



# The Redbud Phenology Project Kickoff Webinar

January 5<sup>th</sup>, 2022



# Kickoff Webinar Agenda



- Overview of the research
- What did we learn last year?
- Overview of USA-NPN and *Nature's Notebook*
- How to get started with the Redbud campaign
- Training materials and other resources
- Q&A

In the chat: Let us know where you're calling in from!



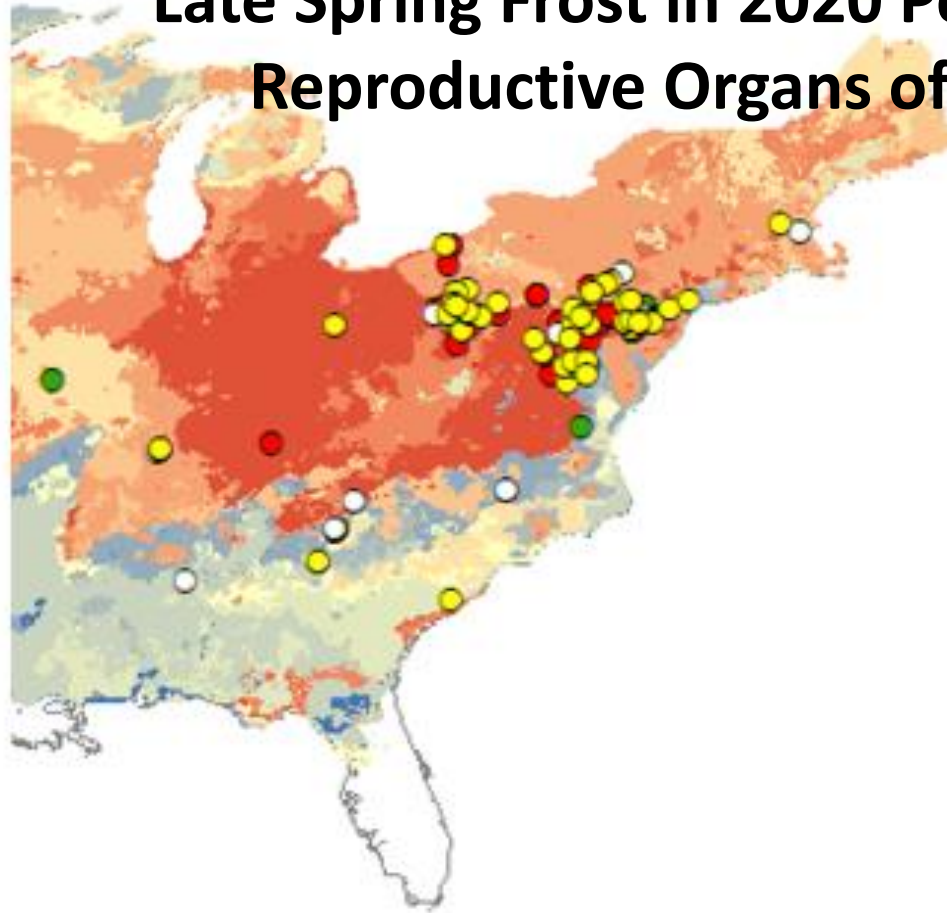
# Biology of Eastern North America Redbud, *Cercis canadensis* Linnaeus, 1753 (Fabaceae)



Branches of redbud at Nixon Park, Jacobus, PA. Note absence of seed pods.



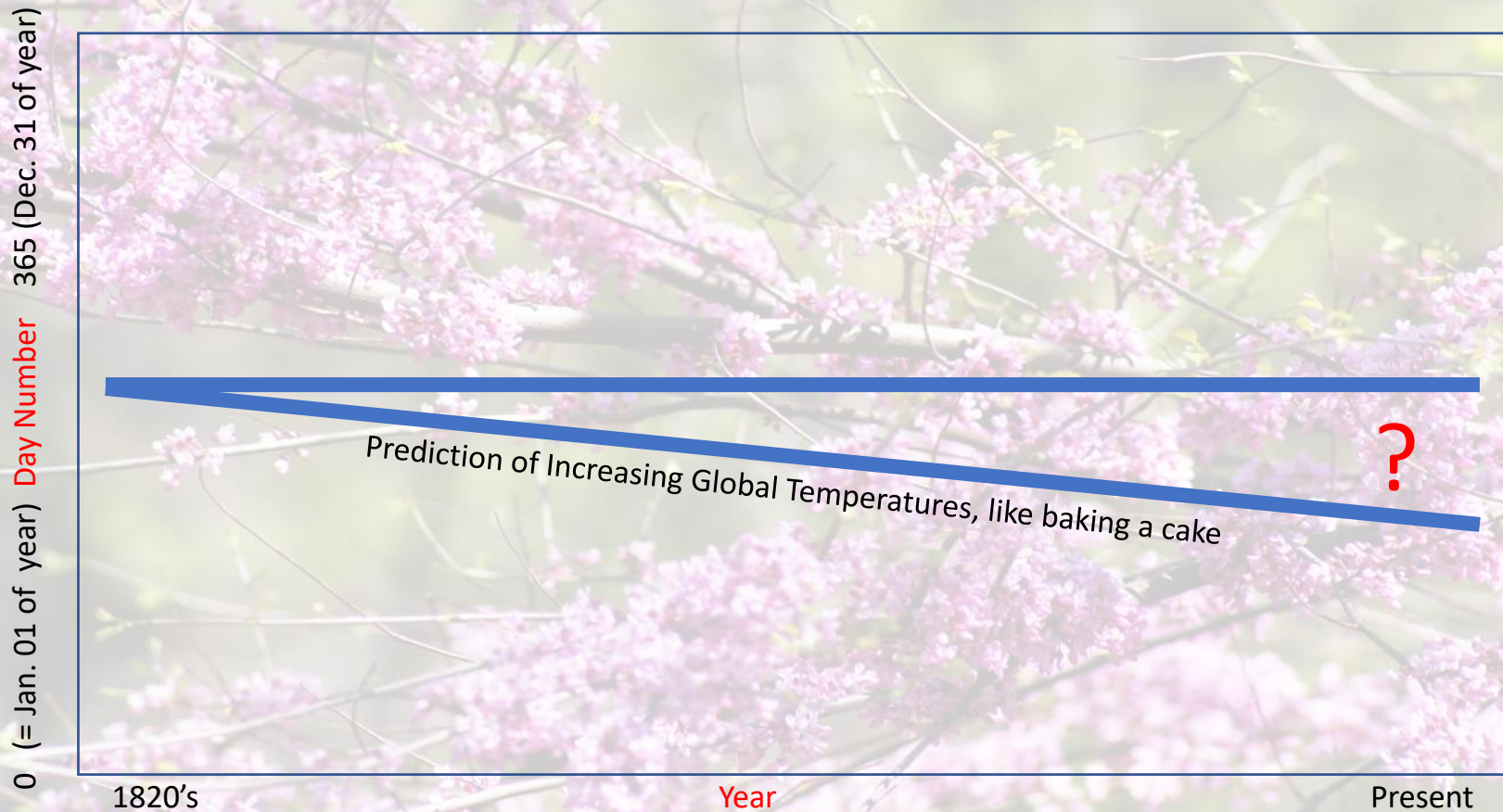
# Late Spring Frost in 2020 Possibly Killed Reproductive Organs of Redbuds



- no fruits in 2020
- substantially fewer fruits in 2020
- approximately same amount of fruits in 2020
- more fruits in 2020

Difference (in days) between the date of last frost in 2019 and 2020 (Data source: PRISM daily minimum temperature maps, Oregon State University). In 2020, the last freeze was over a month later than in 2019 in much of our study area.

