The Arnold Arboretum Tree Spotters

Refresher Training: Spring 2020

Wolkovich Temporal Ecology Lab
Arnold Arboretum of Harvard University

Tree Spotters Team

Suzanne Mrozak, Volunteer Coordinator

Danny Schissler, Associate Project Manager

Catherine (Cat) Chamberlain, Graduate Student

In this presentation…

- Tree Spotters program update
- Coronavirus (COVID-19) update
- Tips and updates from NPN
- NPN mobile app
- Phenology review
- Route reviews
- Tree Spotter observations/route
- Tree Spotter photos on Flickr
- Your data: How to view it and how it’s used

Tree Spotters program update

- As most of you know, the Tree Spotters program began in the Wolkovich Lab as a means of collecting phenology data for use in the lab group's research. When the Wolkovich Lab relocated to UBC, the volunteer-run program shifted to the Arboretum's Public Programs offerings while maintaining its objective of providing phenology data for researchers at the Arboretum.
- Cat Chamberlain will be wrapping up her research using the Tree Spotters data in 2020. As no other research projects at the Arboretum are using Tree Spotters data directly, **2020 will be the final year that the program is offered.**
- Given our strong core of citizen scientist volunteers and overwhelming success of the Tree Spotter program, **Public Programs leadership will spend 2020 actively investigating new citizen programing at the Arboretum** and will be in touch with developments.
- A resounding THANK YOU to our volunteers who have collectively contributed over 270,000 observations over five seasons! **This program would not have been possible without your considerable efforts.**

Coronavirus (COVID-19) update

- The safety of our volunteers and coordinators is our number-one priority. Due to Coronavirus (COVID-19), **we will be cancelling all March and April events** and assessing the viability future events in 2020 as the situation unfolds.
- We encourage those who are comfortable spending time on the grounds to continue Tree Spotting over the coming months while practicing safe “social distancing” (maintaining at least six feet of distance from others at all time) and good hygiene measures. Please see recommendations from the Center for Disease Control here: https://www.cdc.gov/coronavirus/2019-ncov/about/index.html
- Until further notice, the Visitor Center and Hunnewell Building services (including restrooms) at 125 Arborway will be closed to the public. Portable restrooms are available outside the Hunnewell Building. You are welcome to call our public number for information (617.524.1718).
- The Arboretum is counting on visitors to keep our landscape and community safe and healthy by removing all trash that they generate instead of using on-site receptacles.

Tips and updates from NPN

- It's very important to capture the first Y, so early Ns are important.
- Re values and intensities
  - We do not ask you to report values and intensities.
  - NPN would love it if people would report the low-end intensities, however.
  - If you want to report the low-end intensities, it's fine to stop reporting when it gets too hard to get an accurate count.
- It's definitely OK not to report something if it's too confusing or too hard.

Tips and updates from NPN

- How to record Ripe fruits: *Betula alleghaniensis*
  - The original NPN definition for *Betula alleghaniensis* (Yellow Birch) “Ripe fruits” was: “One or more ripe fruits are visible on the plant. For *Betula alleghaniensis*, a fruit in considered ripe when it has turned tan or light brown and readily drops from the dark brown catkin when touched. Do not include empty catkins that have already dropped all of their nutlets.”
    - The term “empty catkins” is not applicable here. When the seeds disperse, the catkin disintegrates, leaving a woody stalk.
    - This also does not include the fact that the seeds (the nutlets) continue to fall through the winter - and even into the following spring.

Tips and updates from NPN

- How to record Ripe fruits: *Betula alleghaniensis*
  - The new NPN definition for *Betula alleghaniensis* (Yellow Birch) “Ripe fruits” is: “One or more ripe fruits are visible on the plant. For *Betula alleghaniensis*, a fruit in considered ripe when it has turned tan or light brown and readily drops from the dark brown catkin when touched. Do not include empty catkin stalks that have already dropped all of their nutlets.”

Tips and updates from NPN

- How to record Ripe fruits *Betula alleghaniensis*
  - NPN has also now clarified (in an email) that the “Ripe fruits” (the mature, tan nutlets in the catkins) should be reported for as long as you see them on the tree, which may mean as late as the following spring.

Betula alleghaniensis 629-83*D
Photo by S. Mrozak

Bottom line: Please ask us if you have questions. The NPN definitions can sometimes be very general. They are aware of that and are happy to make them more helpful.

Tips and updates from NPN

- How to record Ripe fruits: *Viburnum cassinoides*
  - NPN guidance on “persistent fruit” - fruit that stays on the plant and “mummifies” (e.g.,*Viburnum cassinoides*) - is to continue to say “Yes” to Ripe fruit until it appears unpalatable to wildlife.
  - They include some guidance on this on page 78 of their Phenophase Primer: https://www.usanpn.org/files/npn/reports/USA-NPNPhenophasePrimer_Section1-June2017.pdf.

Viburnum cassinoides 593-2008*D
Photo by S. Mrozak

Tips and updates from NPN

- How to record Recent fruit drop
  - NPN's definition is "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."
  - We plan to work with NPN this year to clarify definitions for:
    - *Hamamellis viriginiana*
    - *Betula allehganiensis*
    - *Viburnum cassinoides*

Tips and updates from NPN

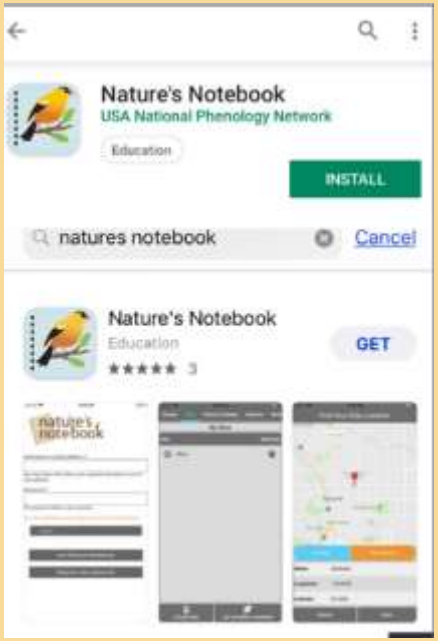
- Stop reporting open flowers when the flowers have withered (senesced).
- In the spring, the end of the increasing leaf size phenophase (when over 50% of the leaves have reached full size) signals the beginning of the growing season.
- In the fall, the loss of chlorophyll, as indicated by colored leaves (leaf senescence) signals the end of the growing season.

