

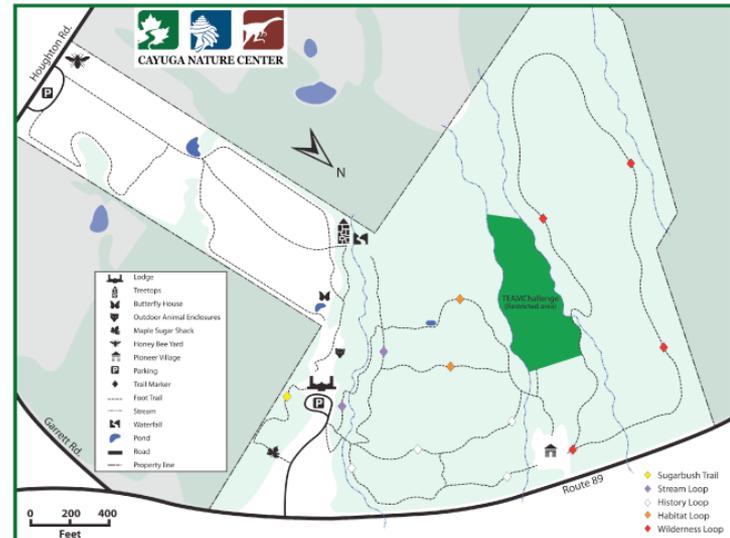
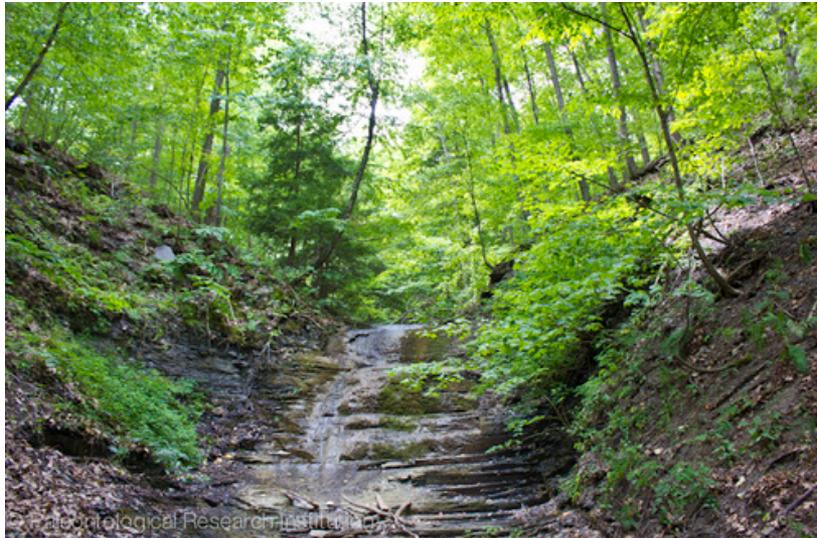
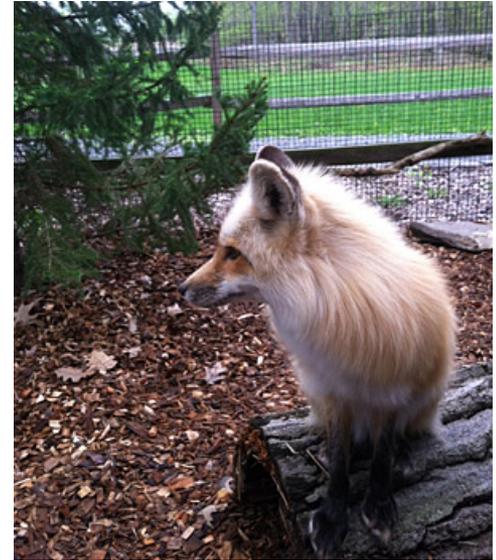
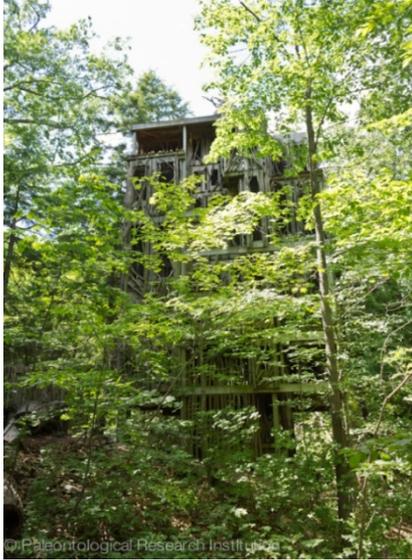
Trees and Tribulations

Setting up and running a tree phenology walk at the Cayuga Nature Center



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Nature Center Programs



Phenology

The study of key seasonal and cyclical changes in plants and animals from year to year, especially their timing and relationship with weather and climate.