# Is Flowering & Fruiting Timing Changing with Increasing Global Temperatures?





## Some of the Committed Citizen Scientists





Photo: MSU Extension/Gary Bachman

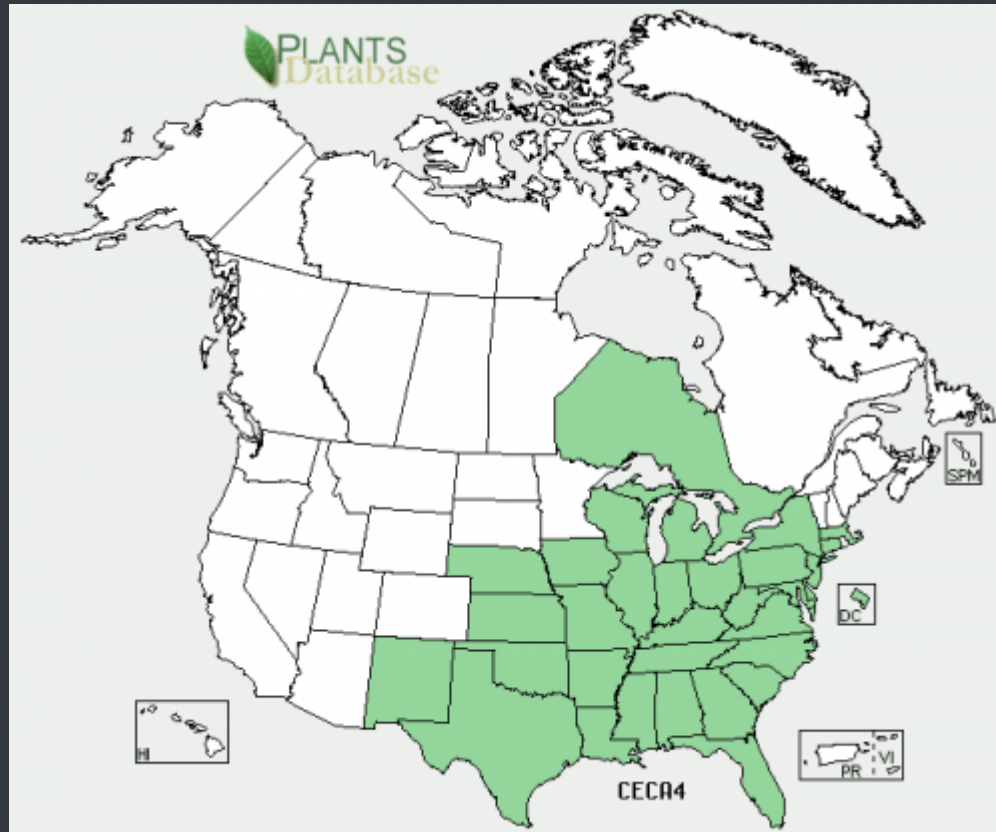






Photo: Dcrjsr

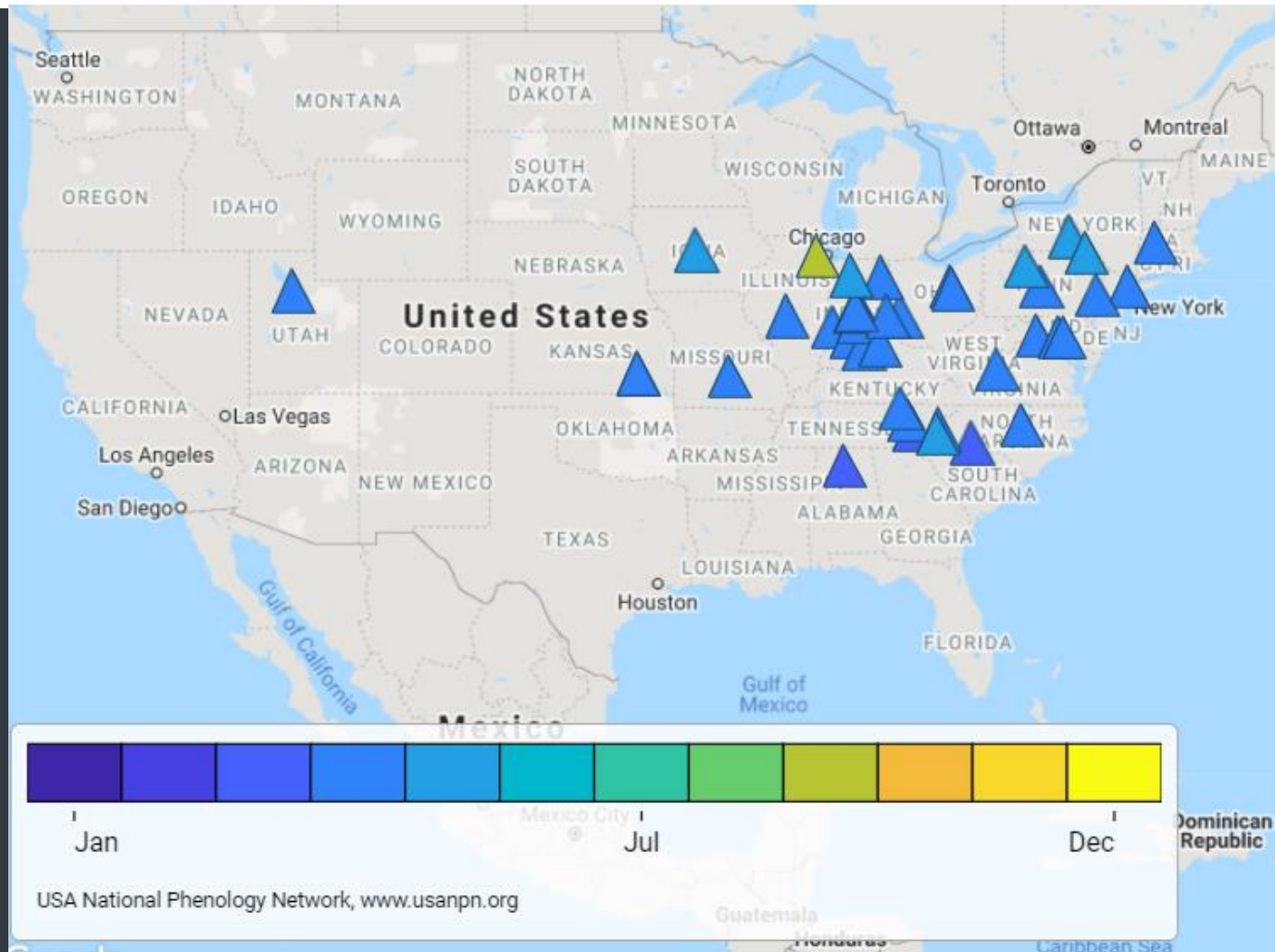




Photo: Sballal via Wikimedia Commons



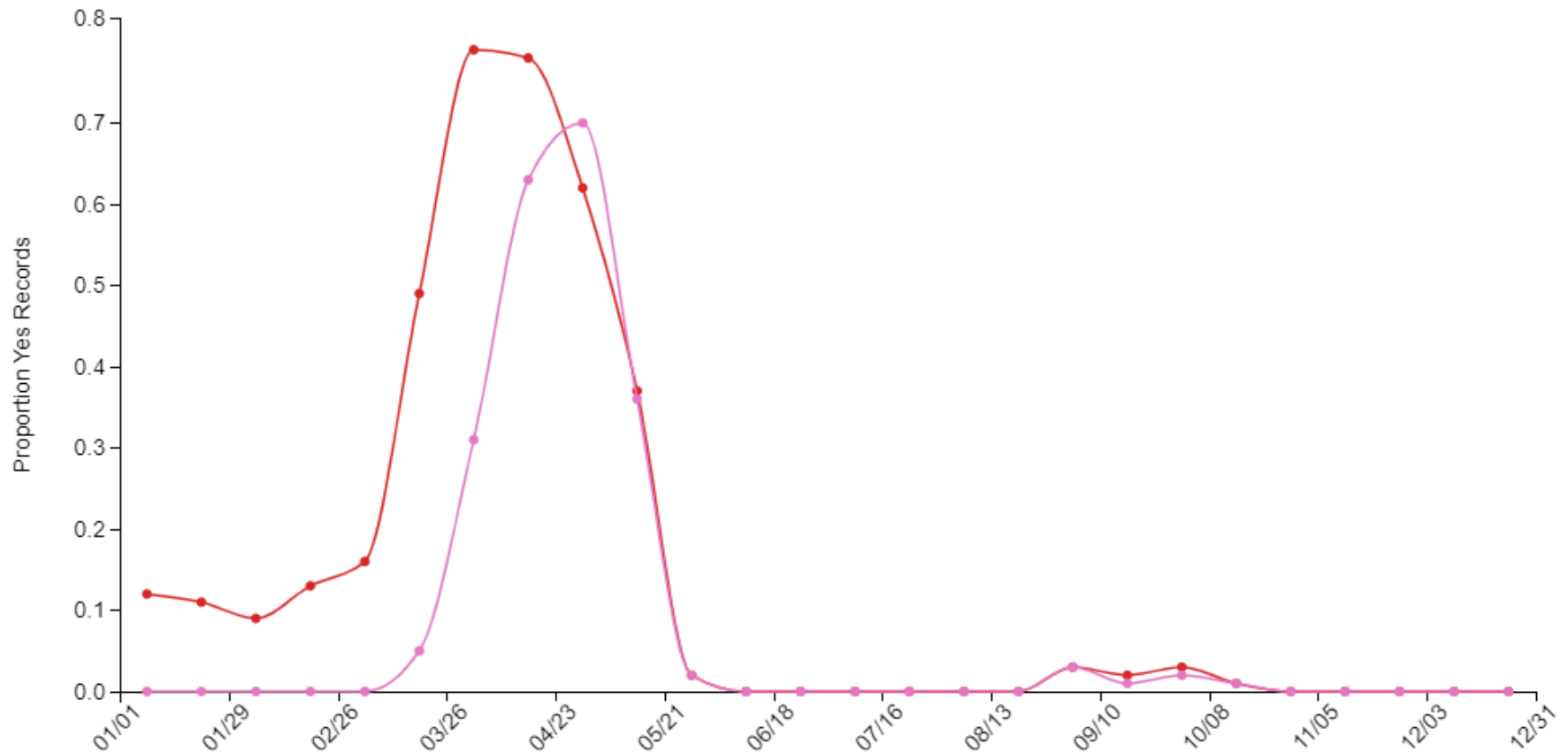
# Eastern redbud open flower reports 2021



# Eastern redbud reports 2021

## Activity Curves

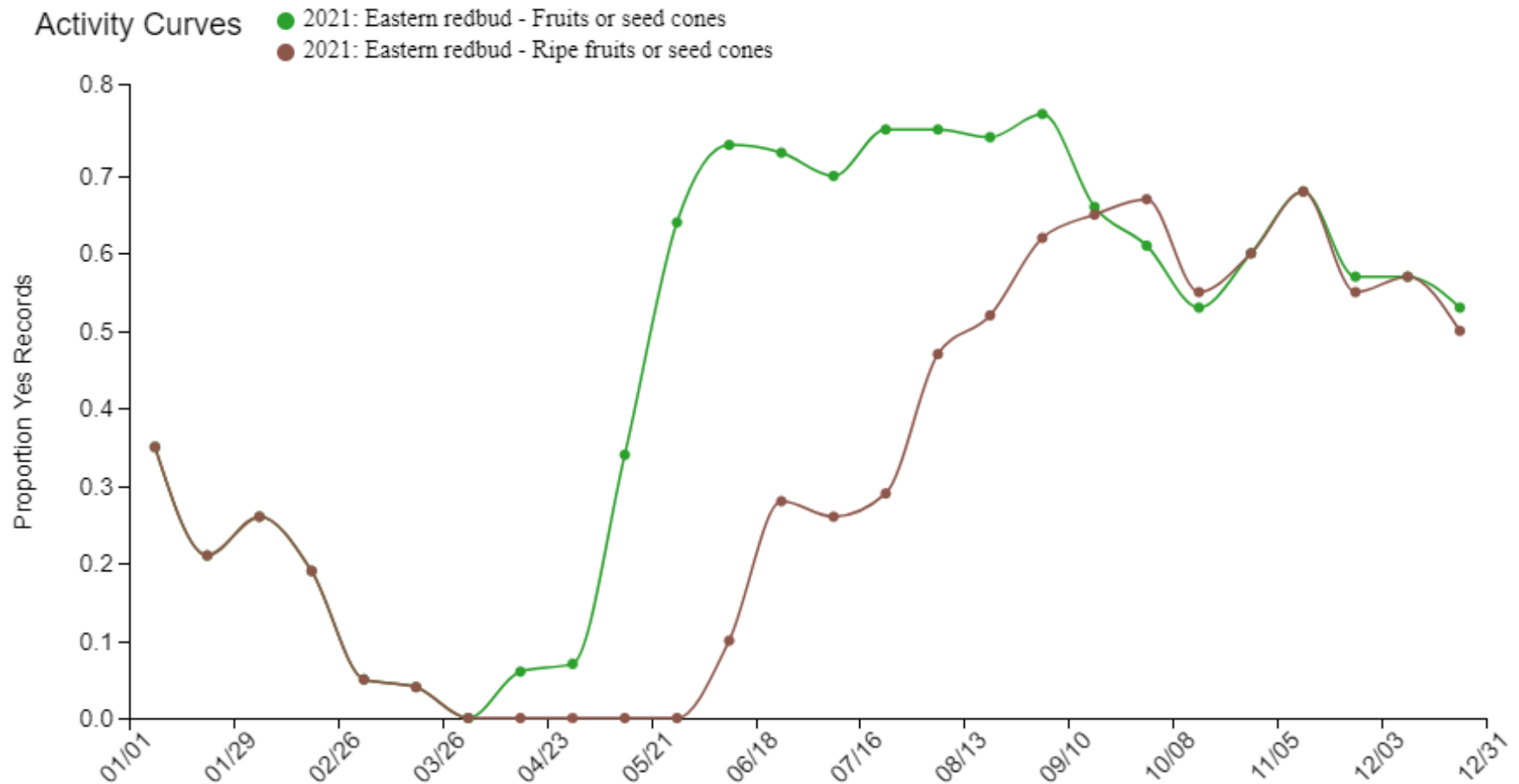
- 2021: Eastern redbud - Flowers or pollen cones
- 2021: Eastern redbud - Open flowers or pollen cones