Tips and updates from NPN

- They suggest that everyone “study up on the natural history of your plant”, not just read the phenophase definitions.
- They are revising their “How to Observe” handbook and hope to have the updated version available in 2020.

NPN mobile app

Reminder: NPN released a new version of the Nature's Notebook mobile application last spring.



NPN will no longer be offering support for the old app after December 16, 2019.

To learn more about the app, take a look at their mobile app tip sheet.

You can download the app from the Apple App Store and the Google Play Store.

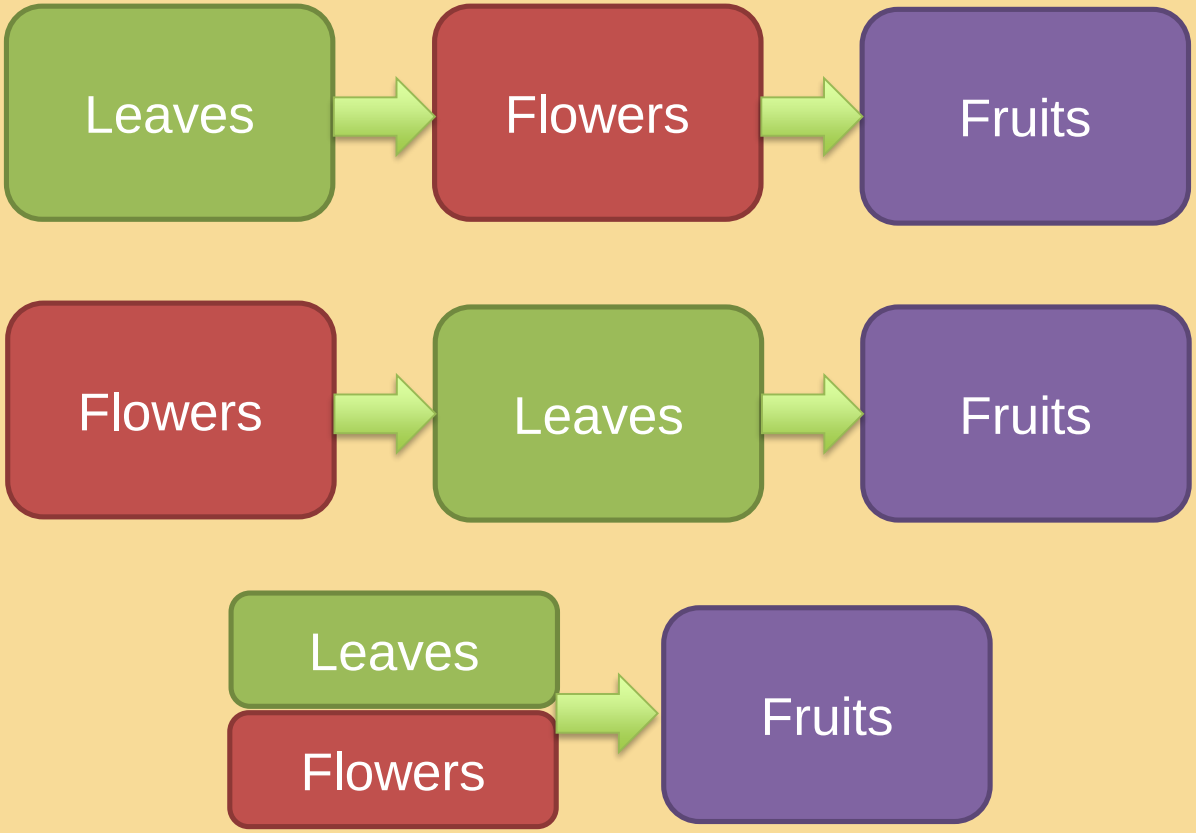
If you have any questions or problems with the app, please let us know by emailing TreeSpotters@fas.Harvard.edu. If we can't answer them ourselves, we will pass them along to the NPN folks.

Phenology review

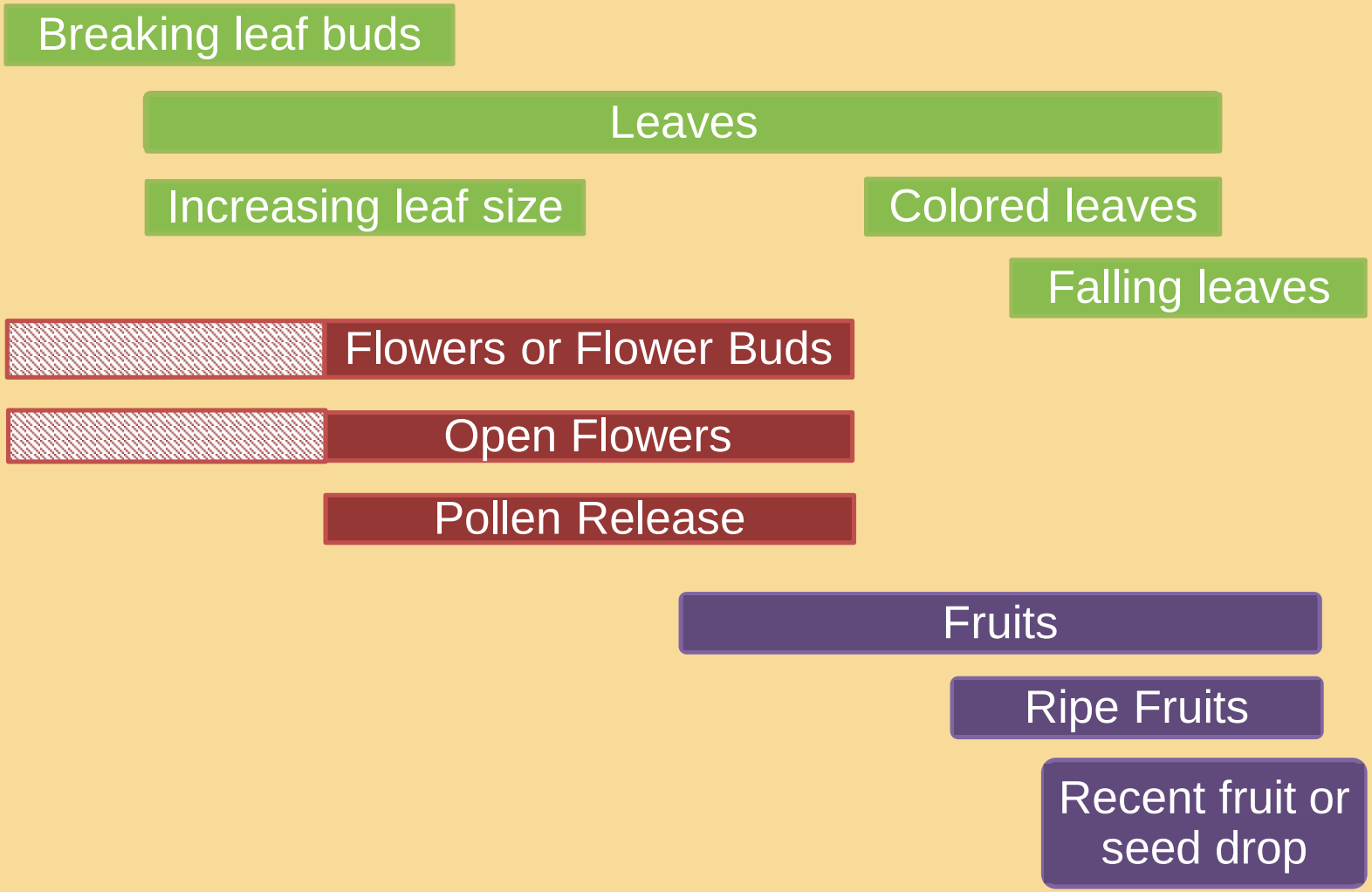
- Phenophases - what to look for when
- Understanding phenophase definitions
- Deciduous plant phenophases
- Phenophase guides

