



First-year Progress and Future Directions of the USA-NPN

- New web site (www.usanpn.org) that went live in June 2008:
 - On-line data entry
 - Clearinghouse for products and information to facilitate research and communications related to phenology;
 - Important links, recent products/papers
 - Enhanced data entry, visualization, and download tools being developed

- Plant phenology program with 200 vetted local, regional, national plant species with descriptions and monitoring protocols + template for addition of new species

- Partnership program describes how other monitoring networks can engage with USA-NPN to collect, manage or disseminate phenological information for science health, education, management or predictive service applications

- Project BudBurst, the NPN Field Campaign for Citizen Scientists, went live Feb 2008; 3000 registered observers now monitor 4000 plants

- Northeast Regional Phenology Network (www.nrn.org) went live this spring; other regional networks are in development or need a champion (see box)

- A Wildlife Phenology Program coordinator started fall 2008; volunteers needed to help develop this program (see box)

- Education clearinghouse now on-line soon; download materials for teaching phenology in the classroom, K-Gray

- National Phenology Canopy Camera network is being visioned and implemented this winter (see box); participants needed!

Future Directions include:

- Integration with national and international, formal and informal science networks

- Developing new landsurface phenology products and services, and enhancing availability

- Leveraging emerging technologies and data management capabilities

SUMMARY

The USA-NPN can leverage the efforts of thousands of individuals, scientists, and organizations to create an invaluable resource for agencies, NGOs, academics, and educators.

Phenology - A Critical Tool for Enabling Adaptive Responses to Climate Change

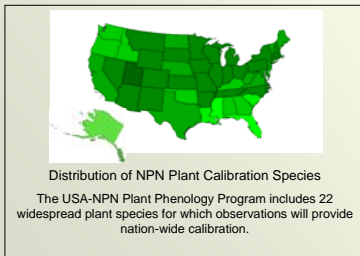
- Integrator of climatic variation and change across scales
- Simple to record and understand
- Science, health, agriculture, nat.resources, recreation
- Phenological data + models = human adaptation to climate change

- A continental science and monitoring initiative
- Agencies, NGOs, academia, public
- Plants + animals; contemporary + legacy data
- On-line data entry, maps, downloads
- Integrates with other science networks
- Education: "more kids in the woods"
- Remote sensing facilitates scaling

The **Plant Phenology Program** facilitates the collection, management, and distribution of nation-wide observations on the occurrence and timing of the various life cycle events of plants. The program maintains a list of plant species recommended for life cycle monitoring and develops protocols for the monitoring of those species by individuals; educational, naturalist, and environmental groups; agencies; and science stations.

The program currently supports:

- A plant-monitoring list recommending 211 species that includes 22 species of national focus, 188 species of regional focus, and one clonal species in the affiliated Lilac Program
- A web page where information on the program and instructions for participating in the plant phenology program can be found
- Network collaboration with the Lilac Program and Project BudBurst
- Protocols for plant phenology monitoring
- Cloned plant program including the Lilac Program



A National Phenology Network

The USA National Phenology Network (USA-NPN) is a national biological science and monitoring program for understanding and predicting impacts of environmental variation on ecological systems. The mission of the USA-NPN is to provide phenological information that can be used to understand the role of the timing of life cycle events in the biosphere. It will establish a nationwide network of phenological observations with simple and effective means to input, report, and utilize these observations, including the resources to provide information for a wide range of decisions made routinely by individual citizens and by the Nation as a whole. *Integration of spatially-extensive phenological data and models with both short and long-term climatic forecasts offer a powerful agent for human adaptation to ongoing and future climate change.*

The goals of the USA-NPN are to:

- Understand how plants, animals and landscapes respond to environmental variation and climate change
- Develop tools and techniques related to phenology for human adaptation to environmental variation and climate change

The core functions of the USA-NPN are to:

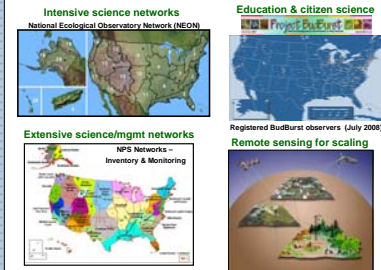
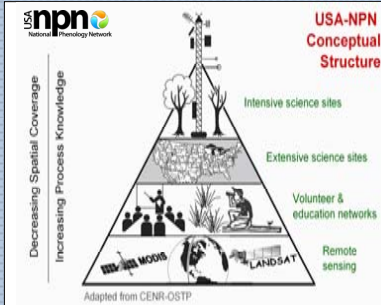
- Provide a database containing data for, or links to, a diversity of phenological or physical datasets for use by scientists, managers, planners and the public.
- Create a relatively simple method for organizations to integrate their websites and databases with those of the USA-NPN.
- Develop and promote standardized phenology monitoring protocols.
- Provide a clearinghouse for phenology-related educational/outreach materials
- Develop and promote tools and approaches for spatial and temporal integration of phenology data for applications and decision-making

PHENOLOGY: THE PULSE OF OUR PLANET

The recently launched **Wildlife Phenology Program** of the USA-NPN is strategically aligned with the Plant Phenology Program collecting nation-wide observations and tracking life cycle events of wildlife.