USA National Phenology Network, [www.usanpn.org](http://www.usanpn.org)



# Eastern redbud reports 2021



USA National Phenology Network, [www.usanpn.org](http://www.usanpn.org)

# Questions about redbud phenology

1. Does the timing of redbud flowering vary by location or elevation?
2. Is there a cycle to abundant years of redbud fruiting?
3. Has the timing of redbud flowering and fruiting advanced in recent years?



Photo: Julie Makin, wildflower.org



# Join The Redbud Phenology Project, a *Nature's Notebook* Campaign



# USA National Phenology Network



Collect • Store • Share  
Phenology data and information

# What is USA-NPN all about?



Informing  
Decisions



Advancing  
Science



Communicating  
& Connecting



Creating an  
Equitable &  
Inclusive Network



# Why phenology?



# Phenology as an indicator

“Phenology...is perhaps the simplest process in which to track changes in the ecology of species in response to climate change.”  
(Intergovernmental Panel on Climate Change 2007)



# The importance of long-term records

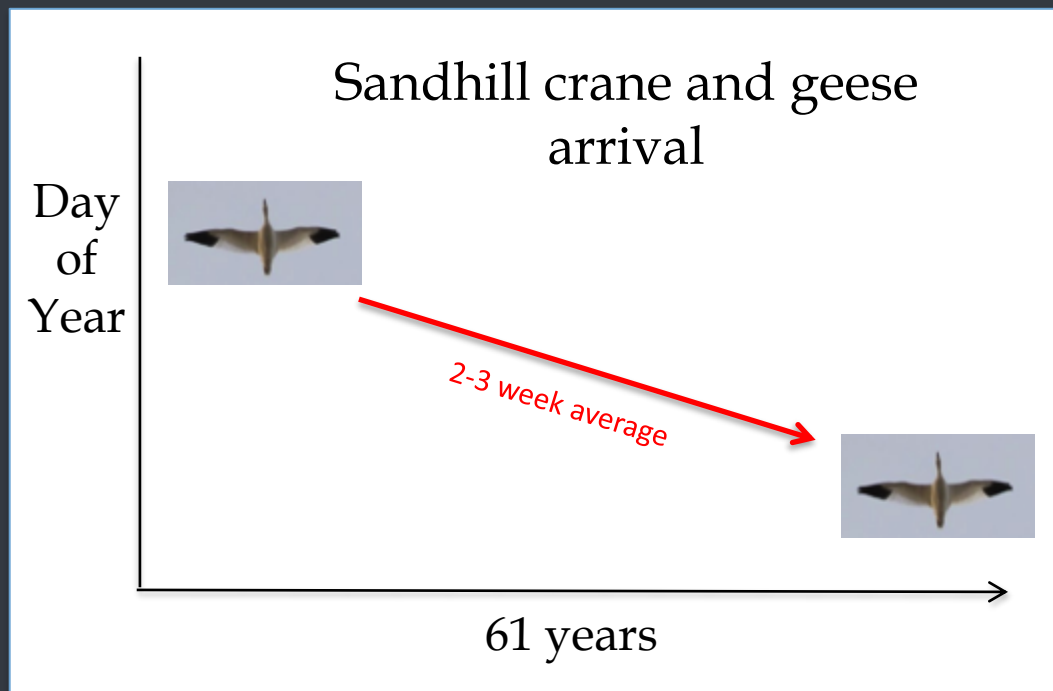


Photo: Journal Sentinel files

Bradley, N.L., et al. 1999, *PNAS*



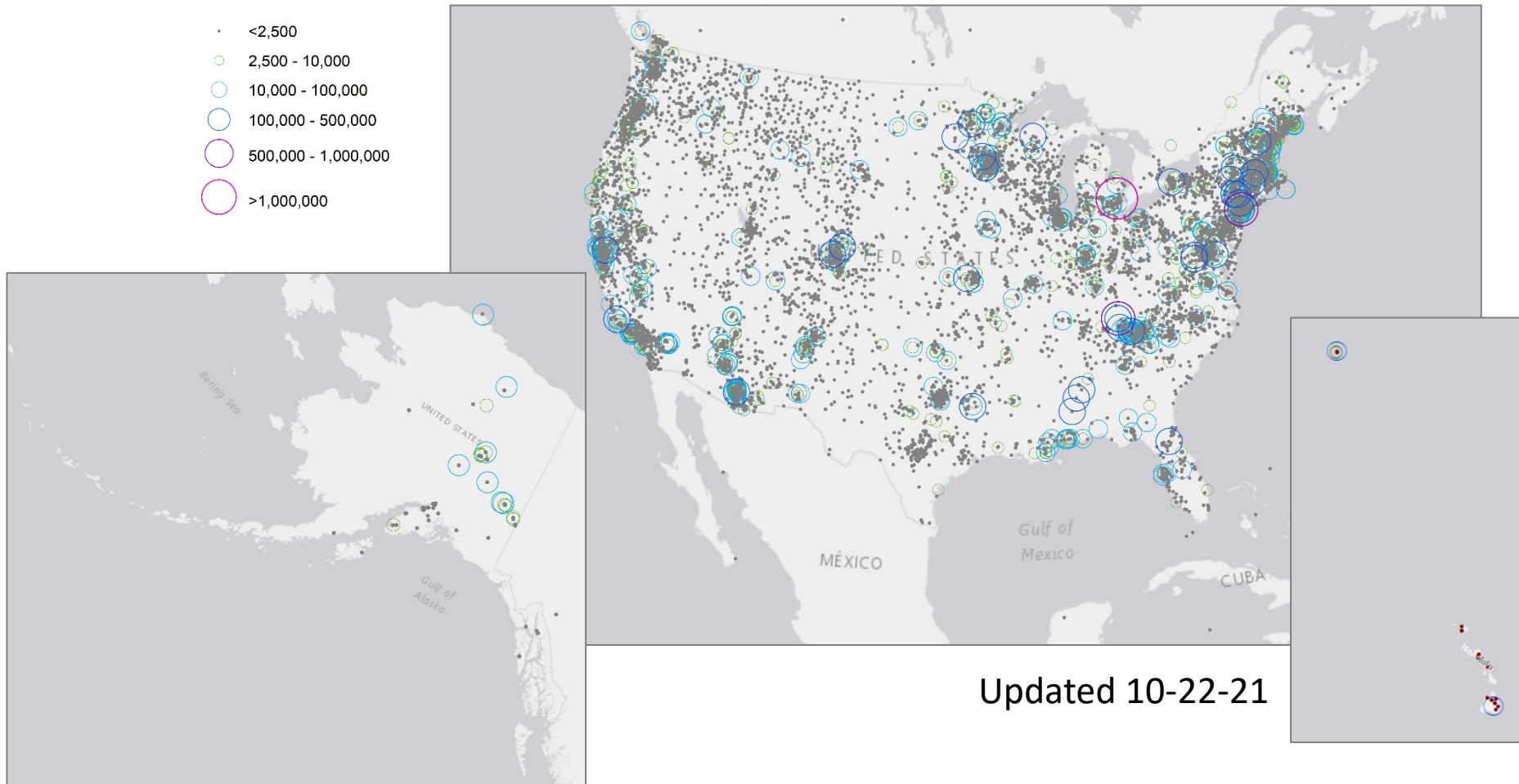
# How do you track plant and animal life cycles?





26M records  
22K observers  
17K sites

- <2,500
- 2,500 - 10,000
- 10,000 - 100,000
- 100,000 - 500,000
- 500,000 - 1,000,000
- >1,000,000



Updated 10-22-21

[www.usanpn.org](http://www.usanpn.org)



# Join our data collection campaigns

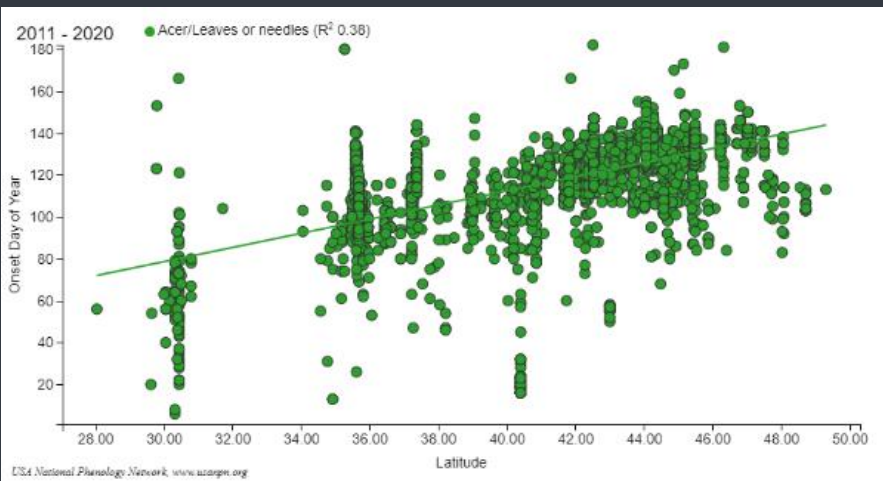


[www.usanpn.org/nn/campaigns](http://www.usanpn.org/nn/campaigns)