Understanding phenophase definitions

Phenophases: Observable life cycle events

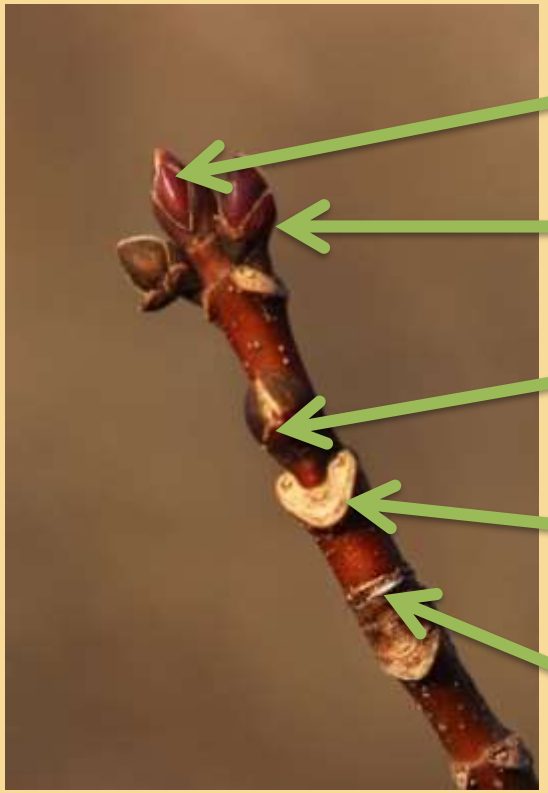


Deciduous plant phenophases



About buds, in general

Scaled buds



Scaleless ("naked") buds

- Terminal or apical bud
- Bud scale
- Axillary or lateral bud
- Leaf scar
- Bud scale scars

Acer rubrum (Red Maple)

Viburnum cassinoides (Withe-rod)

About buds, in general

Vegetative bud
Quercus alba
(White Oak)

Reproductive bud
Betula alleghaniensis
(Yellow Birch)

"Mixed" bud
Acer saccharum
(Sugar Maple)

About buds – some examples

Quercus alba
(White Oak)

Betula nigra
(River Birch)

Tilia americana
(American Linden)

Vaccinium corymbosum
(Highbush Blueberry)

Fagus grandifolia
(American Beech)

Hamamelis virginiana
(Common Witch-hazel)

About leaves, in general

Quercus alba (White Oak)

About leaves – some examples

Betula alleghaniensis
(Yellow Birch)

Populus deltoides
(Eastern Cottonwood)

Aesculus flava
(Yellow Buckeye)

Carya glabra
(Pignut Hickory)

Acer saccharum
(Sugar Maple)

Viburnum cassinoides
(Withe-rod)