Examples: Leaf buds breaking
 Flowers blooming
 Insects emerging
 Birds migrating
 Leaves changing color

Tree Phenology Walk

- Established 2013 with one tree; added nine more in 2014

Sugar Maple
Eastern Redbud
Eastern Hemlock
Black Locust
Northern Red Oak
Bitternut Hickory
American Basswood
Hophornbeam
Common Buckthorn
Bur Oak

- Registered with the USA-National Phenology Network (NPN)



USA **npn**
National Phenology Network

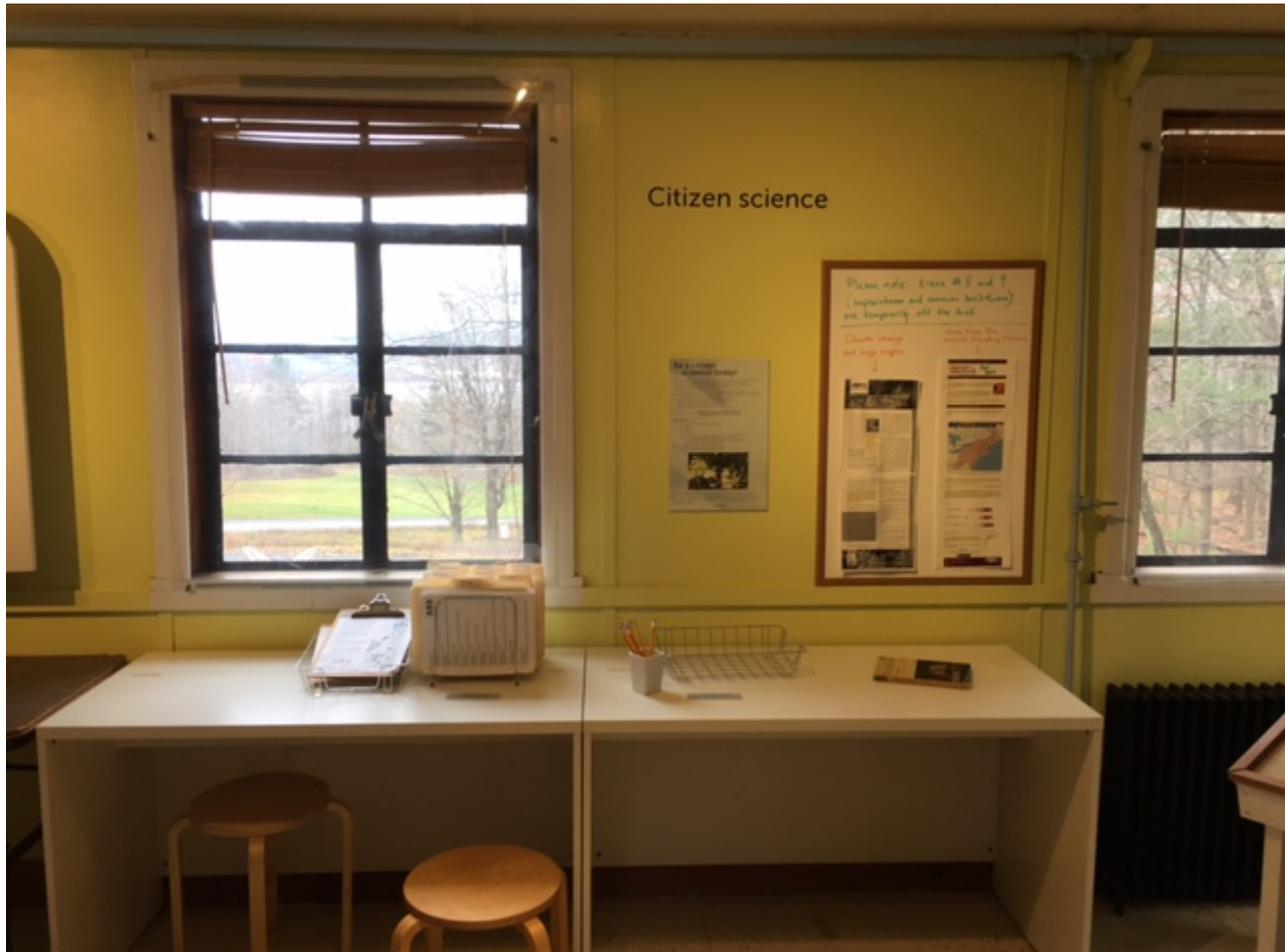
nature's
notebook
A project of the USA-NPN

Phenology Walk Goals

- Education, to build knowledge about climate change
- Motivation, to encourage people to monitor at home
- Data collection, to support scientific research

Phenology Walk

Part of Citizen Science station in *Our Changing Climate*
(exhibit on local impacts of climate change)



Be a citizen scientist today!