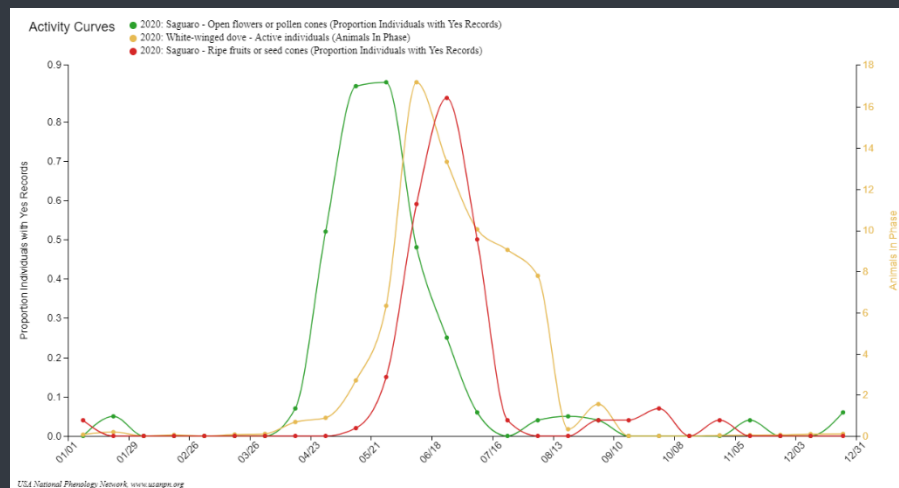
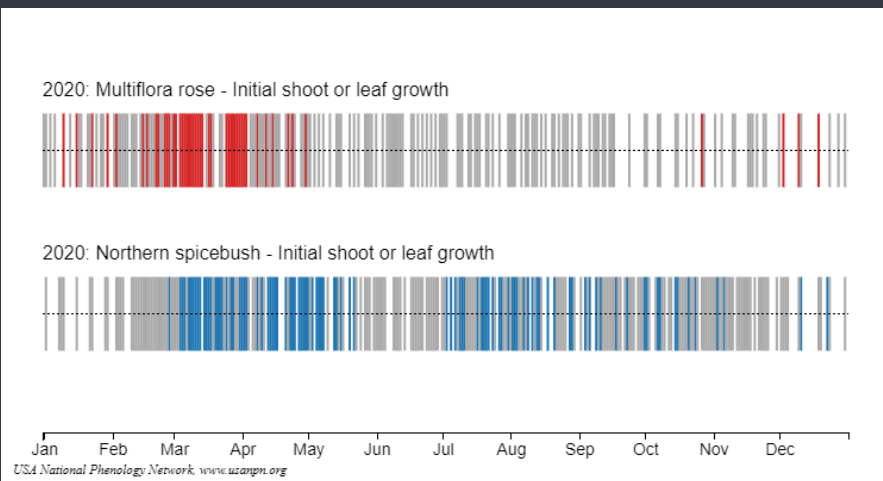


# Explore the data with our Visualization Tool



- Seasonal Stories give you quick access to curated visualizations
- Data Explorer lets you select data and create visualizations

[data.usanpn.org/vis-tool](http://data.usanpn.org/vis-tool)



# Explore how your data are used

## SCIENTIFIC REPORTS

OPEN ***Asclepias Syriaca* (Common Milkweed) flowering date shift in response to climate change**

Received: 17 February 2017  
Accepted: 13 November 2018

Aaron F. Howard



Ecological Indicators  
Volume 109, February 2020, 105745



Flowering phenology indicates plant flammability in a dominant shrub species

Emery, Nathan <sup>a</sup>, Keely Roth <sup>b</sup>, Alexandria Lynn Pivovarov <sup>c</sup>

Ecological Solutions and Evidence **AER** Applied Ecology Resources

FROM PRACTICE AND EDITOR'S CHOICE | Open Access | CC BY

Using phenology data to improve control of invasive plant species: A case study on Midway Atoll NWR

Robert V. Taylor, Wieteke Holthuijzen, Ann Humphrey, Erin Posthumus

ECOSPHERE  
AN ESA OPEN ACCESS JOURNAL

Article | Open Access | CC BY

The primacy of bears as seed dispersers in salmon-bearing ecosystems

Laurie E. F. Harrer, Taal Levi

ECOSPHERE  
AN ESA OPEN ACCESS JOURNAL

Article | Open Access | CC BY

Novel measures of continental-scale avian migration phenology related to proximate environmental cues

Jeffrey F. Kelly, Kyle G. Horton, Phillip M. Stepanian, Kirsten M. de Beurs, Todd Fagin, Eli S. Bridge, Phillip B. Chilson

## How your data are being used

The plant and animal phenology observations that *Nature's Notebook* participants have been contributing tell some interesting stories! We invite you to read about some of our most recent discoveries from *Nature's Notebook* data below. Check back often; we update this page frequently!

### BACKYARD AND BOTANICAL DATA ENABLE THE STUDY OF RARE SPECIES



Thanks to phenology observations from both arboreta and those collected by *Nature's Notebook* observers, researchers were able to predict how rare and understudied species may respond to climate change. Collaborations with botanical gardens and arboreta are critical to continuing to build our understanding of changing phenology.

### NATURE'S NOTEBOOK OBSERVATIONS ARE KEY TO INTERPRETING INFORMATION COLLECTED BY SATELLITES AND AIRCRAFT



In this study, a research team evaluated eight approaches to identifying the dates of the starts and ends of the growing season to MODIS imagery across United States. They compared the estimates of start and end of season with phenology observations contributed to *Nature's Notebook*. The different approaches to identifying the start and end of the season showed a great deal of variability in the dates returned. The date identified as the start of the season at a location varied by as much as 50 days between two approaches. The authors of this study emphasize the importance of ground-based observations of phenology, such as those contributed to *Nature's Notebook*, in interpreting imagery collected by remote instruments such as those borne on satellites.

[www.usanpn.org/nn/vignettes](http://www.usanpn.org/nn/vignettes)

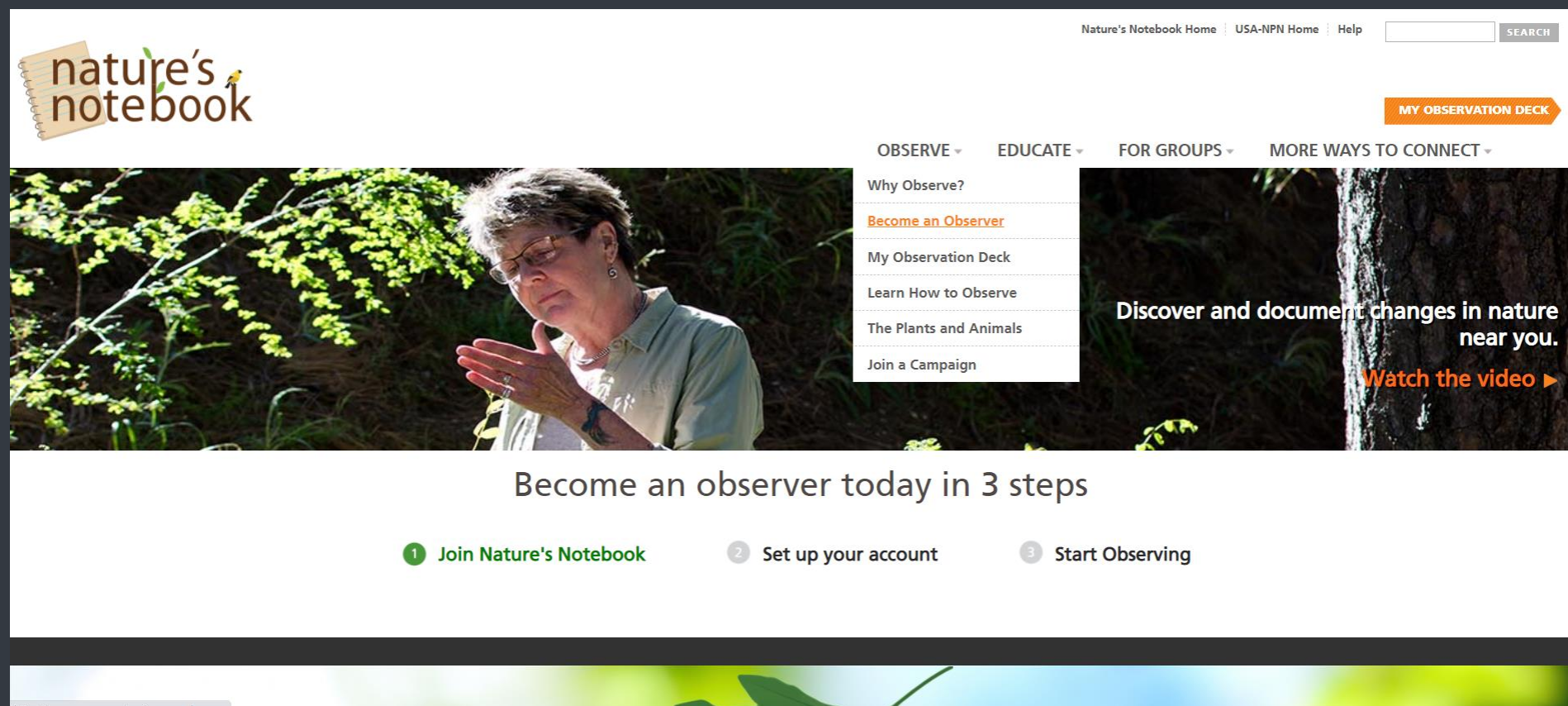
# Steps for getting started



1. Create a *Nature's Notebook* account
2. Add a Personal Site
3. Add a redbud to your site
4. Record data on your redbud
5. Sign up for campaign emails



# 1. Create a *Nature's Notebook* account



The screenshot shows the homepage of the Nature's Notebook website. At the top left is the logo, which consists of a spiral notebook icon and the text "nature's notebook". To the right of the logo are links for "Nature's Notebook Home", "USA-NPN Home", and "Help", followed by a search bar with a "SEARCH" button. Below these links is a navigation bar with "MY OBSERVATION DECK" in an orange button, and "OBSERVE", "EDUCATE", "FOR GROUPS", and "MORE WAYS TO CONNECT" as dropdown menus. A large banner image on the left shows a woman in a light green shirt looking at her hands in a forest. To the right of this image is a vertical menu with links: "Why Observe?", "Become an Observer" (highlighted in orange), "My Observation Deck", "Learn How to Observe", "The Plants and Animals", and "Join a Campaign". Further right is another banner image with the text "Discover and document changes in nature near you." and a "Watch the video" link with a play button icon. Below the banners, the text "Become an observer today in 3 steps" is centered. Underneath this text are three numbered steps: "1 Join Nature's Notebook" (with a green circle), "2 Set up your account" (with a grey circle), and "3 Start Observing" (with a grey circle). At the bottom of the page is a dark grey footer containing the website URL "www.usanpn.org" on the left, and logos for "USA npn National Phenology Network" and "ARIZONA" on the right.

nature's notebook

Nature's Notebook Home USA-NPN Home Help

MY OBSERVATION DECK

OBSERVE EDUCATE FOR GROUPS MORE WAYS TO CONNECT

Why Observe?