About flowers, in general

Flower bud

Sepal

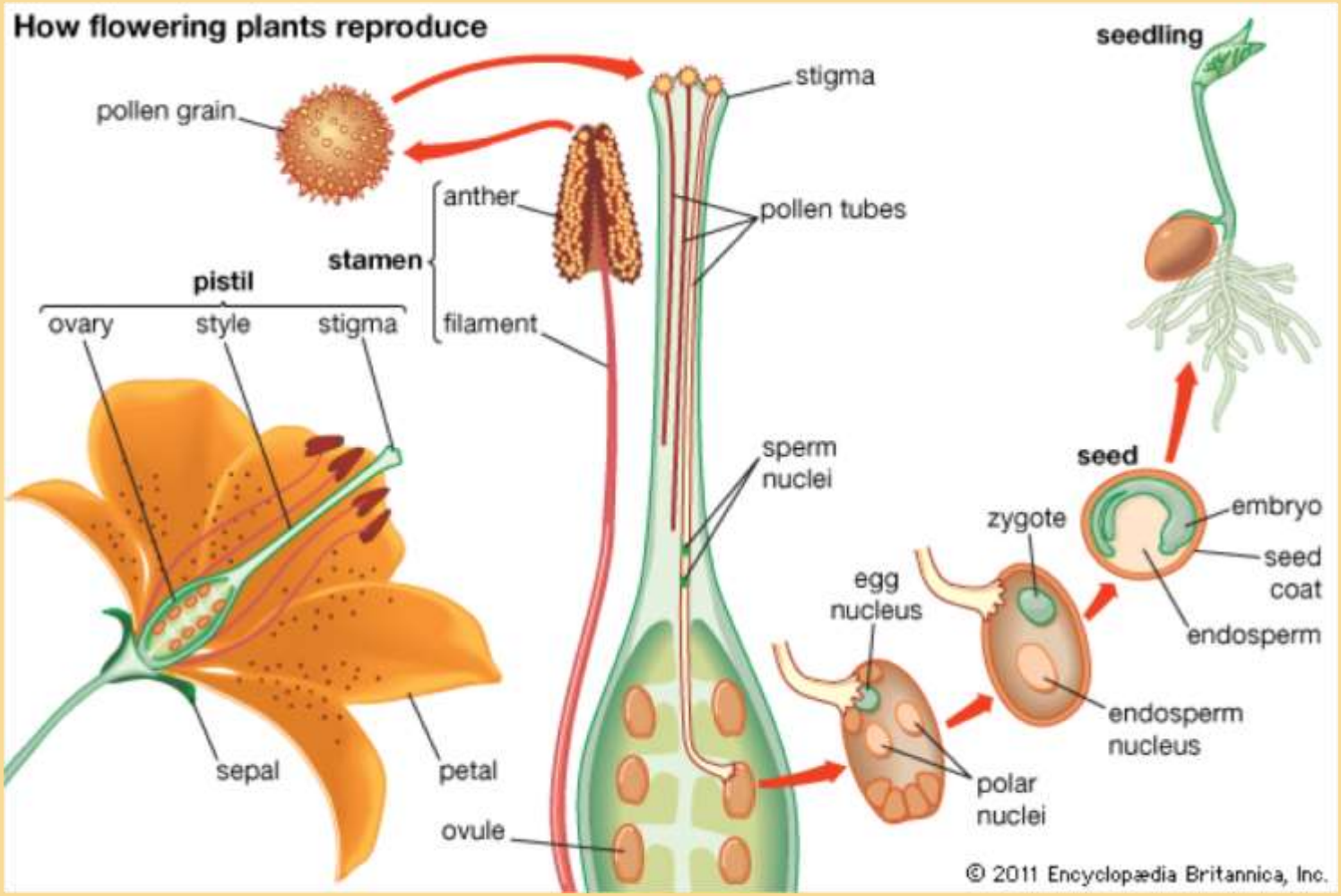
Petal

Pistil

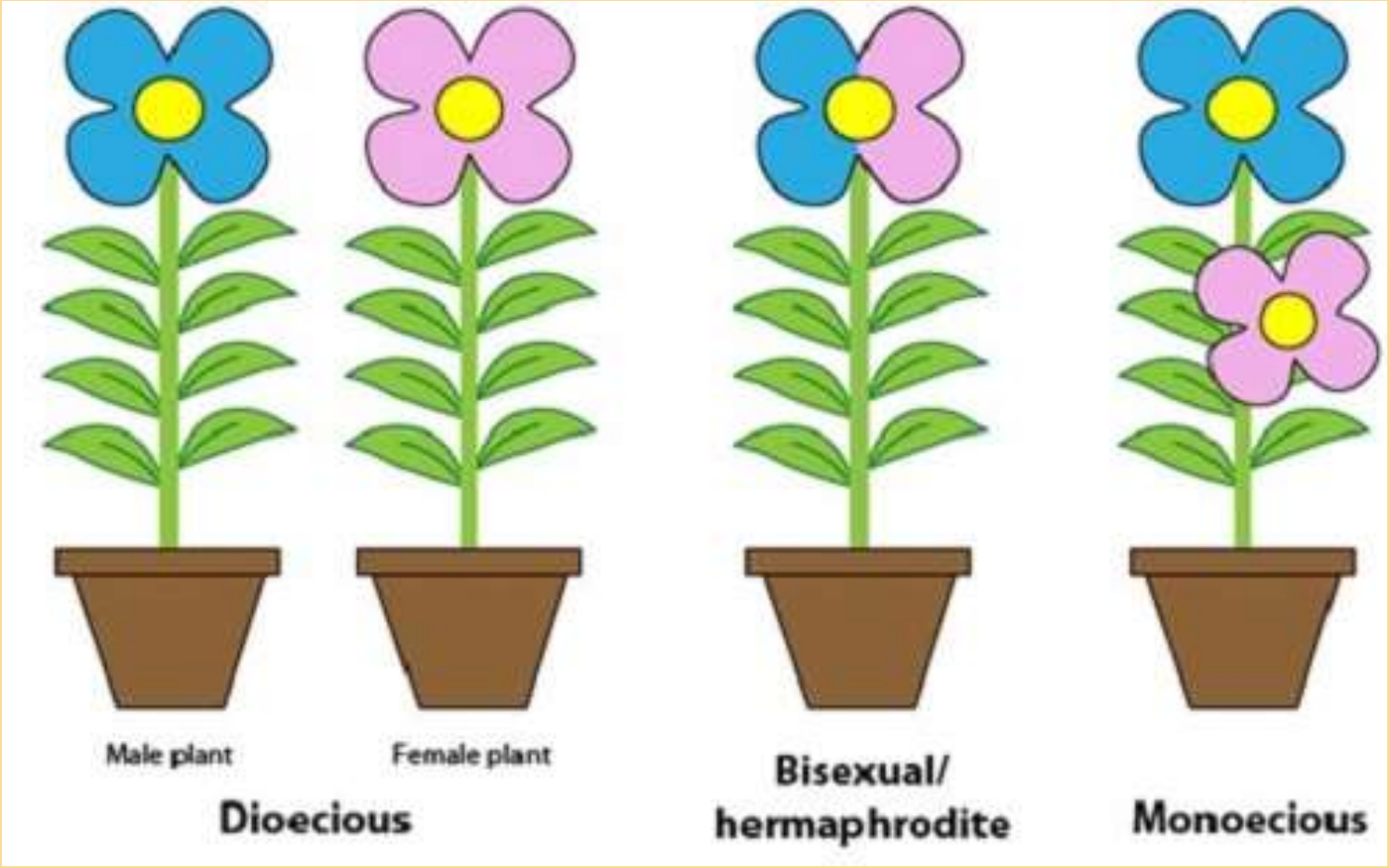
Stamen

Tilia americana (American Linden)

About flowers, in general



About flowers, in general



About flowers – some examples

Fagus grandifolia
(American Beech)

Betula nigra
(River Birch)

Populus deltoides
(Eastern cottonwood)

