The Arnold Arboretum Tree Spotters

Beyond the Basic Training: Spring 2019

Wolkovich Temporal Ecology Lab
Arnold Arboretum of Harvard University

Tree Spotters Team

Suzanne Mrozak, Volunteer Coordinator

Danny Schissler, Program Coordinator

Catherine (Cat) Chamberlain, Graduate Student

Agenda

- Introductions
- Observations on the grounds
- Group debrief
- Program review
- Understanding phenophase definitions
- Observing phenophases
- Recording observations
- Wrap up

Introductions

- Please tell us
  - Your name
  - Where you live and how long you have lived there
  - What aspect of Tree Spotting interests you most

Observations on the grounds

Photo: S. Mrozak

Group debrief - Part 1 (10 minutes)

- Organize yourselves into groups of 3 or 4
- Assign someone to
  - Record the highlights
  - Be a spokesperson for your group in Part 2
  - This can be the same person or two different people
- In your group, discuss at least one of the following:
  - What did you see that was new to you?
  - What did you learn that surprised you?
  - What do you want to know more about?

Group debrief - Part 2 (5 minutes)

- The spokesperson for each group will summarize the group's discussion.
- After that, if you have something to add, please do!
- Danny and Suz will review any questions in the Q & A session at the end of the class.

Program review

- Trees/shrubs we are Spotting
- What phenophases we are observing
- Sample phenophase datasheet
- Where our trees and shrubs are

Trees/shrubs we are Spotting

- *Acer rubrum* **Red Maple**
- *Acer saccharum* **Sugar Maple**
- *Aesculus flava* **Yellow Buckeye**
- *Betula alleghaniensis* **Yellow Birch**
- *Betula nigra* **River Birch**
- *Carya glabra* **Pignut Hickory**
- *Carya ovata* **Shagbark Hickory**
- *Fagus grandifolia* **American Beech**
- *Hamamelis virginiana* **Common Witch-hazel**
- *Populus deltoides ssp. deltoides* **Eastern Cottonwood**
- *Quercus rubra* **Northern Red Oak**
- *Quercus alba* **White Oak**
- *Tilia americana* **American Linden (aka Basswood)**
- *Vaccinium corymbosum* **Highbush Blueberry**
- *Viburnum cassinoides* **Withe-rod (aka *Viburnum nudum*)**

What phenophases we are observing

- Breaking leaf buds
- Leaves
- Increasing leaf size
- Colored leaves
- Falling leaves
- Flowers or flower buds
- Open flowers
- Pollen release
- Fruits
- Ripe fruits
- Recent fruit or seed drop

Photo: S. Mrozak

Sample phenophase datasheet

	Date:
Do you see...	**Time:**
Breaking leaf buds	y n ? _____
Leaves	y n ? _____
Increasing leaf size	y n ? _____
Colored leaves	y n ? _____
Falling leaves	y n ? _____
Flowers or flower buds	y n ? _____
Open flowers	y n ? _____
Pollen release	y n ? _____
Fruits	y n ? _____
Ripe fruits	y n ? _____
Recent fruit or seed drop	y n ? _____
Check when data entered online:	☐
Comments:	

Leaves

Flowers

Fruits

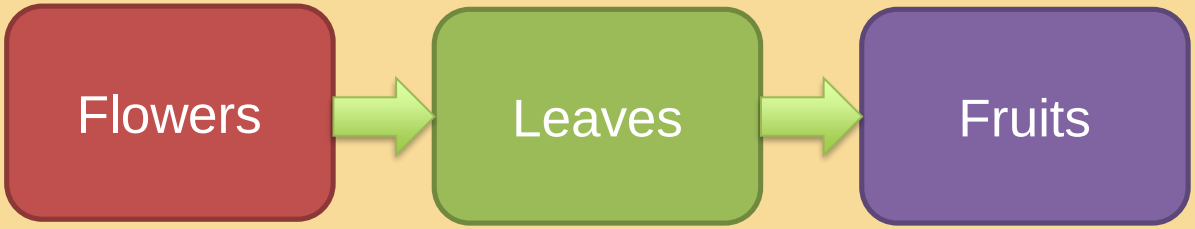
Acer saccharum (Sugar Maple)