[Become an Observer](#)

My Observation Deck

Learn How to Observe

The Plants and Animals

Join a Campaign

Discover and document changes in nature near you.

[Watch the video](#)

Become an observer today in 3 steps

- 1 Join Nature's Notebook
- 2 Set up your account
- 3 Start Observing

www.usanpn.org

USA npn National Phenology Network

ARIZONA

# 1. Create a *Nature's Notebook* account

## Become an Observer

When you participate in the program, you'll go outside to observe nature in your backyard or nearby area weekly and enter this information online.

*Time commitment to...*

**Become an observer:** About 10 minutes

**Observe:** About 2 minutes per individual plant or animal (*once you've familiarized yourself with the program and learned how to observe*).

For assistance with getting started visit our [Learn How to Observe](#) page where you will find step-by-step instructions and video tutorials to help you through the process.

Become an observer today in 3 steps:

### 1 Join *Nature's Notebook*

- To join, download the [Nature's Notebook mobile app](#) or [sign up here](#).
- All that's needed to join is your name and email address. No previous experience necessary. We don't give personal information away (Read our [Privacy Policy](#)).

### > 2 Set up your account

- Choose your site, the location where you want to observe, such as your backyard.
- Select species from our [Species List](#), or our [Campaign Species](#), identifying individual plants or animals you want to observe.

### > 3 Start observing!

- Familiarize yourself with our [observation guidelines](#) and [standardized phenology protocols](#).
- Go outside, take observations of your plants or animals using your mobile device or use paper datasheets and then enter your data online.

DOWNLOAD THE MOBILE APP

- or -

SIGN UP HERE



[www.usanpn.org](http://www.usanpn.org)

USA **npr** National Phenology Network  



## 2. Add a Personal Site

1 Join Nature's Notebook > 2 Set up your account > 3 Start observing

On this page you'll specify your site and select a species, plants and/or animals.

If you intended to join a shared site, return to [edit your profile](#) and join a partner group. Or learn how to [set up a shared site](#).

▼ Choose Your Site

Choose your site, the place where you want to observe. A site should be convenient and easily accessible, such as your backyard, or a favorite trail or park. After you set up your account, you may change your site or add more sites at any time.


Create site

\* Site Name:  (e.g., home, office, my front yard, etc. Note that your site name will be publicly visible on the USA-NPN Phenology Visualizer and in data downloaded.)

Address:

City:  State: --Please select one-- Zip Code:

Map Satellite



CREATE SITE

▲ Select a Plant

To select plant species you want to observe, type the common or scientific plant name in the "Plant Species" field and click the "Add to Checklist" button.

▼ Select an Animal

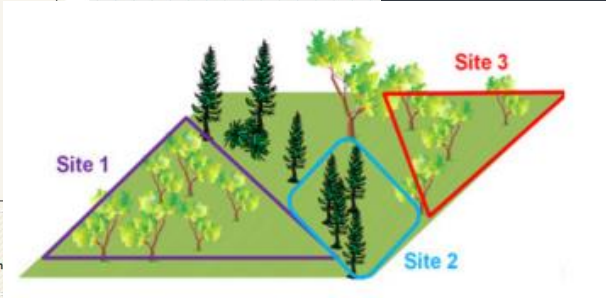
In the left box, select an animal(s) species that you will look for at your site. Click "Add to Checklist" to move them into the right box checklist. Save your checklist.

Please create a site before continuing to step B.

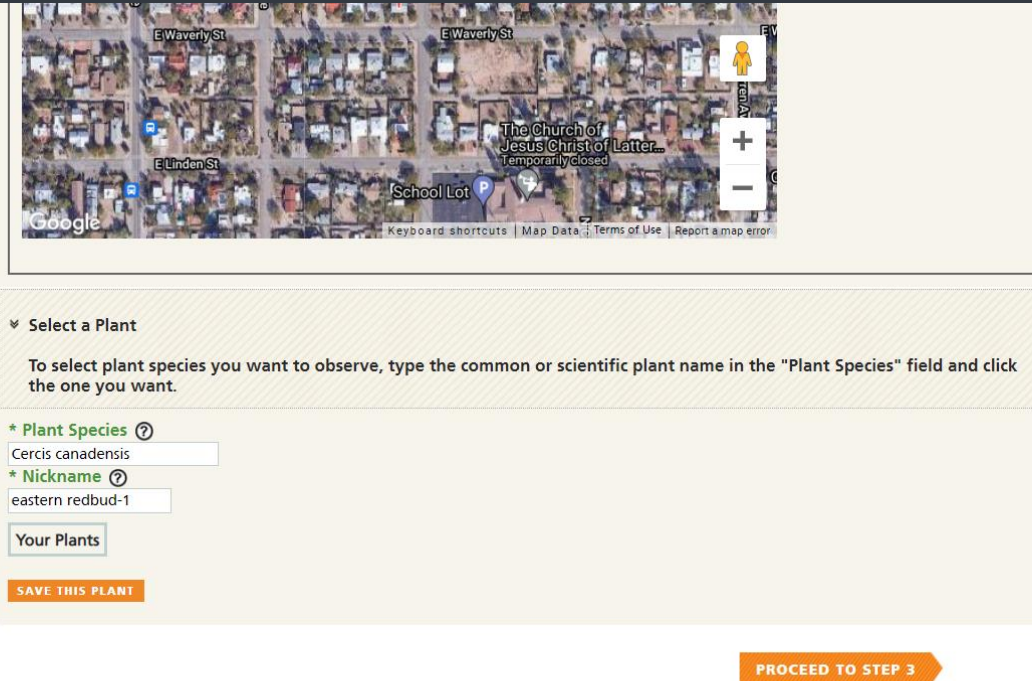
PROCEED TO STEP 3

Select a site that is:

- Convenient
- Representative
- Uniform Habitat
- Appropriate Size



### 3. Add a redbud to your site



The screenshot shows a Google Map of a residential area with labels for 'E Waverly St', 'E Linden St', 'The Church of Jesus Christ of Latter-day Saints Temporarily closed', and 'School Lot'. Below the map is a form titled 'Select a Plant' with instructions: 'To select plant species you want to observe, type the common or scientific plant name in the "Plant Species" field and click the one you want.' The form contains two input fields: '\* Plant Species' with the value 'Cercis canadensis' and '\* Nickname' with the value 'eastern redbud-1'. Below these fields is a button labeled 'Your Plants' and an orange button labeled 'SAVE THIS PLANT'. At the bottom right of the form is an orange button labeled 'PROCEED TO STEP 3'.

✖ Select a Plant

To select plant species you want to observe, type the common or scientific plant name in the "Plant Species" field and click the one you want.

\* Plant Species ?  
Cercis canadensis

\* Nickname ?  
eastern redbud-1

Your Plants

SAVE THIS PLANT

PROCEED TO STEP 3

# 3. Add a redbud to your site

- 1 Join Nature's Notebook
- > 2 Set up your account
- > 3 Start observing!

Congratulations, you're almost done. Once you've completed the two short items below on your own, you'll be able to visit your observation deck to start making observations!



## Learn how to observe

Before beginning to observe, complete our [Observer Certification Course](#). The Course will give you all the basics needed to start observing.



## Create observation datasheets of your species

[Print paper datasheets](#), take them outside to observe, fill out.  
OR Or skip datasheets altogether, instead entering your observations via [Android](#) or [iPhone](#) app.

[GO TO YOUR OBSERVATION DECK](#)

[About Us](#) | [FAQs](#) | [Glossary](#) | [Accessibility](#) | [Terms of Use](#)

Nature's Notebook is a project of the USA National Phenology Network.





Home » Observation Deck

## erintest-redbud's Observation Deck

Learning My Phenology Calendar Badges

### My Courses

#### NATURE'S NOTEBOOK OBSERVER CERTIFICATION COURSE:

Module 1: How to Observe [Take the Module](#)

Module 2: *Nature's Notebook* Mobile App [Take the Module](#)

Module 3: Plant and Animal Phenophases [Take the Module](#)

Module 7: Practice Making Observations [Take the Module](#)

[My Learning Dashboard](#)

### Observe

Why Observe?

Become an Observer

**My Observation Deck**

Learn How To Observe

The Plants and Animals

Leaderboards

### MY ACCOUNT

You are currently logged in as erintest-redbud

[MY ACCOUNT DETAILS](#)

### REMINDERS TO OBSERVE

You are currently signed up for weekly reminders to observe emails.

[UNSUBSCRIBE](#)

### Observations

Enter your observations below or via smartphone. You can edit the sites, plants or animals you've selected anytime.

#### Sites

Personal Sites ▾

home

[Edit Site »](#)  
[Add a New Personal Site »](#)

#### My Plants & Animals

eastern redbud-1

[Add or Edit Plants »](#)  
[Add or Edit Animals »](#)  
[Sort Plants & Animals »](#)  
[Print Field Datasheets »](#)

#### Details for this Organism

eastern redbud-1  
eastern redbud (*Cercis canadensis*)



[View Species Profile »](#)  
[Print Field Datasheet »](#)  
[Print Phenophase Definition Sheet »](#)

#### Enter Observations



[Enter Observation Data »](#)  
[Download My Data \(0\) »](#)  
[Visualize My Data »](#)

[Nature's Notebook mobile apps for Android and iPhone.](#)

# Already a *Nature's Notebook* observer?

## Observations

Enter your observations below or via smartphone. You can edit the sites, plants or animals you've selected anytime.