Populus deltoides
(Eastern Cottonwood)

Viburnum cassinoides
(Withe-rod)

Aesculus flava
(Yellow Buckeye)

Acer rubrum
(Red Maple)

From flower to fruit

River birch (*Betula nigra*)

Female flower

Pollination

Unripe fruit

Maturation & Ripening

Ripe Fruit

Dehiscence

Seeds

Shagbark hickory (*Carya ovata*)

Female flower

Pollination

Unripe fruit

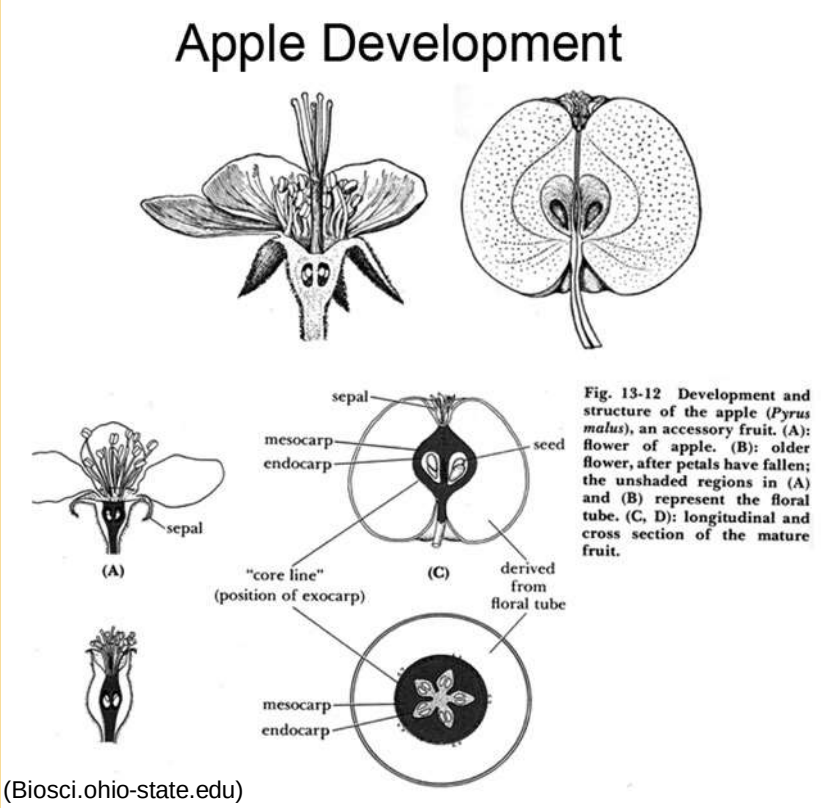
Maturation & Ripening

Ripe Fruit

Dehiscence

Seeds

About fruit, in general



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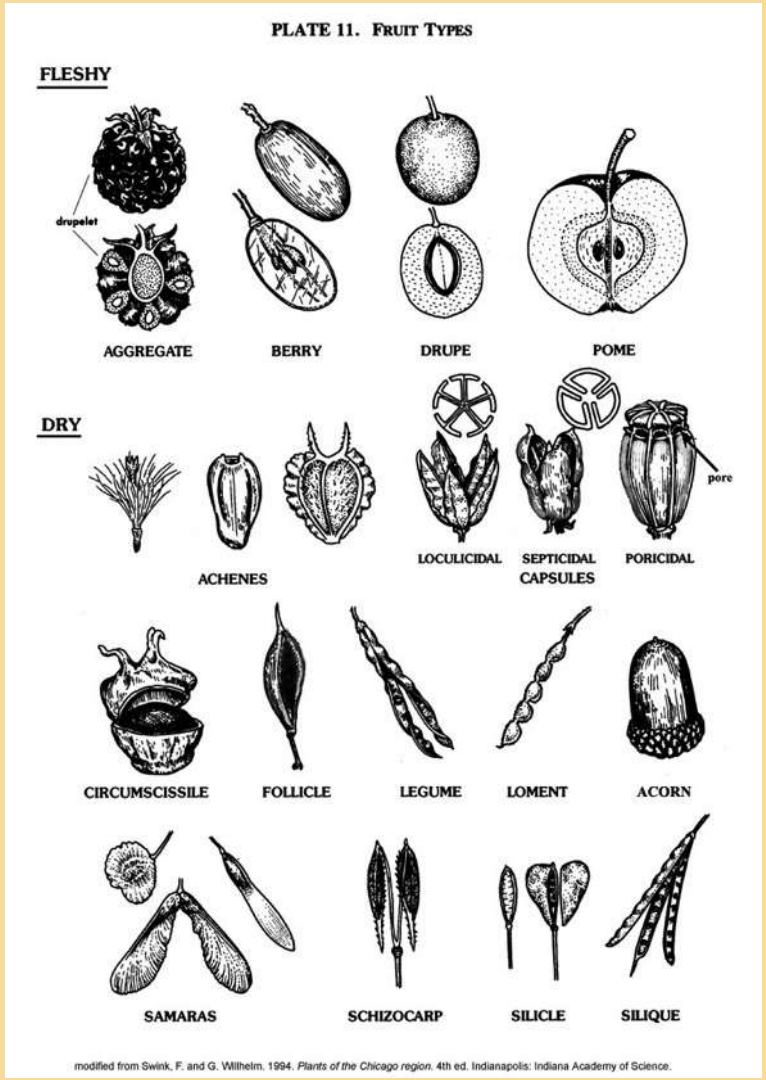


About fruit – some examples

Acer rubrum
(Red Maple)

Betula nigra
(River Birch)

Populus deltoides
(Eastern Cottonwood)

Vaccinium corymbosum
(Highbush Blueberry)

Aesculus flava
(Yellow Buckeye)

Fagus grandifolia
(American Beech)

Hamamelis virginiana lifecycle

Breaking Leaf Bud

Increasing Leaf Size

Leaves
(early spring through late fall)

Leaves

Autumn Leaf Color

Hamamelis virginiana lifecycle

Flowers or Flower Buds

Open Flowers

Flowers or Flower Buds (fall)

NOTE: *Hamamelis virginiana* retains its sepals (structures that support flower petals) long after flowering. These are *not* flowers!