While you're here today you can collect and submit observations of trees through a project of the USA National Phenology Network called Nature's Notebook. Phenology is the study of seasonal and cyclic changes in plants and animals, especially related to weather and climate. Contribute to scientific discovery! Your observations will become part of a national, long-term database that's an invaluable tool for tracking the impacts of climate change.

- Scientists use your data in groundbreaking research.
- Land managers use your data to make better-informed decisions about natural resources in their care.
- Decision-makers use your data to determine policy.

**We have ten trees on our phenology trail.
Feel free to observe one, a few, or all ten.**

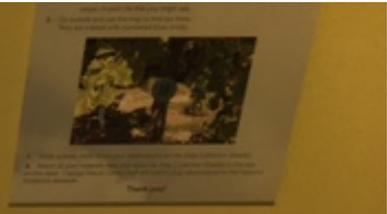
How to do it:

1. Pick up these things from the table below.
 - a. Pencil
 - b. Clipboard
 - c. Trail map
 - d. Data Collection Sheets for the trees you want to observe. This is where you will write down your observations. On the back of each sheet are descriptions of the different stages of plant life that you might see.
2. Go outside and use the map to find our trees. They are marked with numbered blue circles.



3. While outside, write down your observations on the Data Collection Sheet(s).
4. Return all your materials here and leave the Data Collection Sheet(s) in the box on this table. Cayuga Nature Center staff will submit your observations to the Nature's Notebook database.

Thank you!



Data collection sheets

1 Sugar Maple (*Acer saccharum*)

A phenophase is a visible stage in a plant's life cycle.
For help in identifying phenophases, see the photos below.
! Please carefully read the definitions on the back of this page for the phenophases you are observing.

Leaves	Buds
<p>The leaves are 3 to 5 inches long and usually wide with five primary veins. The leaves are green turning to bright yellow, orange or flame-red or red-orange in the fall.</p>	<p>Immature leaf expansion</p> <p>Developing bud, can't distinguish between leaf bud and flower bud at this stage. Bud, size of thumb, long, pointed out at the end of the twig is generally a leaf bud, whiter, plumper ones around that bud are more than likely a flower buds.</p> <p>Breaking leaf bud. Leaf tips just barely visible beyond the bud tip.</p> <p>Emerging flower bud. Flower tips just barely visible beyond the bud tip.</p>
Flowers	Fruit
<p>Small, greenish-yellow flowers are produced in loose-like clusters, or racemes. Each drooping cluster contains 8 to 14 flowers.</p> <p>Initial flower expansion</p>	<p>The fruit is two joined seeds in a "V" shape, each seed having a wing.</p> <p>The fruit is considered ripe when it has turned yellowish-green or brownish and readily drops from the plant when touched.</p>

Record your observations:

Directions: In the box to the right, circle the appropriate letter to describe the phenophase status (a phenophase is a visible stage in a plant's life cycle).

y = I see the phenophase
n = I don't see the phenophase
? = I'm not sure if I see the phenophase

Example: If you see leaves on the tree, circle "y" in the row labeled "do you see leaves?"

Example: If you see buds but you're not sure if they are flower buds or leaf buds, circle "?" in the row labeled "do you see flowers or flower buds?"

	Circle "y" for yes, "n" for no, "?" for not sure
do you see breaking leaf buds?	y n ?
do you see leaves?	y n ?
do you see increasing leaf size?	y n ?
do you see colored leaves?	y n ?
do you see falling leaves?	y n ?
do you see flowers or flower buds?	y n ?
do you see open flowers?	y n ?
do you see pollen release?	y n ?
do you see fruits?	y n ?
do you see ripe fruits?	y n ?
do you see recent fruit or seed drop?	y n ?

Site: Cayuga Nature Center
Observer: _____
Date: _____ Time: _____

Report your contribution of time and observations of snow here:

Report your contribution of time	
Time spent observing	hr min
Time spent in travel	hr min
Report on snow	
Is there snow on the ground?	y n ?
Estimate the % of ground covered with snow	
Is there snow in the canopy?	y n ?