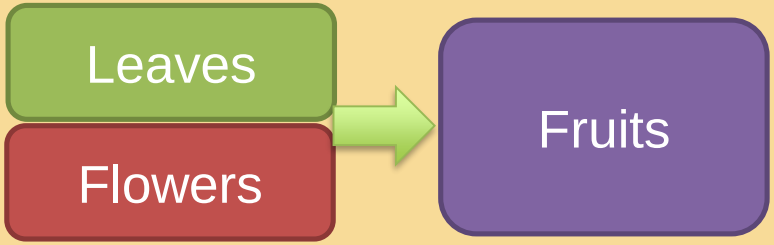
Where our trees/shrubs are

Photos: S. Mrozak

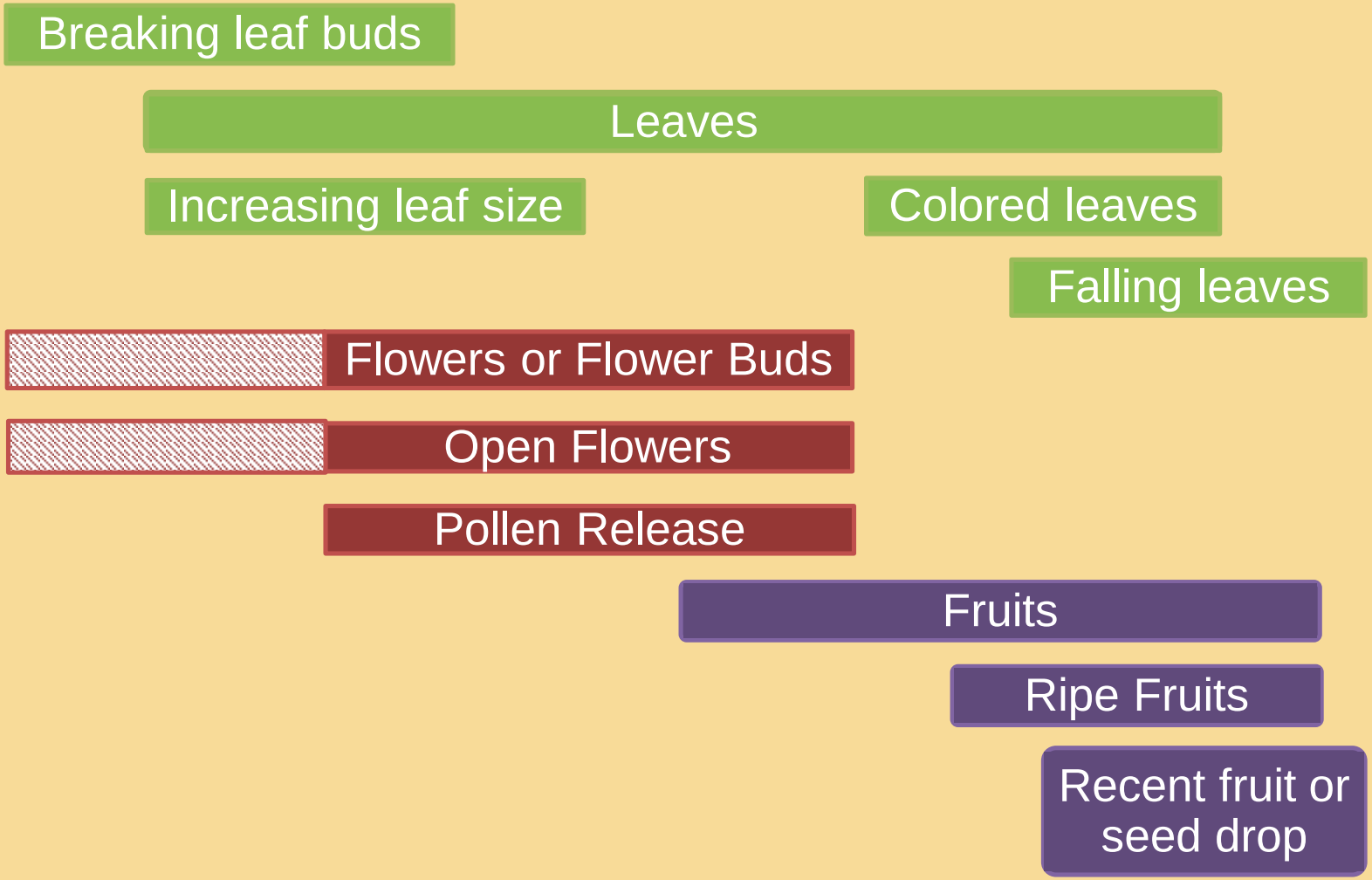
Understanding phenophase definitions

Phenophases: Observable life cycle events



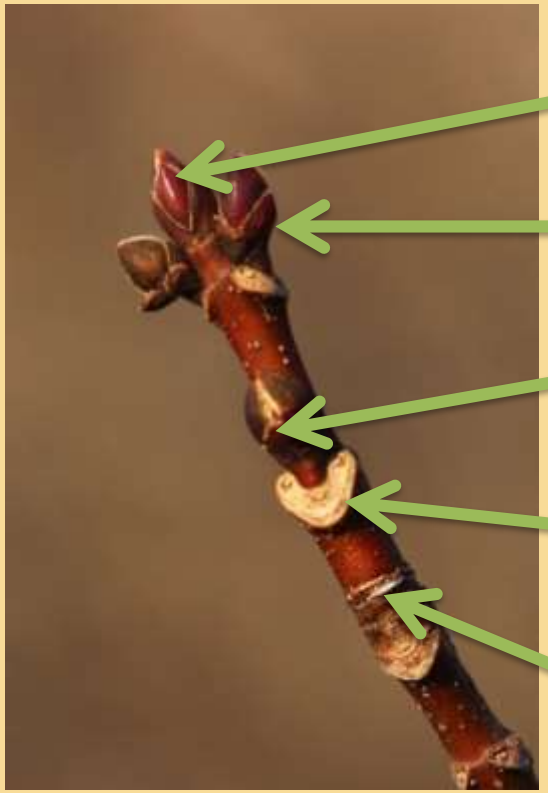


Deciduous Plant Phenophases



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 (With-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
(With-rod)