### Sites

#### Personal Sites

Mayfly test site  
Mt Graham biologists field camp  
Plant test site  
Silver Street  
Terra Alta  
test  
TWS 2012 Portland  
**Waverly Street**

[Edit Site »](#)

[Add a New Personal Site »](#)

### My Plants & Animals

pineneedle milkweed-1  
honeybee  
monarch  
ocotillo front yard  
American century plant 1  
creosote bush side yard  
ocotillo side yard  
American kestrel  
Anna's hummingbird  
bumblebee  
Cooper's hawk

[Add or Edit Plants »](#)

[Add or Edit Animals »](#)

[Sort Plants & Animals »](#)

[Print Field Datasheets »](#)

### Details for this Organism

pineneedle milkweed-1  
pineneedle milkweed  
(*Asclepias linaria*)



[View Species Profile »](#)

[Print Field Datasheet »](#)

[Print Phenophase Definition Sheet »](#)

### Enter Observations



[Enter Observation Data »](#)

[Download My Data \(4037\) »](#)

[Visualize My Data »](#)







*Nature's Notebook*  
mobile apps for  
Android and iPhone.

# 4. Record data on your redbud

## Eastern Redbud Datasheet

Do you see...	
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 ? ____
Fruits	y n ? ____
Ripe fruits	y n ? ____
Recent fruit or seed drop	y n ? ____

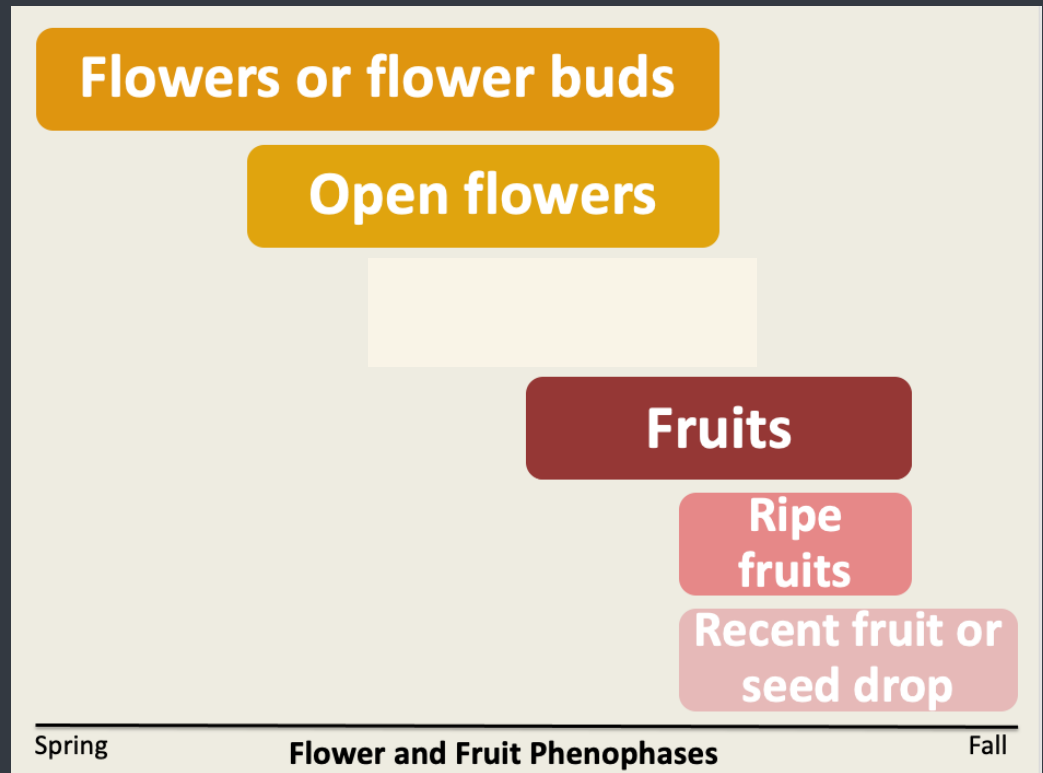
[www.usanpn.org/nn/redbud](http://www.usanpn.org/nn/redbud)

Phenophase	Definition	Photo (click to enlarge)
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.	
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.	
Fruits	One or more fruits are visible on the plant. For <i>Cercis canadensis</i> , the fruit is a pod that changes from green to purplish to dark brown and, over time, splits open to expose the seeds. Do not include empty pods that have already dropped all of their seeds.	
Ripe fruits	One or more ripe fruits are visible on the plant. For <i>Cercis canadensis</i> , a fruit is considered ripe when it has turned dark brown. Do not include empty pods that have already dropped all of their seeds.	
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.	



# 4. Record data on your redbud

Do you see...	
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 ? ____
Fruits	y n ? ____
Ripe fruits	y n ? ____
Recent fruit or seed drop	y n ? ____



# 4. Record data on your redbud

Paper datasheets and a web browser OR mobile app

**Trees and Shrubs** *Deciduous*

**Directions:** Fill in the date and time in the top rows and circle the appropriate letter in the column below.  
y (phenophase is occurring); n (phenophase is not occurring); ? (not certain if the phenophase is occurring).  
Do not circle anything if you did not check for the phenophase. In the adjacent blank, write in the appropriate measure of intensity or abundance for this phenophase.

**nature's notebook**

Species: Cercis canadensis  
Common Name: eastern redbud  
Nickname: \_\_\_\_\_  
Site: \_\_\_\_\_  
Year: \_\_\_\_\_  
Observer: \_\_\_\_\_

Do you see...	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:
	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:
Breaking leaf buds	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?
Leaves	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?
Increasing leaf size	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?
Colored leaves	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?
Falling leaves	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?
Flowers or flower buds	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?
Open flowers	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?
Fruits	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?
Ripe fruits	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?
Recent fruit or seed drop	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?	y n ?
Check when data entered online:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:								

Verizon 2:43 PM 31%

Sites Plants & Animals **Observe** Review

**Plants** Animals Site-Visit Details

Observation Date 2022-1-4 : 14:42

eastern redbud-1

Flowers or flower buds Y N ?

Open flowers Y N ?

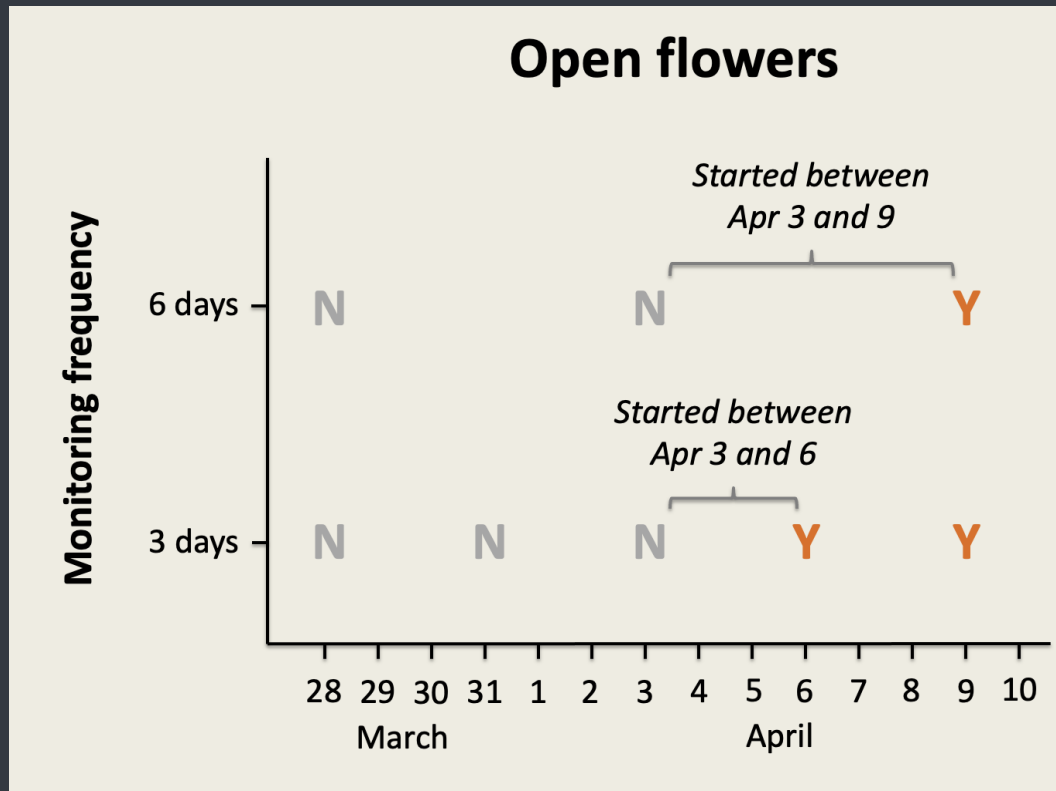
Fruits Y N ?

Ripe fruits Y N ?

Recent fruit or seed drop Y N ?

