to predict how our species and ecosystems in the Northern Forest will respond to climate change and help us, as a regional society, adapt to these changes in terms of allergy seasons, tourist seasons, etc. In the meantime, we hope that engaging large numbers of citizen scientists in the effort will spur more people to make personal choices to help mitigate the degree to which we are changing our planet.

# Future directions

- With no future funding, the NE-RPN will attempt to maintain a low-key minimal web presence.
- The initial efforts of the NE-RPN laid the groundwork and although it may no longer go on in the name of the NE-RPN, the work certainly continues strongly with many of the NE-RPN citizen science groups and researchers working directly with the USA-NPN to collect, disseminate and interpret phenology information to better understand how the plants, animals and ecosystems of the Northern Forest are responding to climate change.



# List of products

## **Direct products**

- Nov 2010 Citizen science workshop products include agenda, workshop notes, etc.
- List of Northeast focal species by ecosystem type and other criteria

## **Indirect products**

- Improved phenology training materials based in part on input from NE-RPN members are in the works at the USA-NPN National Coordinating Office
- Phenophase status records in the National Phenology Database submitted by Northeast citizen science groups

# List of products

## Indirect products (cont.)

- Published protocols and scientific papers utilizing the aforementioned data
  - Tierney, G., B. Mitchell, A. Miller-Rushing, J. Katz, E. Denny, C. Brauer, T. Donovan, A. D. Richardson, M. Toomey, A. Kozlowski, J. Weltzin, K. Gerst, E. Sharron, O. Sonnentag, F. Dieffenbach. 2013. Phenology monitoring protocol: Northeast Temperate Network. *Natural Resource Report* NPS/NETN/NRR—2013/681 National Park Service, Fort Collins, Colorado.
  - Denny, E.G., K.L. Gerst, A.J. Miller-Rushing, G.L. Tierney, T.M. Crimmins, C.A.F. Enquist, P. Guertin, A.H. Rosemartin, M.D. Schwartz, K.A. Thomas, and J.F. Weltzin. In review. Standardized phenology monitoring methods to track plants and animal activity for science and resource management applications. *International Journal of Biometeorology*.
  - Jeong, S. J., Medvigy, D., Shevliakova, E., & Malyshev, S. (2013). Predicting changes in temperate forest budburst using continental-scale observations and models. *Geophysical Research Letters*, 40(2), 359-364.