About flowers, in general

Flower bud

Sepal

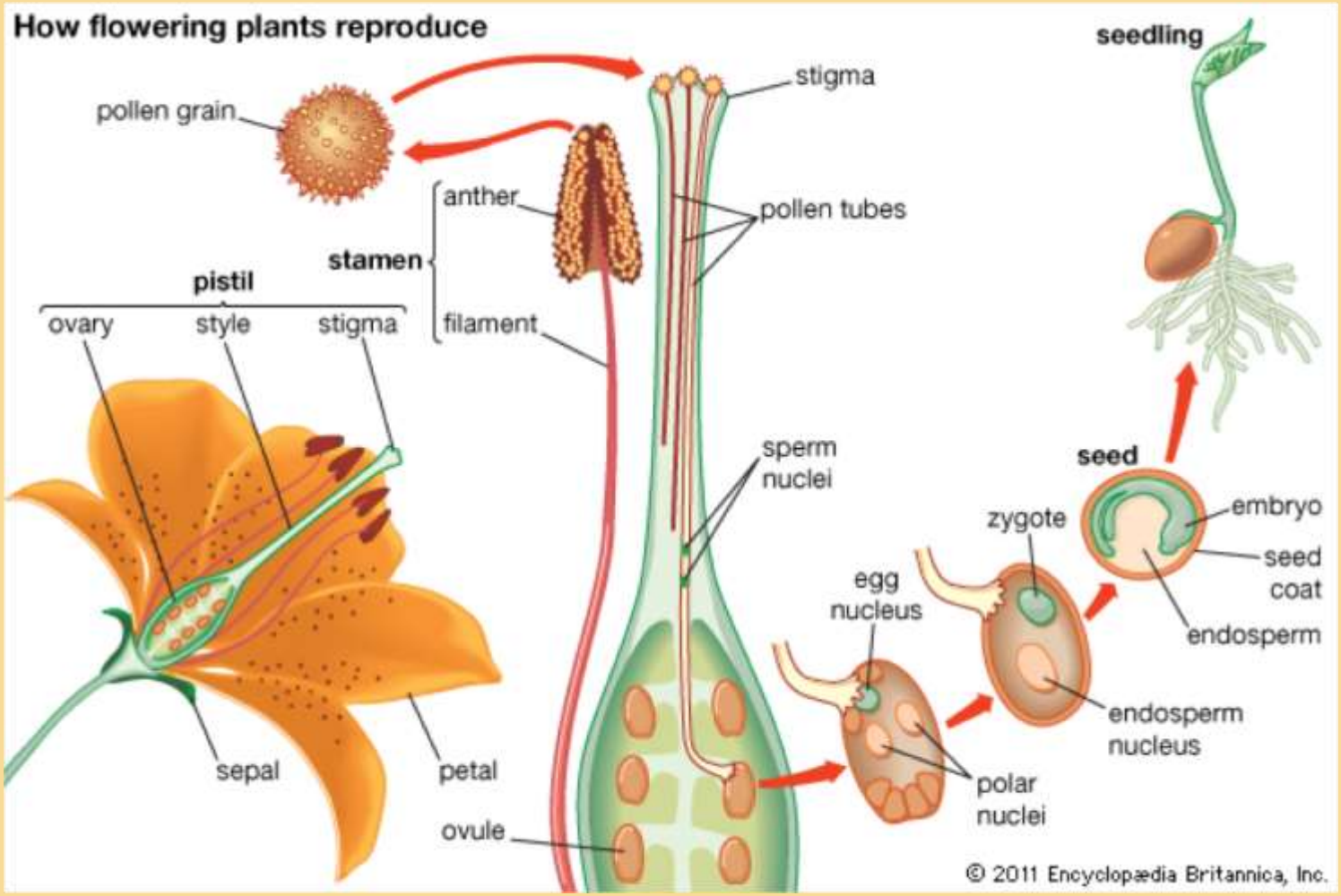
Petal

Pistil

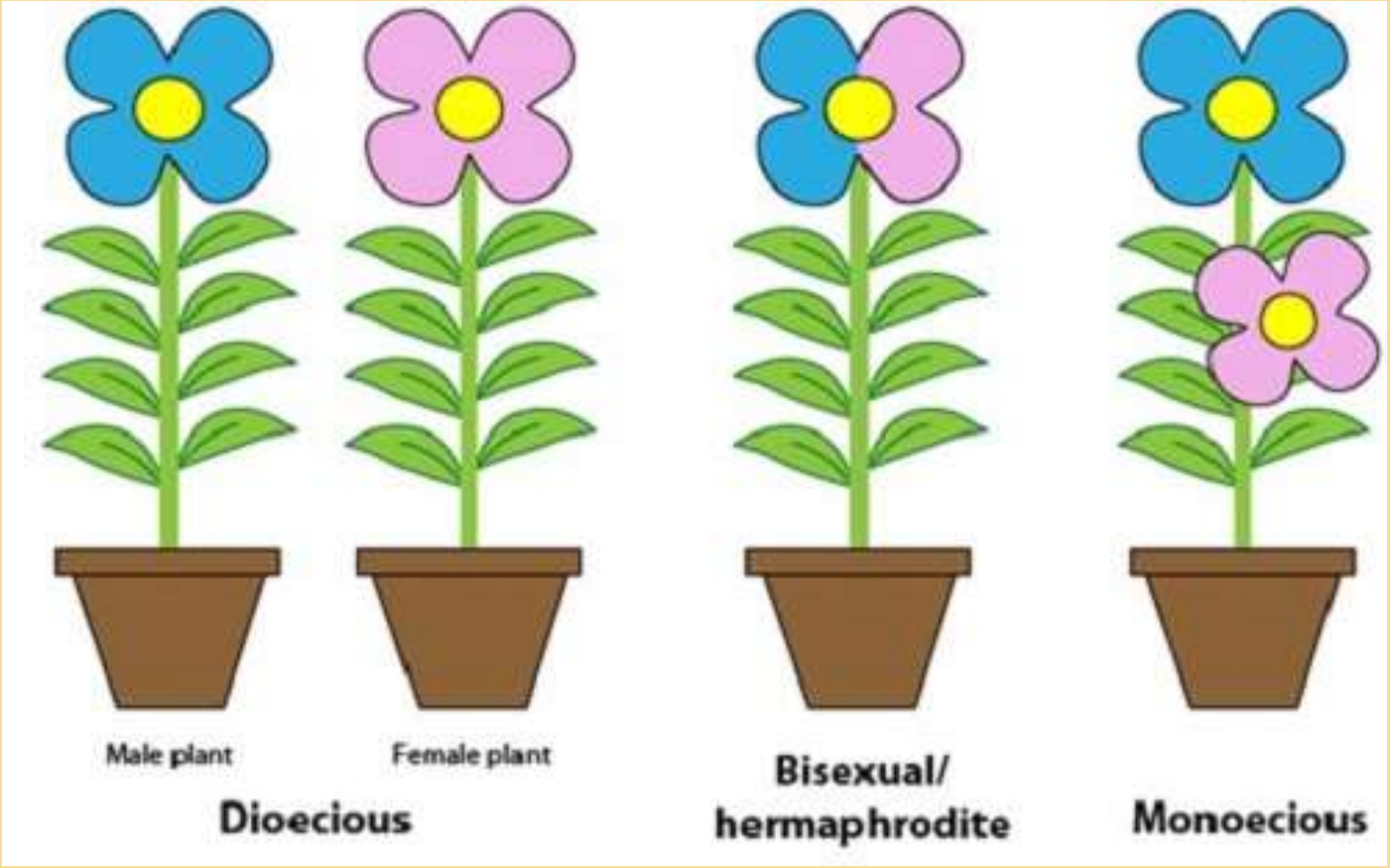
Stamen

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

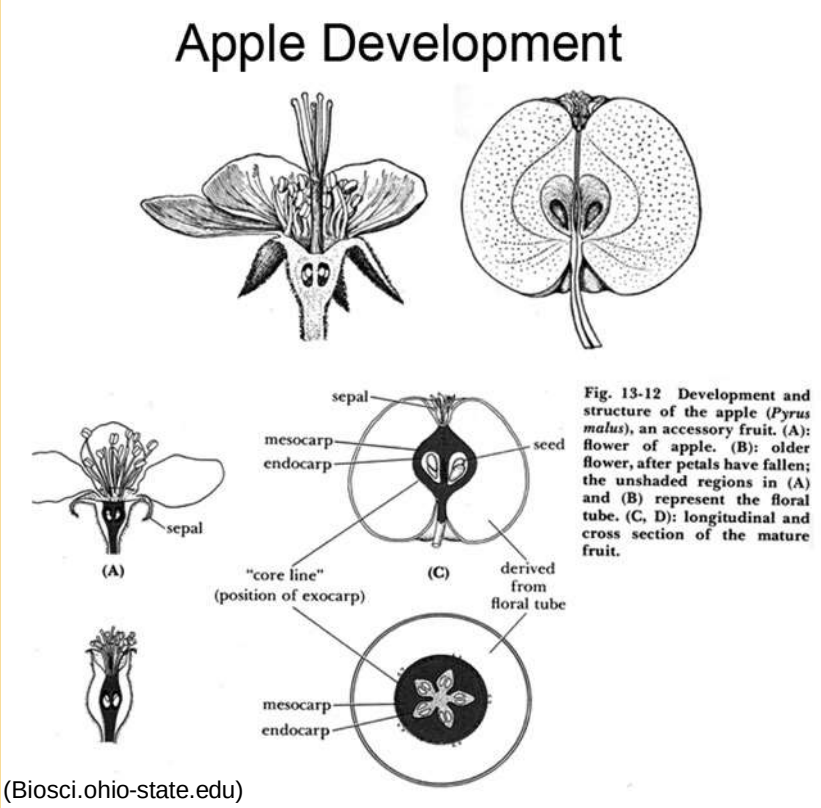
Maturation & Ripening

Ripe Fruit

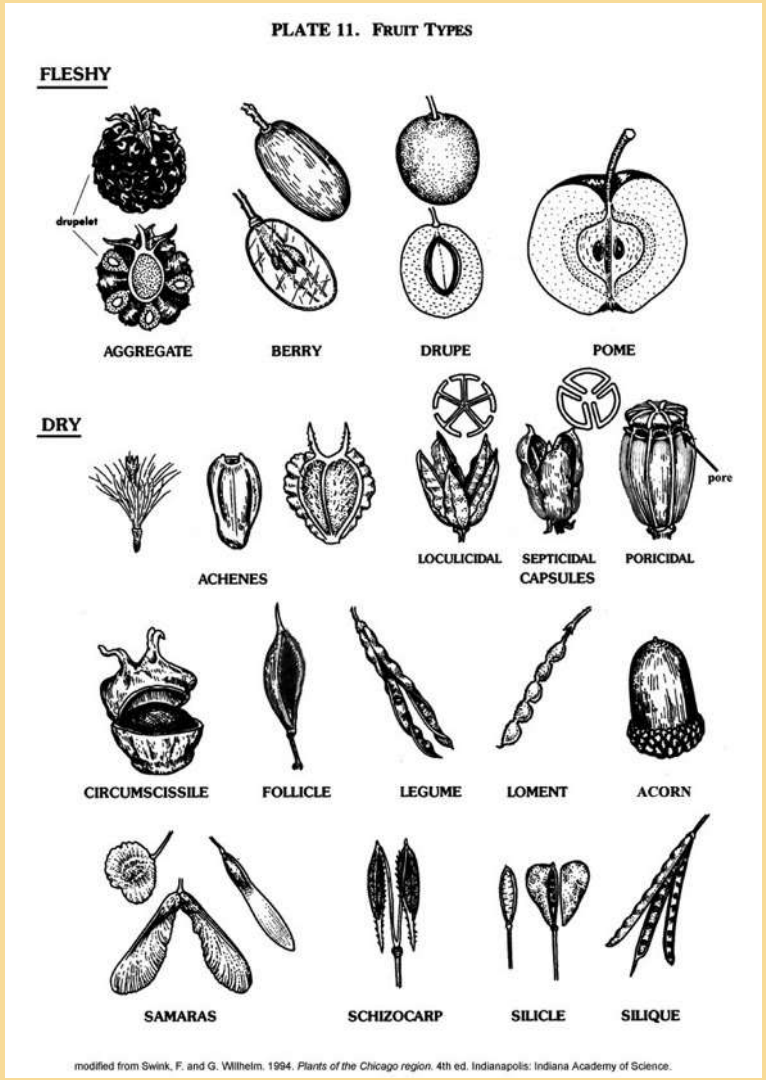
Dehiscence

Seeds

About fruit, in general



(Biosci.ohio-state.edu)



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)

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

Observing phenophases

- What do you see?
  - Breaking leaf buds?
  - Leaves?
  - Increasing leaf size?
  - Colored leaves?
  - Falling leaves?