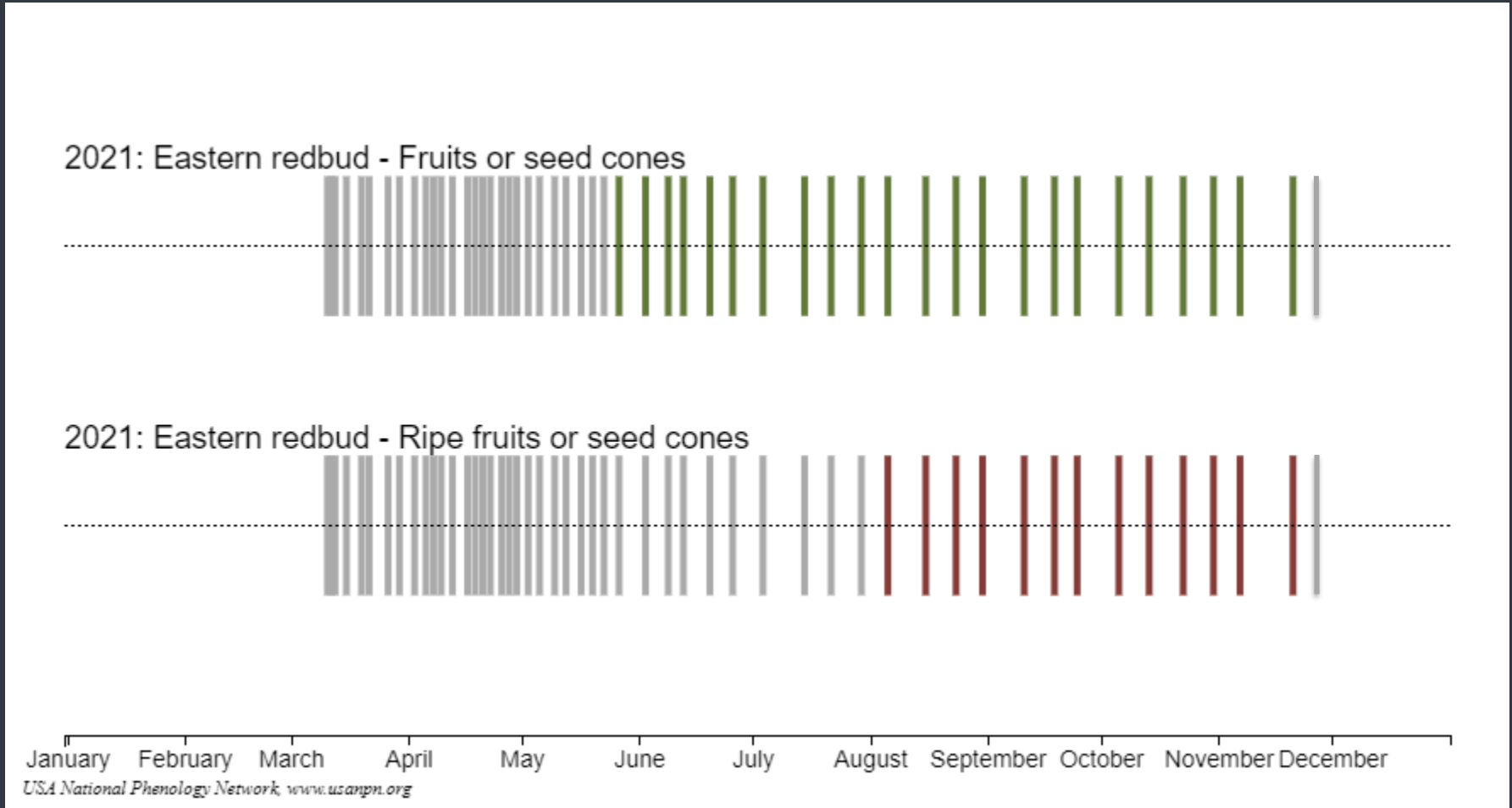
Save Data Next Plant

## 4. Record data on your redbud





# 4. Record data on your redbud



# 4. Record data on your redbud

## Flowers

### 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.

*How many flowers and flower buds are present? For species in which individual flowers are clustered in flower heads, spikes or catkins (inflorescences), simply estimate the number of flower heads, spikes or catkins and not the number of individual flowers.*

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

### 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 unfoldered or open flower parts (petals, floral tubes or sepals). Do not include wilted or dried flowers.

*What percentage of all fresh flowers (buds plus unopened plus open) on the plant are open? For species in which individual flowers are clustered in flower heads, spikes or catkins (inflorescences), estimate the percentage of all individual flowers that are open.*

Less than 5%; 5-24%; 25-49%; 50-74%; 75-94%; 95% or more;

## Fruits

### Fruits

One or more fruits are visible on the plant. For *Cercis canadensis*, the fruit is a pod that changes from green to purplish to dark brown and, over time, splits open to expose the seeds. Do not include empty pods that have already dropped all of their seeds.

*How many fruits are present?*

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

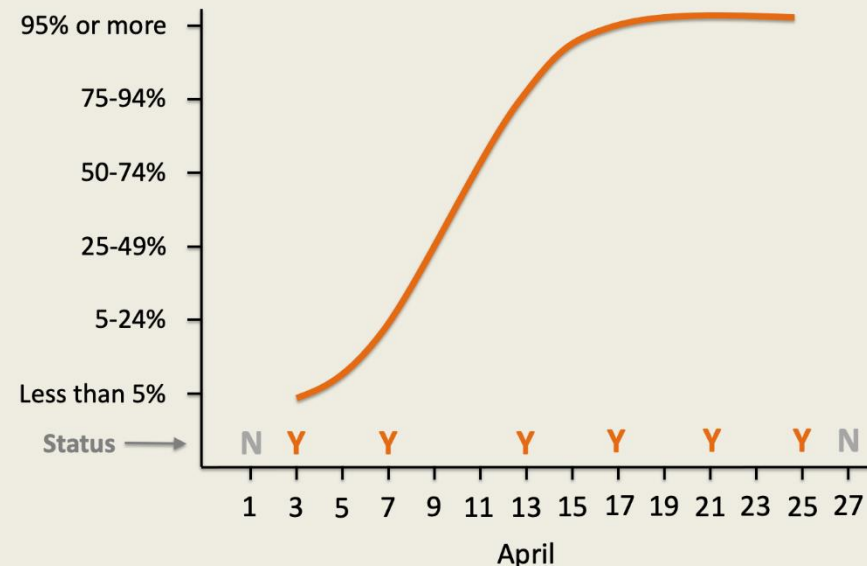
### Ripe fruits

One or more ripe fruits are visible on the plant. For *Cercis canadensis*, a fruit is considered ripe when it has turned dark brown. Do not include empty pods that have already dropped all of their seeds.

*What percentage of all fruits (unripe plus ripe) on the plant are ripe?*

Less than 5%; 5-24%; 25-49%; 50-74%; 75-94%; 95% or more;

## Open flowers



# 5. Sign up for campaign emails



## Sign up for the Redbud Phenology Project messages

You will receive the Redbud Phenology Project campaign messages several times during the season with results, observation tips, and more.  
Photo: Thom Pennington

\* Email

\* First Name

Zip Code

Sign Up



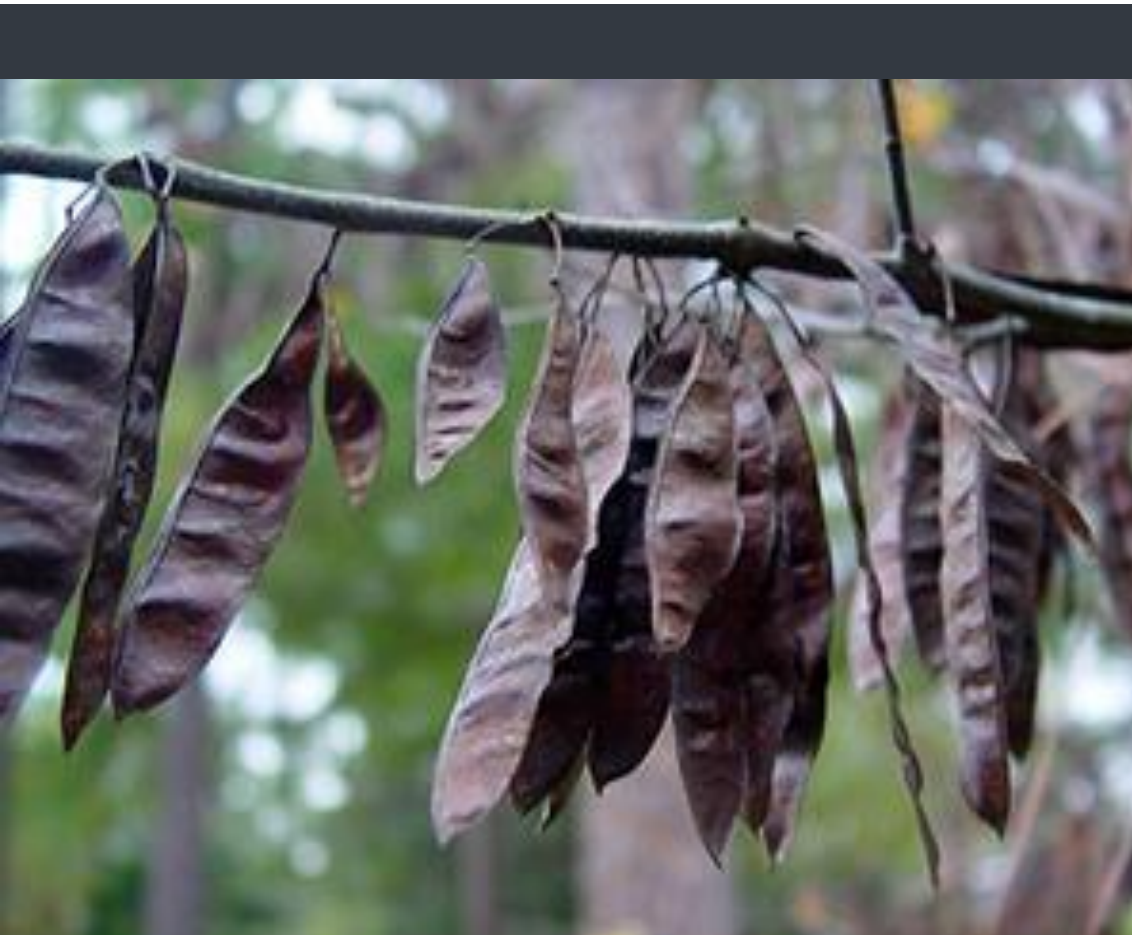
# Test your skills!



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.
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.
Fruits	One or more fruits are visible on the plant. For <i>Cercis canadensis</i> , the fruit is a pod that changes from green to purplish to dark brown and, over time, splits open to expose the seeds. Do not include empty pods that have already dropped all of their seeds.
Ripe fruits	One or more ripe fruits are visible on the plant. For <i>Cercis canadensis</i> , a fruit is considered ripe when it has turned dark brown. Do not include empty pods that have already dropped all of their seeds.
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.

Photo: MSU Extension/Gary Bachman

# Test your skills!



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Photo Credit: Chris Evans, University of Illinois, [Bugwood.org](http://Bugwood.org)

# A couple things to remember about redbuds...

- Redbud trees may not flower until several years old
- Do not count winter flower buds until they swell
- Look for reproductive parts of flowers to know when they are open
- Redbuds may hold onto empty seed pods all winter – you should stop counting “Yes” to ripe fruits once pods have released seeds
- If recording leaf phenophases, note that young leaves may appear red – this is not “colored leaves” that occurs in late summer/autumn
- Consider selecting 2-3 individual trees at your site if you have them available

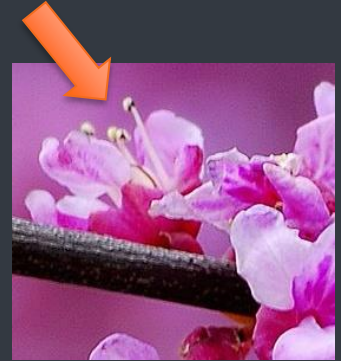


Photo Credit: Wendy VanDyk Evans, [Bugwood.org](http://Bugwood.org)



# Training materials and resources

## Eastern Redbud

(*Cercis canadensis*)

### Phenophase Definitions



#### Directions:

As you report on phenophase status (Y, N or ?) on the datasheets, refer to the definitions on this sheet to find out what you should look for, for each phenophase in each species. To report the intensity of the phenophase, choose the best answer to the question below the phenophase, if one is included. Feel free not to report on phenophases or intensity questions that seem too difficult or time-consuming.