Phenophase definitions (for deciduous trees)

Leaves

Breaking leaf buds

One or more breaking leaf buds are visible on the plant. A leaf bud is considered "breaking" once a green leaf tip is visible at the end of the bud, but before the first leaf from the bud has unfolded to expose the leaf stalk (petiole) or leaf base.

Leaves

One or more live, unfolded leaves are visible on the plant. A leaf is considered "unfolded" once its entire length has emerged from the breaking bud so that the leaf stalk (petiole) or leaf base is visible at its point of attachment to the stem. Do not include fully dried or dead leaves.

Increasing leaf size

A majority of leaves on the plant have not yet reached their full size and are still growing larger. Do not include new leaves that continue to emerge at the ends of elongating stems throughout the growing season.

Colored leaves

One or more leaves (including any that have recently fallen from the plant) have turned to their late season colors. Do not include fully dried or dead leaves that remain on the plant.

Falling leaves

One or more leaves are falling or have recently fallen from the plant.

Flowers

Flowers or flower buds

One or more fresh open or unopened flowers or flower buds are visible on the plant. Include flower buds that are still developing, but do not include wilted or dried flowers.

Open flowers

One or more open, fresh flowers are visible on the plant. Flowers are considered "open" when the reproductive parts (male stamens or female pistils) are visible between or within unfolded or open flower parts (petals, floral tubes or sepals). Do not include wilted or dried flowers.

Pollen release

One or more flowers on the plant release visible pollen grains when gently shaken or blown into your palm or onto a dark surface.

Fruit

Fruits

One or more fruits are visible on the plant.

Ripe fruits

One or more ripe fruits are visible on the plant.

Recent fruit or seed drop

One or more mature fruits or seeds have dropped or been removed from the plant since your last visit. Do not include obviously immature fruits that have dropped before ripening, such as in a heavy rain or wind, or empty fruits that had long ago dropped all of their seeds but remained on the plant.

Data collection sheets

Circle
"y" for yes,
"n" for no,
"?" for not sure

do you see breaking leaf buds?	y n ?
do you see leaves?	y n ?
do you see increasing leaf size?	y n ?
do you see colored leaves?	y n ?
do you see falling leaves?	y n ?
do you see flowers or flower buds?	y n ?
do you see open flowers?	y n ?
do you see pollen release?	y n ?
do you see fruits?	y n ?
do you see ripe fruits?	y n ?
do you see recent fruit or seed drop?	y n ?

Note: abundances
left off

Data collection sheets: phenophase definitions

Phenophase definitions (for deciduous trees)

Leaves

Breaking leaf buds

One or more breaking leaf buds are visible on the plant. A leaf bud is considered “breaking” once a green leaf tip is visible at the end of the bud, but before the first leaf from the bud has unfolded to expose the leaf stalk (petiole) or leaf base.



Bur Oak



Sugar Maple in spring

Guided walks



Guided walks

Why study phenology?

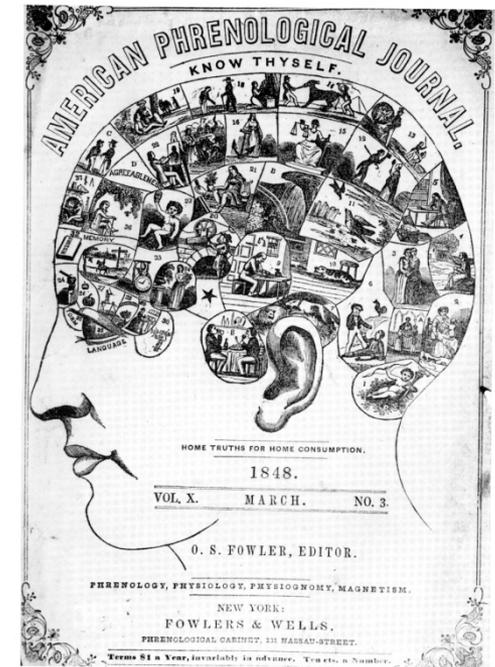
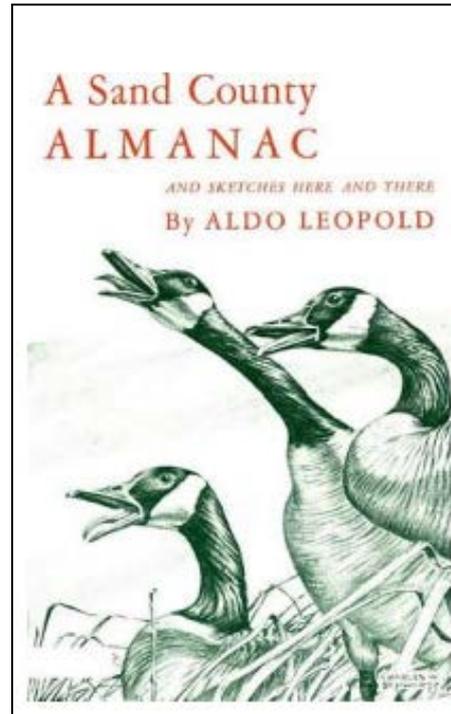
Jefferson, Thoreau