Today we are focusing on the
Acer rubrum (Red Maple) and *Acer saccharum* (Sugar Maple)

Do you see… breaking leaf buds?

- **One or more breaking leaf buds are visible on the plant.** A leaf bud is considered "breaking" once a green (or colored) 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.
- For *Acer saccharum*, leaf tips may appear reddish.

Acer saccharum
(Sugar Maple)

Acer rubrum
(Red Maple)

Do you see… leaves?

- **One or more live, unfolded leaves are visible on the plant.** A leaf is considered "unfolded" once its entire length has emerged from a breaking bud, stem node or growing stem tip, 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.

Acer saccharum
(Sugar Maple)

Acer rubrum
(Red Maple)

Do you see… 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.

Acer saccharum
(Sugar Maple)

Acer rubrum
(Red Maple)

Do you see… colored leaves?

- **One or more leaves show some of their typical late-season color, or yellow or brown due to drought or other stresses.** Do not include small spots of color due to minor leaf damage, or dieback on branches that have broken. Do not include fully dried or dead leaves that remain on the plant.

Acer saccharum
(Sugar Maple)

Acer rubrum
(Red Maple)

Do you see… falling leaves?

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

Acer saccharum
(Sugar Maple)

Acer rubrum
(Red Maple)

Observing phenophases

- What do you see?
  - Flowers or flower buds?
  - Open flowers?
  - Pollen release?

Do you see… flowers or flower buds?

- **One or more fresh open or unopened flowers or flower buds are visible on the plant.** Include flower buds or inflorescences that are swelling or expanding, but do not include those that are tightly closed and not actively growing (dormant). Also do not include wilted or dried flowers.

Acer saccharum
(Sugar Maple)

Acer rubrum
(Red Maple)

Do you see… 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.

Acer saccharum
(Sugar Maple)

Acer rubrum
(Red Maple)

Do you see… 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.**

Acer saccharum
(Sugar Maple)

Acer rubrum
(Red Maple)

Observing phenophases

- What do you see?
  - Fruit?
  - Ripe fruit?
  - Recent fruit or seed drop?

Do you see… fruit?

- **One or more fruits are visible on the plant.**
- For *Acer saccharum*, the fruit is two joined seeds in a "V" shape, each seed having a wing, that changes from green to yellowish-green or brownish and drops from the plant.
- For *Acer rubrum*, the fruit is two joined seeds in a "V" shape, each seed having a wing, that changes from green or red to tan or brownish and drops from the plant.

Acer saccharum
(Sugar Maple)

Acer rubrum
(Red Maple)

Do you see… ripe fruit?

- One or more ripe fruits are visible on the plant.
- For *Acer saccharum*, a fruit is considered ripe when it has turned yellowish-green or brownish and readily drops from the plant when touched.
- For *Acer rubrum*, a fruit is considered ripe when it has turned tan or brownish and readily drops from the plant when touched.

Acer saccharum
(Sugar Maple)

Acer rubrum
(Red Maple)

Do you see… 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.

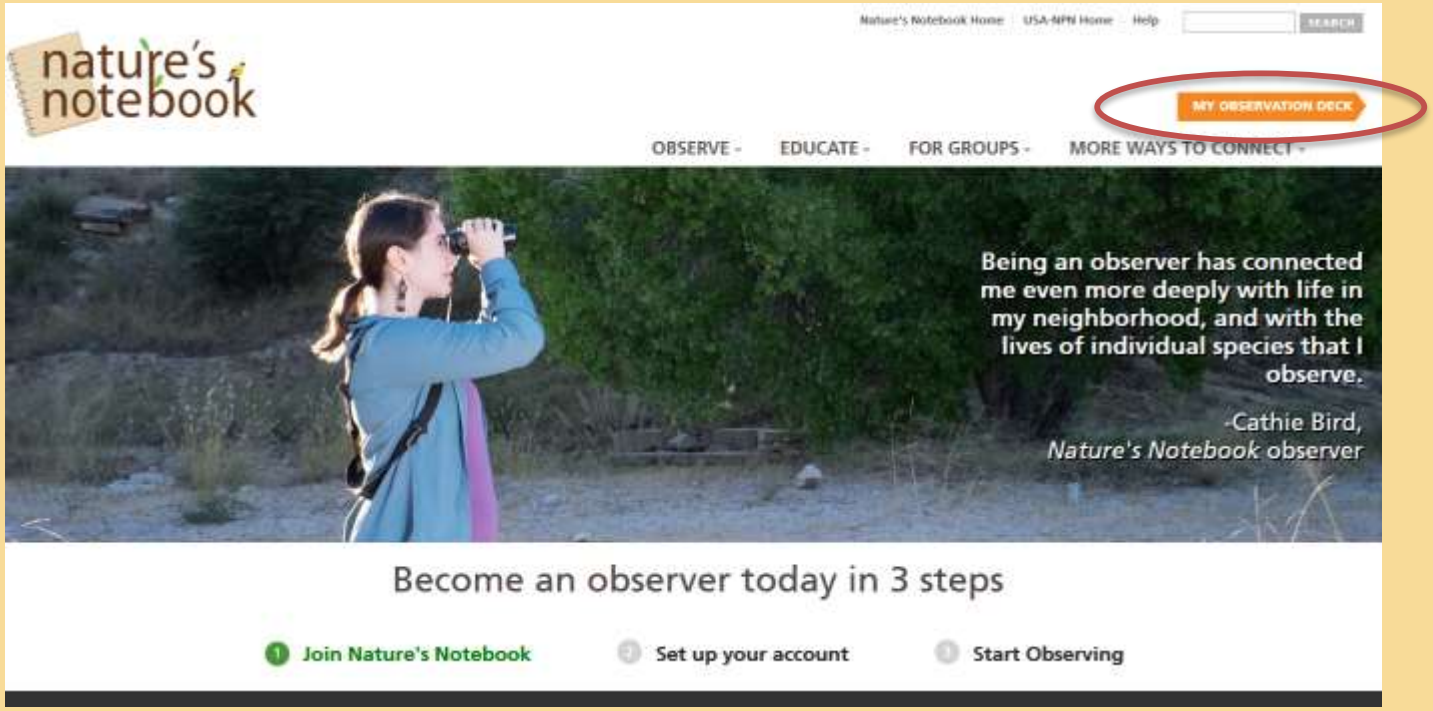
Acer saccharum
(Sugar Maple)