Hamamelis virginiana lifecycle

Fruit

Ripe Fruit

Fruit
(late spring through early fall)

Recent Fruit or Seed Drop

Phenophases recap

- ☑ Breaking leaf buds
- ☑ Increasing leaf size
- ☑ Leaves
- ☑ Colored leaves
- ☑ Falling leaves

- ☑ Flowers or flower buds
- ☑ Open flowers
- ☑ Pollen release

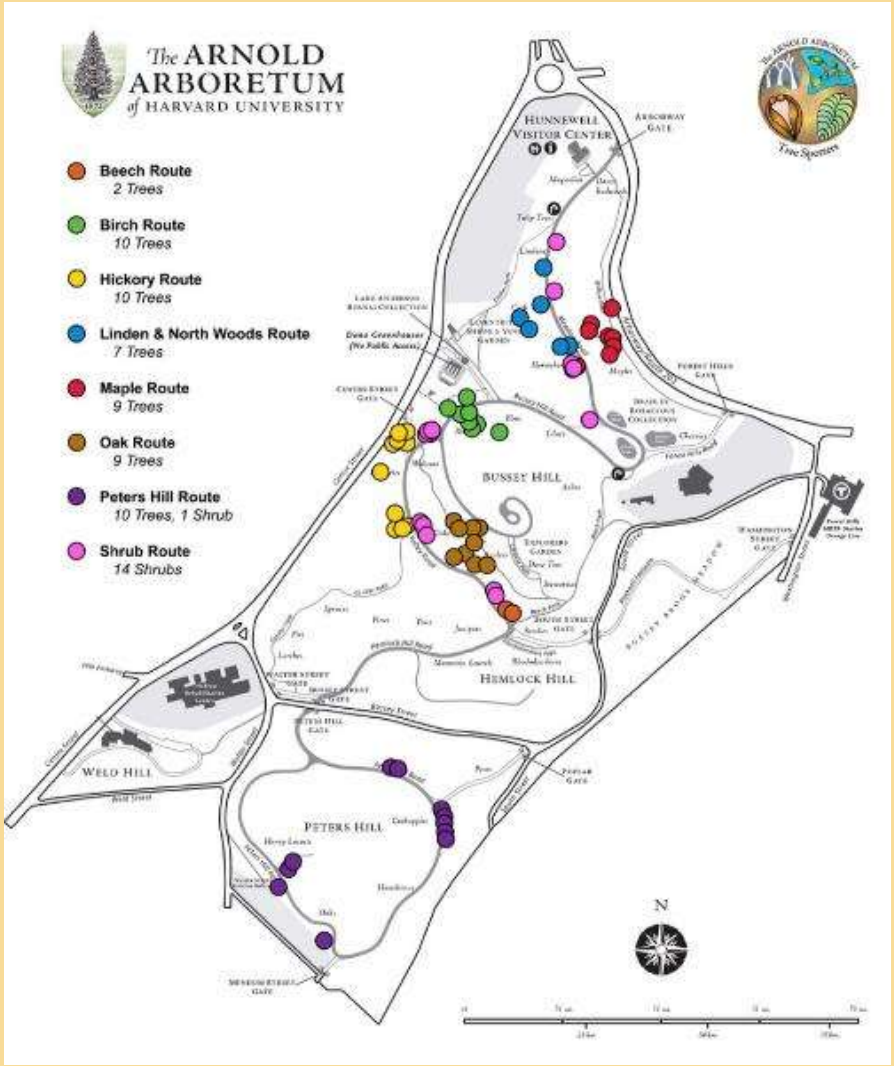
- ☑ Fruits
- ☑ Ripe fruits
- ☑ Recent seed or fruit drop

Phenophase guides

- Posted on the Tree Spotters website
  - *Acer rubrum*
  - *Acer saccharum*
  - *Betula nigra*
  - *Populus deltoides ssp. deltoides (female)*
  - *Populus deltoides ssp. deltoides (male)*
  - *Tilia americana*
- In progress
  - *Betula alleghaniensis*
  - *Carya glabra*
  - *Carya ovata*
  - *Fagus grandifolia*
  - *Quercus alba*

Route reviews

- *Fagus grandifolia*
- *Betula nigra*
- *Betula alleghaniensis*
- *Carya ovata*
- *Carya glabra*
- *Tilia americana*
- *Aesculus flava*
- *Acer saccharum*
- *Acer rubrum*
- *Quercus rubra*
- *Quercus alba*
- *Populus deltoides ssp. deltoides*
- *Vaccinium corymbosum*
- *Viburnum cassinoides*
- *Hamamelis virginiana*