#### Leaves

##### Breaking leaf buds

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

##### 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

#### Leaves

One or more live, unfolded leaves are visible on the plant. A leaf is considered "unfolded" when the length of the leaf has emerged from a breaking bud, stem node or growing stem tip, so that the leaf or leaf base is visible at its point of attachment to the stem. Do not include fully dried or dead leaves.

##### What percentage of the potential canopy space is full with leaves? Ignore dead branches in your estimate of potential canopy space.

Less than 5%; 5-24%; 25-49%; 50-74%; 75-94%; 95% or more;

##### Increasing leaf size

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

##### What percentage of full size are most leaves?

Less than 25%; 25-49%; 50-74%; 75-94%; 95% or more;

#### Colored leaves

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

#### Taking the Pulse of Our Planet

Contact: [ncd@usanpn.org](mailto:ncd@usanpn.org) | More information: [www.usanpn.org](http://www.usanpn.org)

## Phenophase Definitions

What percentage of the potential canopy space is full with non-green leaf color? Ignore dead branches in your estimate of potential canopy space.

Less than 5%; 5-24%; 25-49%; 50-74%; 75-94%; 95% or more;

#### Falling leaves

One or more leaves with typical late-season color, or yellow or brown due to other stresses, are falling or have recently fallen from the plant. Do not include fully dried or dead leaves that remain on the plant for many days before falling.

#### Flowers

##### 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.

How many flowers and flower buds are present? For species in which individual flowers are clustered in flower heads, spikes or catkins (inflorescences), simply estimate the number of flower heads, spikes or catkins and not the number of individual flowers.

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

##### 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.

What percentage of all fresh flowers (buds plus unopened plus open) on the plant are open? For species in which individual flowers are clustered in flower heads, spikes or catkins (inflorescences), estimate the percentage of all individual flowers that are open.

Less than 5%; 5-24%; 25-49%; 50-74%; 75-94%; 95% or more;

#### Fruits

##### Fruits

One or more fruits are visible on the plant. For *Cercis canadensis*, the fruit is a pod that changes from green to purplish to dark brown and, over time, splits open to expose the seeds. Do not include empty pods that have already dropped all of their seeds.

##### How many fruits are present?

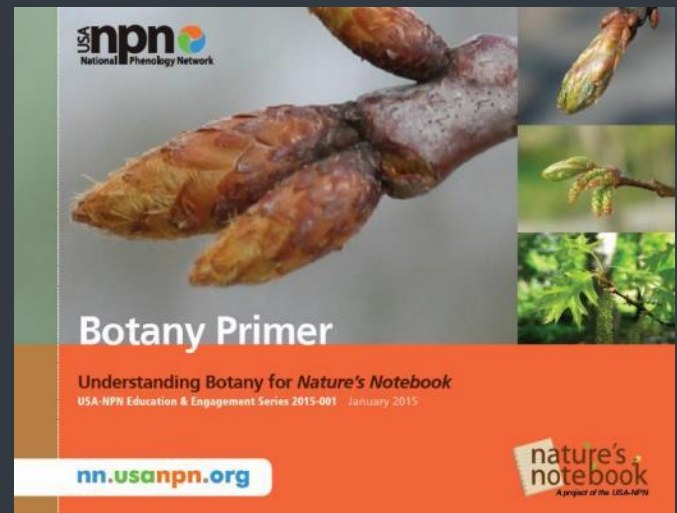
Less than 3; 3 to 10; 11 to 100; 101 to 1,000; 1,001 to 10,000; More than 10,000

##### Ripe fruits

One or more ripe fruits are visible on the plant. For *Cercis canadensis*, a fruit is considered ripe when it has turned dark brown. Do not include empty pods that have already dropped all of their seeds.

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## Botany Primer

Understanding Botany for Nature's Notebook

USA NPN Education & Engagement Series 2015-001 January 2015

[nn.usanpn.org](http://nn.usanpn.org)

nature's  
notebook  
A project of the USA-NPN

[www.usanpn.org/pubs/reports](http://www.usanpn.org/pubs/reports)

[www.usanpn.org](http://www.usanpn.org)

# Observer Certification Course

**erintest-redbud's Observation Deck**

Learning | My Phenology Calendar | Badges

### My Courses

**NATURE'S NOTEBOOK OBSERVER CERTIFICATION COURSE:**

Module 1: How to Observe [Take the Module](#)

Module 2: Nature's Notebook Mobile App [Take the Module](#)

Module 3: Plant and Animal Phenophases [Take the Module](#)

Module 7: Practice Making Observations [Take the Module](#)

[My Learning Dashboard](#)

**OBSERVE**

Why Observe?

Become an Observer

**My Observation Deck**

Learn How To Observe

The Plants and Animals

Leaderboards

**MY ACCOUNT**

You are currently logged in as erintest-redbud

[MY ACCOUNT DETAILS](#)

**REMINDERS TO OBSERVE**

You are currently signed up for weekly reminders to observe emails.

[UNSUBSCRIBE](#)

**USA npn**  
National Phenology Network


## Nature's Notebook How-to Observe Module - Lesson 1: What is phenology?

**Lesson 1: What is phenology?**

Phenology is the study of the timing of life cycle events in plants and animals, their recurrence, and relationship to the environment. The word comes from the Greek root word *phaino*, which means to show or appear.

Phenology is nature's calendar—when cherry trees bloom, when a robin builds its nest and when leaves turn color in the fall.

Phenology is pollinators visiting open flowers to aid in reproduction, elk making mating calls, and a tadpole turning into a frog.



**Course Outline**

The Nature's Notebook How-to Observe Module

Nature's Notebook How-to Module Learning Outcomes

Lesson 1: What is Phenology and Why Monitor It?

Lesson 1: What is Phenology and Why Monitor It? - Learning Objectives

**Lesson 1: What is phenology?**

Lesson 1: What is Phenology Video

Lesson 1: Summary

Lesson 1: Quiz

Lesson 2: Create a Nature's Notebook Account

Lesson 3: Establish a Site Outdoors for Monitoring

Lesson 4: Choose Plant and Animal Species for Observation

Lesson 5: Set up Your Sites and Species in Nature's Notebook Online

## A group of four people, three women and one man, are standing outdoors in a wooded area. They are all looking at a book titled "Nature's 5 &amp; 6" which is being held by one of the women. The man on the left is wearing an orange shirt and a cap. The woman next to him is wearing a light-colored jacket. The woman in the center is wearing a green shirt. The woman on the right is wearing a blue polo shirt. The background shows trees and foliage.

Contact  
erin@usanpn.org for  
more info!

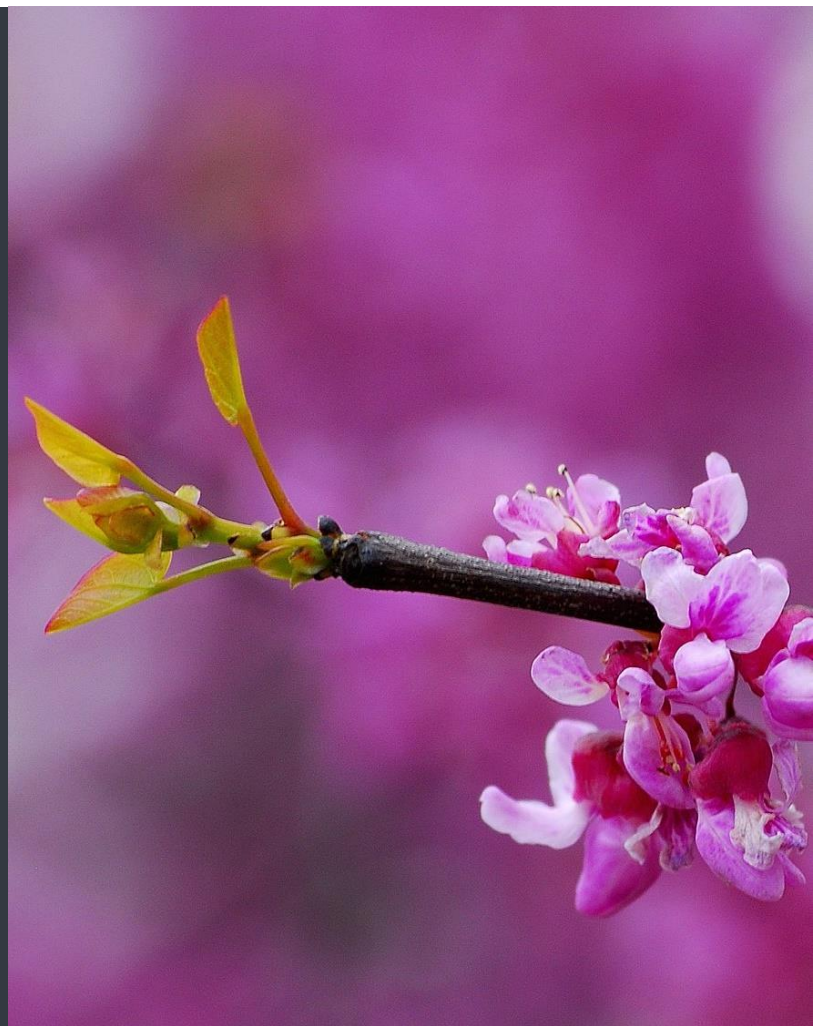


- Online Certification Course
- Program Planning Resources
- Volunteer recruitment and retention strategies
- Community of Practice



# Recap – Join the redbud campaign

- Create a *Nature's Notebook* account
- Add a site and individual redbud(s)
- Record observations (at least once per week if possible)
- Take advantage of training materials
- Sign up for redbud campaign messages



# Questions?

Need help getting started?

Erin Posthumus

[erin@usanpn.org](mailto:erin@usanpn.org)

520-314-7883

Dr. Jorge Santiago-Blay

[blayj@psu.edu](mailto:blayj@psu.edu)