Acer rubrum
(Red Maple)

Recording your observations

- ☐ YES
- ☐ NO
- ☐ ?

Logging in to Nature's Notebook

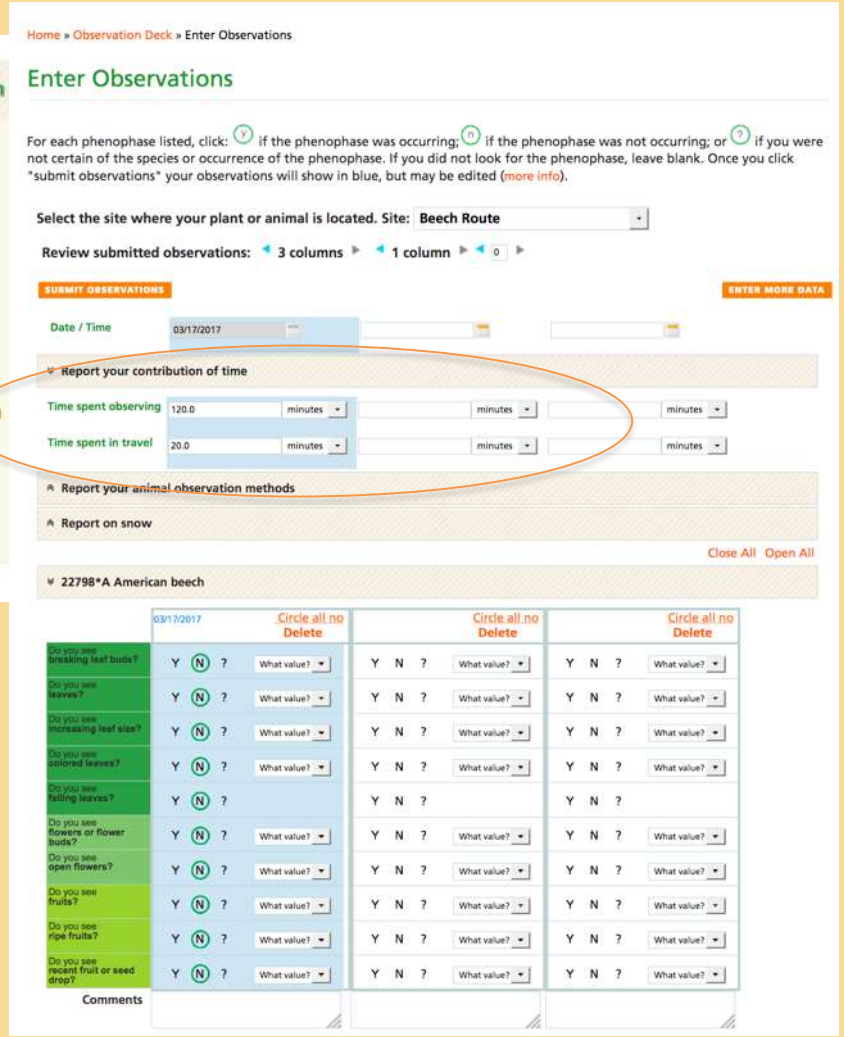


https://www.usanpn.org/natures_notebook

Entering observations in Nature's Notebook

Observation Deck > Site > Route > Tree

Observation Deck -> Enter Observations



We encourage you to fill in your time, but it's optional.

Free mobile app

- Works with Android and Apple products.
- Help sheets to get started: https://www.usanpn.org/node/22250
- When in doubt, use a paper data sheet.

You MUST have your account completely set up online first to use the mobile apps!

Clarifying what data NPN wants reported

- No category for "dormant buds" but you can mention these in your notes for each tree. (Visit the Tree Spotters Flickr site to see examples of dormant buds.)
- "Flowers or flower buds" refers to flower buds that are clearly swelling or that are open and still fresh. It includes open flowers, but you should also report "Open flowers" separately.

Clarifying what data NPN wants reported

- Continue marking "breaking leaf buds" whenever you see them throughout the season. Sometimes trees will get a second flush of leaves, even when the canopy is already leafed out.