Tree Spotter observations/route

2015-2018
Total: 193,298
% of total

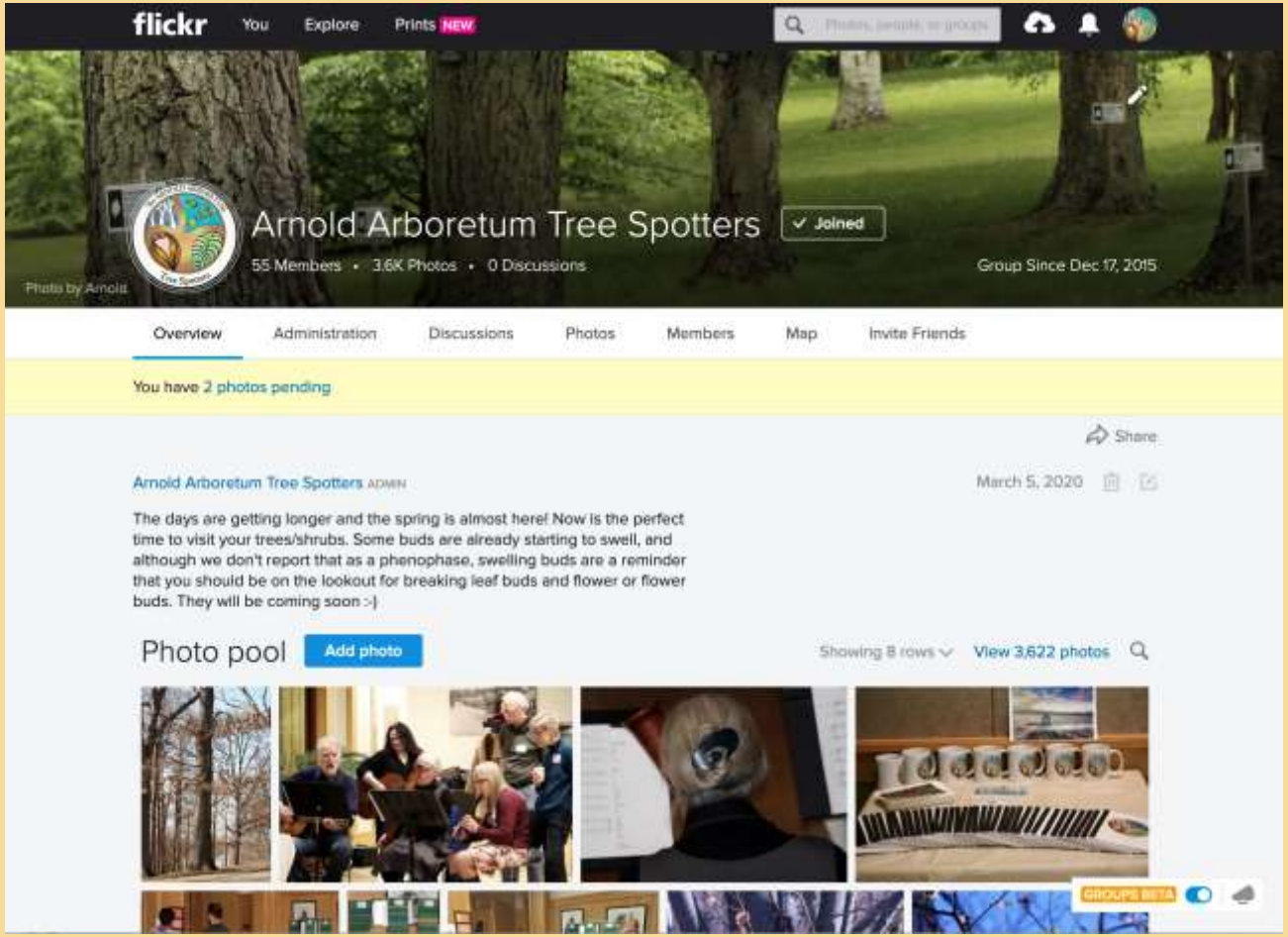
- **Peters Hill: 48,797 (25.2%)**
- **Birch: 47,076 (24.4%)**
- **Hickory: 28,873 (14.9%)**
- **Linden & North Woods: 20,716 (10.7%)**
- **Oak: 19,106 (9.9%)**
- **Maple: 15,178 (7.9%)**
- **Beech: 11,945 (6.2%)**
- **Shrub: 1,607 (0.8%)**

2019
Total: 77,203
% of total

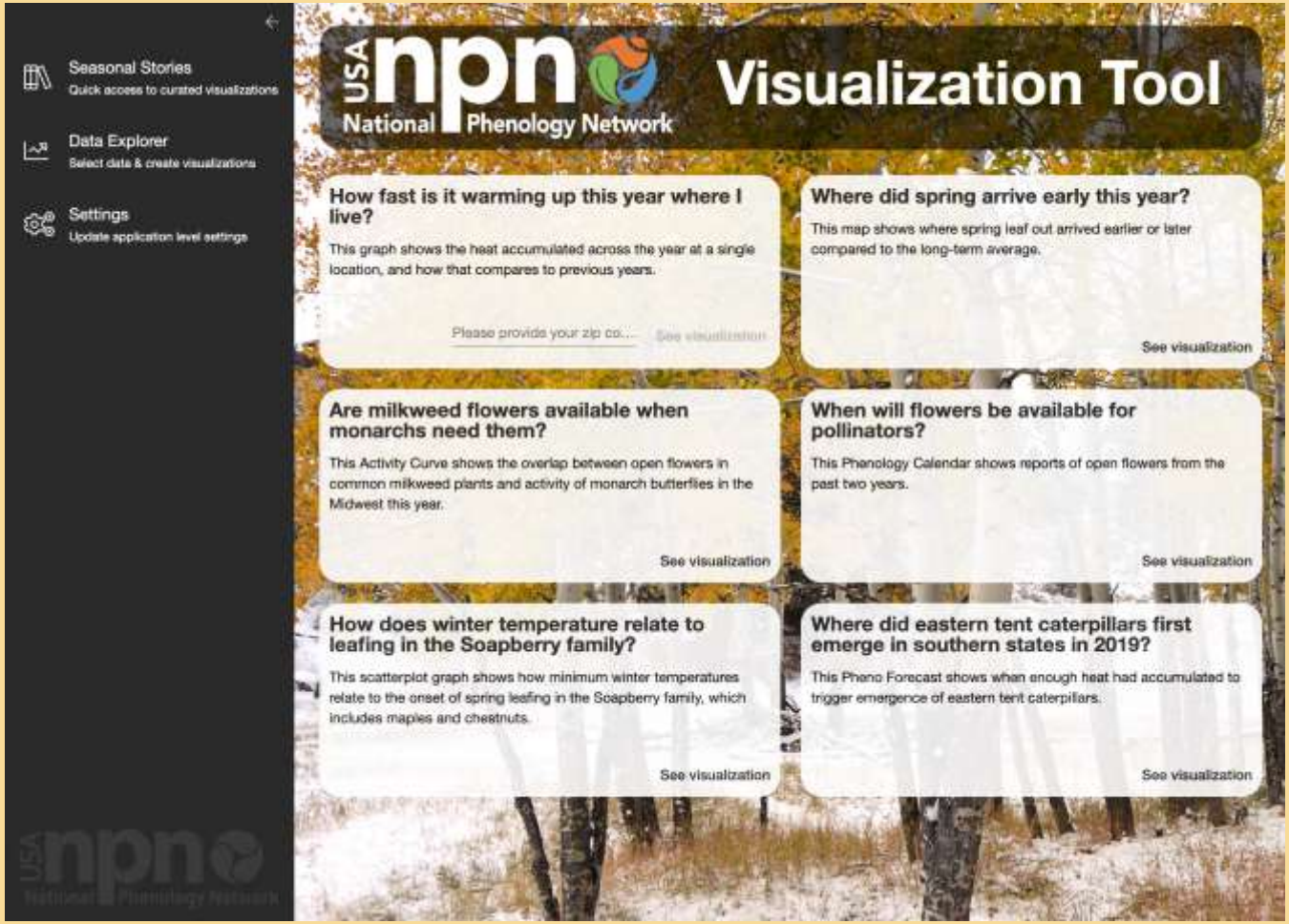
- **Birch: 18,439 (23.9%)**
- **Shrub: 15,791 (20.5%)**
- **Hickory: 12,422 (16.1%)**
- **Maple: 11,763 (15.2%)**
- **Peters Hill: 8,275 (10.7%)**
- **Oak: 4,705 (6.1%)**
- **Linden & North Woods: 4,263 (5.6%)**
- **Beech: 1,545 (2%)**