The Wildlife Phenology Program is currently preparing:

- A list of ~120 species for monitoring, including amphibians, birds, fish, invertebrates, mammals, and reptiles.
- Protocols for monitoring animal phenology.
- Collaborations with a wide variety of wildlife organizations, including the US Fish and Wildlife Service, Cornell Lab of Ornithology, and Association of Zoos and Aquariums.



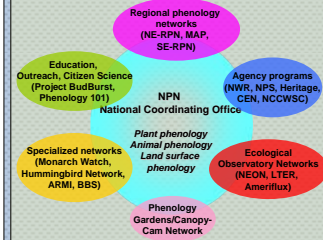
The USA-NPN database organizes four types of phenology observations: 1) local **intensive science sites** focused on process studies at science networks such as NEON, LTER, and Ameriflux, 2) **extensive sites** focused on widespread standardized monitoring such as the National Park Service and the U.S. Fish and Wildlife Refuges, 3) **volunteer and education networks** such as the NPN-affiliated Project BudBurst and Lilac Program, and 4) **landscape monitoring with remote sensing** that extend surface observations.

REGIONAL PHENOLOGY NETWORKS

Integration of spatially-extensive phenology data with models of both short- and long-term climatic forecasts offer a powerful agent for human adaptation to ongoing and future climate change. Regional Phenology Networks (RPNs) are key components to help fully realize the contribution of phenological data towards this goal. They contribute at local to regional scales, and may portend conditions at, and be contextually linked to, the national scale.

- ↓ The Northeast RPN (NE-RPN) is well established and active, focused upon issues of regional importance, and contributing to strategic and logistic development of the USA-NPN
- ↓ The Northeast Regional Phenology Network is a cooperative network designed to coordinate phenological monitoring, facilitate data sharing and synthesize phenology data from the northeastern US and eastern Canada.
- ↓ The Mid-Atlantic RPN launched April 2008, the Southwest RPN launched October 2008.
- ↓ The Southeast RPN is seeking funding for an initial workshop in 2009
- ↓ The Rocky Mountain and California RPNs are emerging.

The USA-NPN is a **collaborative partnership** that includes federal agencies, the academic community, and the general public, all working together to monitor and understand the influence of seasonal cycles on the Nation's biological resources.



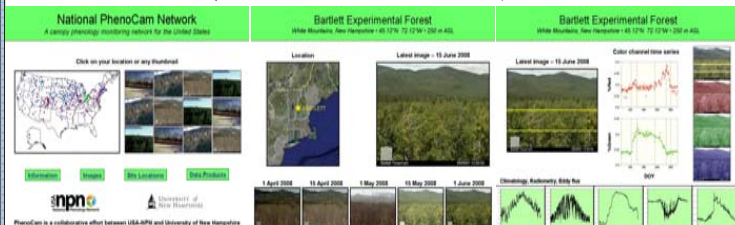
Sponsors provide support for USA-NPN activities either through direct funding or substantial in-kind support or cooperation. Collaborators work closely with USA-NPN on specific projects with defined activities and deliverables. Participants collect and/or contribute data or value-added products to USA-NPN.



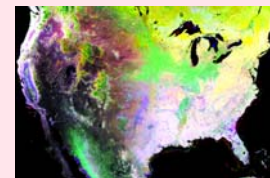
Regional network name, acronym, domain name, and potential coordinator.	NE-RPN	www.nrn.org	Denny
Northeast Regional Phenology Network	NE-RPN	www.nrn.org	Denny
Mid Atlantic Phenology Network	MAP	www.mapseasons.org	De Beurs
Southeast Regional Phenology Network	SE-RPN	www.serpn.org	Kish
Great Lakes Regional Phenology Network	GL-RPN	www.glrpn.org	TBD
Midwest Regional Phenology Network	MW-RPN	www.mwrpn.org	TBD
Northern Plains Regional Phenology Network	NP-RPN	www.nprpn.org	Brown?
Southern Plains Regional Phenology Network	SP-RPN	www.sprpn.org	TBD
Rocky Mountain Regional Phenology Network	RM-RPN	www.rmprpn.org	Alaback
Southwest Regional Phenology Network	SW-RPN	www.swrpn.org	Van Leeuwen
Northwest Regional Phenology Network	NW-RPN	www.nwrpn.org	TBD
California Regional Phenology Network	CAL-RPN	www.clrpn.org	Haggerty
Islands Regional Phenology Network	ISL-RPN	www.islrpn.org	TBD

A Proposal to Scale from Surface to Landscape Remote Sensing of Phenology

(contact Andrew Richardson andrew@solo.unh.edu)



- Strategy and governance issues addressed at RCN meeting: Geoff Henehy (chair), Wim van Leeuwen (vice-chair), September.
- Scoping proposal submitted to NASA Terrestrial Ecology program, October.
- "Shifts in Phenology and Seasonality? Recent Evidence from Multiple Taxa, Ecoregions, and Models", special sessions on phenology at AGU Fall Meeting, December.
- Education proposal submitted to NASA Global Climate Change Education program, October
- Come to EGU in Vienna, April 2008 - Session CL44 - Abstracts needed! (Contact Jake Weltzin, co-convenor)**



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