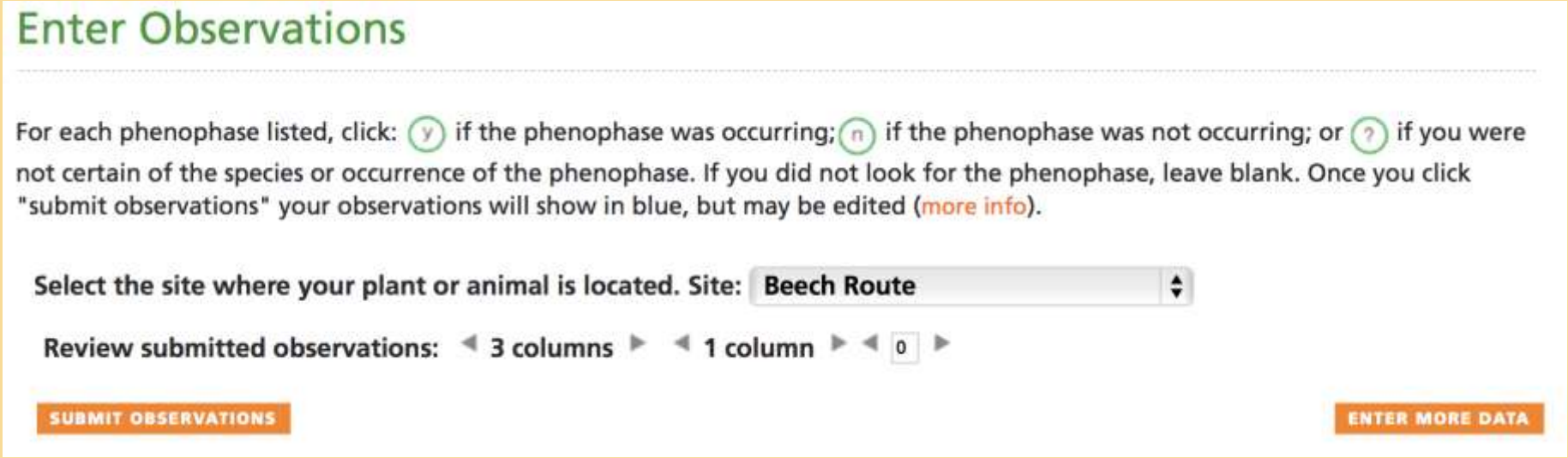
Hamamelis virginiana (Common Witch-hazel)

Clarifying what data NPN wants reported

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

Hamamelis virginiana (Common Witch-hazel)

Editing data previously entered into Nature's Notebook



How to estimate values and intensities

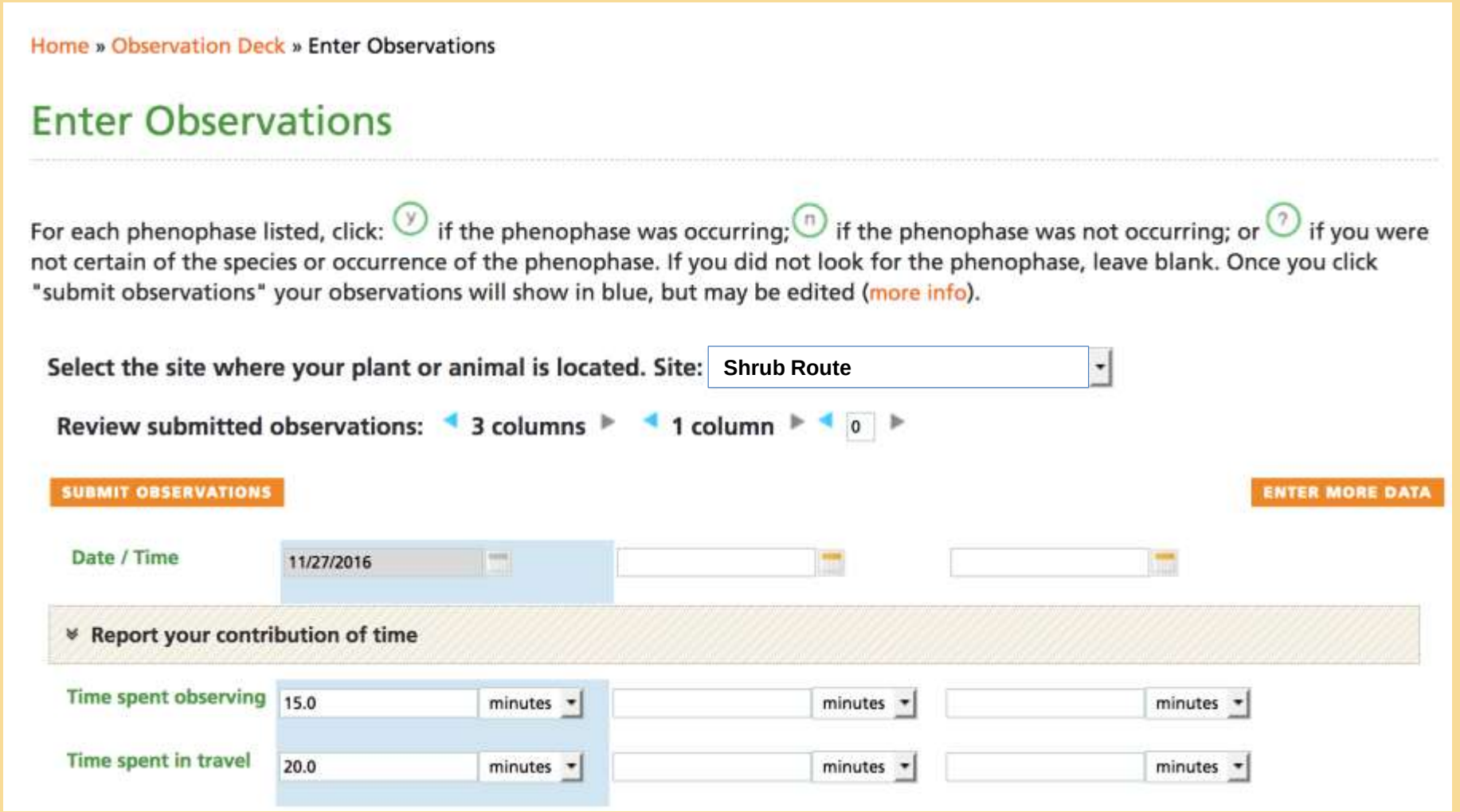
- For our purposes, **we do not need intensity data**.
- Intensity data is very subjective, and therefore less reliable.
- If you are excited about entering this data, though, go for it!
- NPN has guidance on this on their website.

