

Nature's Notebook

An extensible and flexible platform for network-based research and collaboration

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What is the USA-NPN?

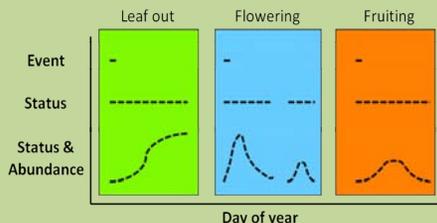
The USA National Phenology Network (USA-NPN, www.usanpn.org) is a national science and monitoring initiative focused on phenology as a tool to understand how plants, animals and landscapes respond to environmental variation & climate change.

USA-NPN helps you to address questions including

- Spatial and temporal trends in phenology
- Phenology as an indicator of species and habitat vulnerability
- Relationships between phenology and ecosystem processes
- To facilitate this, the USA-NPN offers a variety of programs, tools and materials.

USA-NPN offers scientifically rigorous observation protocols

- Plants and animals
- *Status* monitoring (noting the phenological status of plants and animals during a series of repeated observations)
- Animal *abundance* and plant canopy *development*, which yield a rich data set including multiple events in a season, phenophase duration and estimates of error in onset and commencement dates



Advantages of Nature's Notebook for EREN

Nature's Notebook as a platform for science



- Proven, established, off-the-shelf program
- National, integrated, multi-taxa framework
- Operates across scales of organization
- Data management already provided
- Core protocols and methodologies are vetted/documented
- Data use and attribution policies already established
- Flexible: hypothesis-testing or pattern-based research projects
- Leverage on data collected by other organizations
- Network Coordinating Office can provide custom services

Nature's Notebook as a platform for education

- Experiential, real-world meaningful activity that can provide opportunities for career selection.
- Training and education materials already exist and can be adapted to fit academic settings
- Meet students "where they are"
 - flexible: students can access webpage anytime
 - data entry using mobile apps (Android, iPhone)
 - students can participate "from their backyard"



Case studies - Nature's Notebook for EREN

University of California, Santa Barbara

Since 2007, Dr. Susan Mazer and PhD candidate Brian Haggerty have been **cultivating phenological literacy** at the college level, although phenology is not a formal component in the undergraduate curriculum.



- ✓ One-hour lectures
- ✓ Hands-on phenological data collection activities
- ✓ Three-hour training workshops
- ✓ Discussion of peer-reviewed literature
- ✓ Resources on www.usanpn.org

Meredith College, Raleigh, North Carolina

Dr. Erin Lindquist has created a **semester-long data collection project** for her 200-level plant biology course. Students collected phenology data on trees in the Meredith Forest and entered data on a bi-weekly basis into *Nature's Notebook*.

The project culminated in **oral presentations** analyzing phenological **data patterns** compared to data recorded elsewhere. Curricula available at www.usanpn.org



Nature's Notebook



An off-the-shelf program appropriate for scientists and non-scientists alike that engages citizen scientist volunteers across the US to collect phenology observations on both plants and animals.

Training resources available on USA-NPN's website:



Seeking partnerships with educational, research and management organizations

- Implement vetted, standardized protocols for collecting phenology observations
- Use phenology data and information
- Develop inquiry-based education

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