Causes of seasonal change

How do scientists use
phenological data?

Make observations

How to join the project on
your own



Lessons Learned: Choosing Trees

- NPN campaign
- How many?
- Trees with a story
- Tree maturity
 - Too young: not producing fruit yet
 - Too old: could die soon
- Accessibility
 - Low branches
 - Clear ground
 - Entire tree visible





Lessons Learned: Signage

- Signs by the tree are best
 - Increase participation
 - Increase awareness
- Place signs when trees are fully leafed out
- Signs disappear

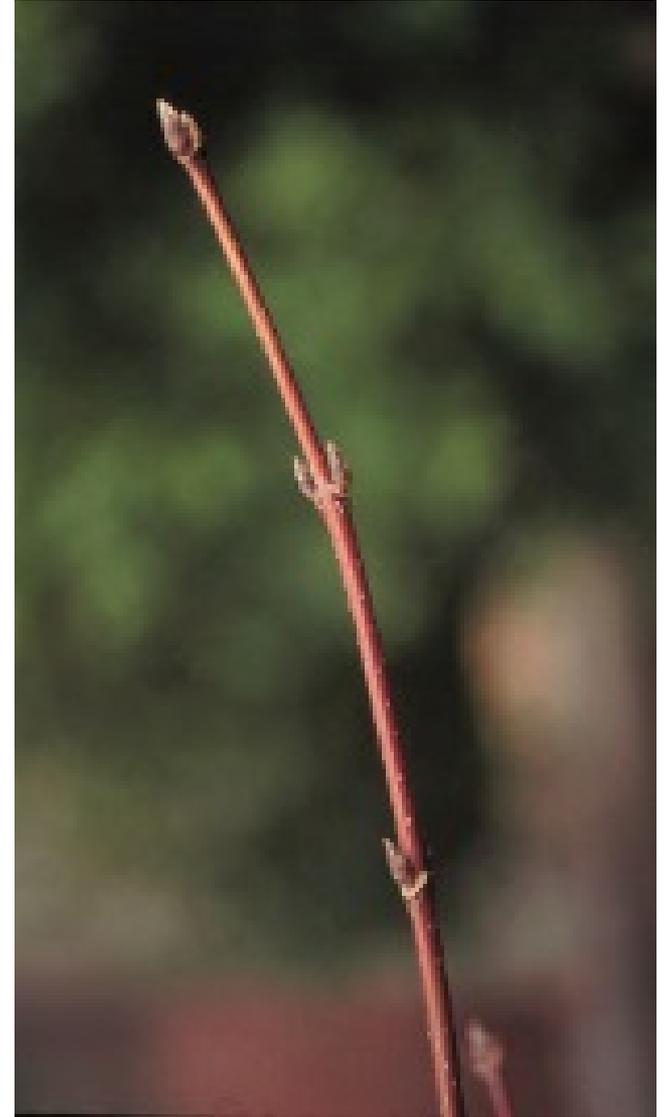
Lessons Learned:

Data Collection Sheet Design

- What questions to ask?
 - Use NPN questions
 - Include abundance?
- Include photos
- Include phenophase definitions
- Give brief, clear instructions
 - “It’s okay to enter ? if you’re not sure.”

Lessons Learned: Data Quality

- Training matters
- Don't fear bad data
- Think about your goals
 - Education
 - Motivation
 - Data collection
 - Find and train volunteers
- Data quantity
 - Dedicated staff/volunteers doing regular collection?



Sugar maple winter buds (DNR, Cornell)

Lessons Learned: Keeping it Interesting

- Year-round activity
- Nos are important
- Phenology in general:
 - Tough sell: data are only interesting after many years
 - Easy sell: seasonal changes are familiar, welcome
- Think Spring!



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