Do you see...?	Check when data entered online: ☐
Breaking leaf buds	y n ? ____
Leaves	y n ? ____
Increasing leaf size	y n ? ____
Colored leaves	y n ? ____
Falling leaves	y n ? ____
Flowers or flower buds	y n ? ____
Open flowers	y n ? ____
Pollen release	y n ? ____
Fruits	y n ? ____
Ripe fruits	y n ? ____
Recent fruit or seed drop	y n ? ____

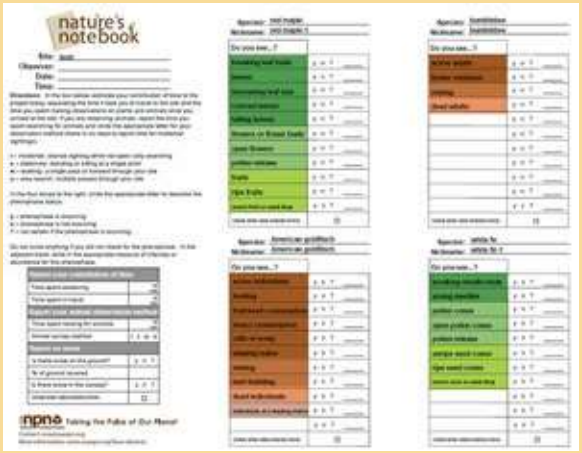
How many buds are breaking?

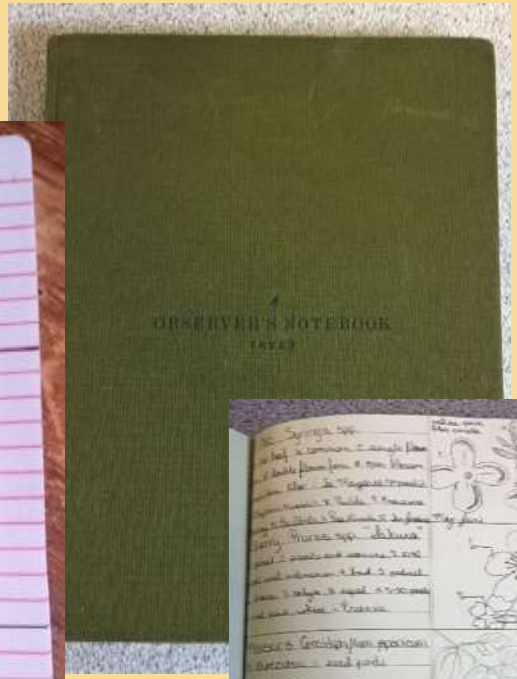
Less than 3; 3 to 10; 11 to 100; 101 to 1,000; 1,001 to 10,000; More than 10,000;

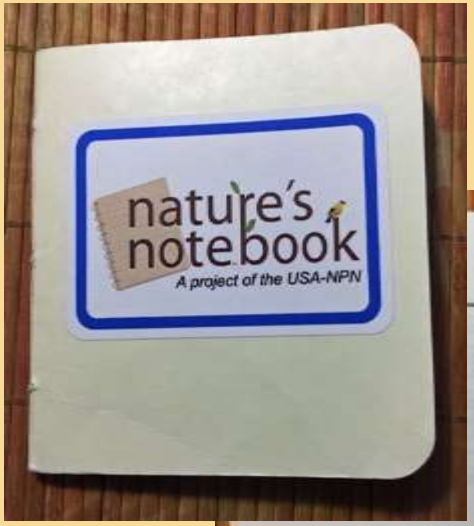
Reminder: Please enter your time



Journaling tips







Review

	Date:	
Do you see...	Time:	
Breaking leaf buds	y n ?	_____
Leaves	y n ?	_____
Increasing leaf size	y n ?	_____
Colored leaves	y n ?	_____
Falling leaves	y n ?	_____
Flowers or flower buds	y n ?	_____
Open flowers	y n ?	_____
Pollen release	y n ?	_____
Fruits	y n ?	_____
Ripe fruits	y n ?	_____
Recent fruit or seed drop	y n ?	_____
Check when data entered online:	☐	
Comments:		

- Long term monitoring of the same individual plants is key
- “No” observations are important
- Catch the first and last “Yes”
- If uncertain, use “?”
- It’s OK not to circle anything
- No need to include values or intensities unless you want to
- Include additional observation in the Comments field
- Please report your time

Wrap up

- What happens next
- Q & A

What happens next

- Choose your route(s)
- Find your trees
- Get your stuff together
- Observe and record data in the field
- Enter your data into Nature's Notebook
- Ask us if you want company or if you need help

Photo: S. Mrozak

Q & A

TreeSpotters@fas.harvard.edu