Tree Spotter photos on Flickr

[Arnold Arboretum Tree Spotters Flickr Group]



Your data: How to view it and how it's used



http://data.usanpn.org/vis-tool/ - /

Tree Spotter events

To recap: The safety of our volunteers and coordinators is our number-one priority. Due to Coronavirus (COVID-19), we will be cancelling all March and April events and assessing the viability of future events in 2020 as the situation unfolds.

At this point, we hope to resume our Spotting Together and Focus Tree Gatherings in May or June and hold our Summer BBQ in July and our Holiday Party in early December.

Spotting Together

- Walks led by one or more of the Tree Spotters Team members. (Approximately 1 hr.)
- Visit specific trees that are of particular interest at the time.
- Record observations.
- May, August, and October.

Photo: S. Mrozak

Focus Tree Gatherings

- Meet at one of our trees. (Approximately 30 - 45 minutes.)
- Tree Spotter team members talk about the tree's life cycle and share some fun facts.
- Record observations.
- June, September, and November.

Photo: D. Schissler

Summer BBQ

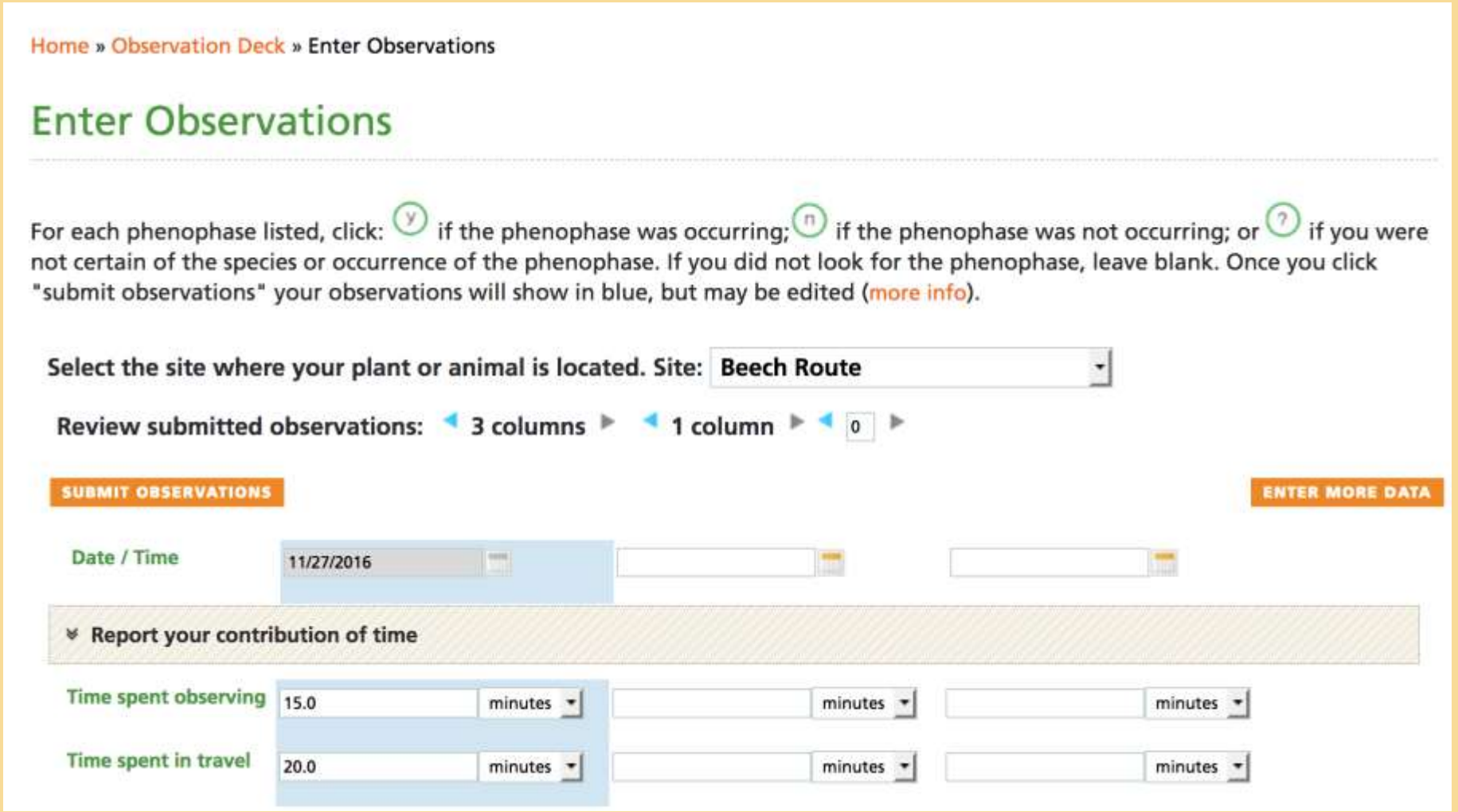
- July potluck party at Weld Hill.
- All Tree Spotters and a guest are welcome.

Photos: S. Mrozak

Holiday Party

- Early December potluck party at Weld Hill.
- Celebration of our many accomplishments over 6 years.
- All Tree Spotters and a guest are welcome.

Reminder: Please enter your time



How to contact us

- TreeSpotters@fas.harvard.edu
- For outdoor event info, text Suz at 857-321-2825

Thank you for your contributions!

Wolkovich Temporal Ecology Lab
Arnold Arboretum of Harvard University

USGS science for a changing world

nature's notebook

The ARNOLD ARBORETUM of HARVARD UNIVERSITY

USA npn National Phenology Network

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