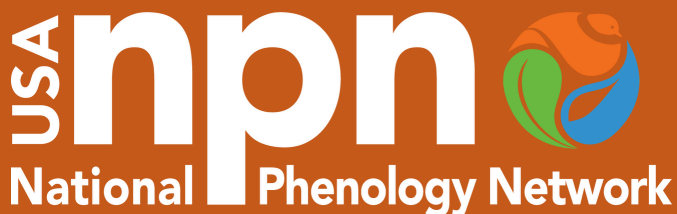




The Local Phenology Program Handbook

A guide to creating a Local Phenology Program in *Nature's Notebook*

USA-NPN Education & Engagement Series 2025-001



USA-NPN Education & Engagement Series 2025-001

Local Phenology Program Handbook

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This is a companion handbook to the **Program Planning Workbook**, USA-NPN Education & Engagement Series 2025-002, which can be found at www.usanpn.org/community/LocalPhenologyPrograms/Guidance

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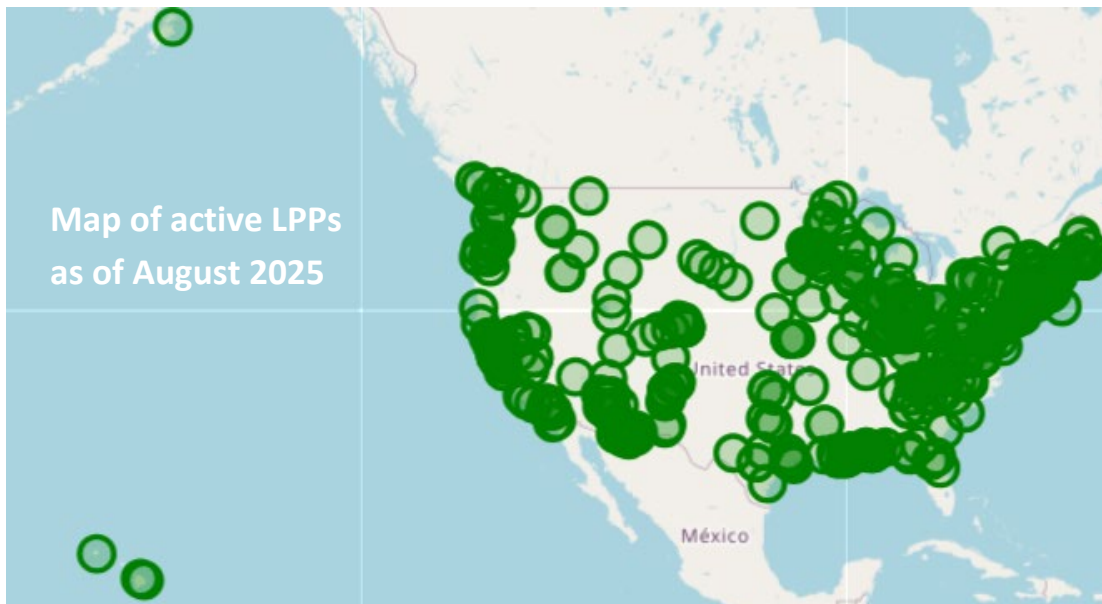
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1. WHY CREATE A LOCAL PHENOLOGY PROGRAM?

Local Phenology Programs, or LPPs, are organizations or community groups that connect like-minded people in tracking **phenology** with the **USA National Phenology Network's *Nature's Notebook*** platform.

LPPs range from small, local-scale efforts to larger regional networks made up of many LPPs working toward a greater purpose and/or common goal. Organizations including nature centers, arboreta, museums, schools and colleges, Master Gardener and Master Naturalist chapters, and land conservancies and trusts have recognized *Nature's Notebook* as a relevant data collection and science engagement tool to help build on their education and outreach programming efforts.



Minimum requirements for starting an Local Phenology Program:

- Plan to create a Program that will collect data for at least 2 years. We recommend this because it can take a year or more to work through any issues and settle on a monitoring setup that works for you.
- Identify one or more Local Phenology Leaders (LPLs) to help support your Local Phenology Program (LPP). A Local Phenology Leader can be a paid staff member, such as a volunteer coordinator or staff biologist, or an active volunteer.
- Complete the USA-NPN's annual survey each year to provide feedback. This is a great opportunity for you to tell us what is working well and what resources you need to improve your Program!

LPPs are powerful tools for collecting long-term observational data for research and management and for educating and engaging visitors, students, and volunteers in science and natural history.

Benefits to your organization or community include:

- **Scientific literacy** - Engage your volunteers and the public in the scientific process. This can include designing research questions relevant to your location, selecting locations and species of interest, collecting data, interpreting results, and sharing information with other communities and researchers across the country.
- **Data infrastructure and sharing** - Easily contextualize and visualize your data with those collected by others in Nature's Notebook. Once you have collected data, you will be able to visualize and download your LPPs data alongside data collected by other observers in your area or data collected on the same species from across the country.
- **Connection to nature** - Making repeated observations at a given location on a daily or weekly basis will help students, amateur naturalists, fellow visitors, and even seasoned scientists notice the changes happening in the natural world.
- **Stewardship** - Inspire in your volunteers a feeling of connection to and care for the plants and animals they are observing.
- **Community building** - Provide the opportunity for current and new volunteers to connect with each other and be part of a larger national effort.

In addition to benefits to your organization or community, there are great benefits to science and society from your data collection, including:

- **Providing a long-term record** - Collecting observational data over a sustained period helps us create a detailed record of what is happening here and now. These data can be useful for generations to come.
- **Advancing science** - Data can be used in scientific research to make discoveries - examples
- **Informing decisions** - Data can also be used to create more effective management practices and better inform the timing of actions related to habitat restoration or invasive species management.

2. PHENOLOGY

Phenology is the study of recurring plant and animal life cycle stages, especially their timing and relationships with weather and climate. Put simply, phenology is nature's calendar!

Phenology is a term that few people know, but most are familiar with. Phenology is easy to observe and has connections to many fields including ecology, agriculture, allergies, invasive species management, and tourism and recreation.

Phenology is also an important indicator of climate change. Phenology datasets that consist of observations of multiple life cycle stages collected at regular intervals at the same locations over many years help support scientific discovery and decision-making.

We call each observable stage that plants and animals experience in their seasonal life cycles a **phenophase**. Phenophases are measurable, observable, and have a start and end point. Some phenophases can last for months, while others may last only minutes.

Applications of phenology data include:

- Documenting impacts of climate change on plant and animal seasonal cycles
- Managing invasive species and forest pests
- Predicting human health-related events, such as allergy and mosquito season
- Optimizing when to plant, fertilize, and harvest crops
- Understanding the timing of ecosystem processes, such as carbon cycling

To learn more about phenology, watch our videos - Introduction to Phenology, and Shifts in Phenology - linked from the LPP Guidance webpage

(www.usanpn.org/community/LocalPhenologyPrograms/Guidance). You can also download the slide decks to adapt and use for your own training and outreach purposes.



Program Planning: How does Phenology fit your needs?

The [Local Phenology Program Planning Workbook](#) (available on the LPP Guidance webpage) walks you through detailed steps for planning your long-term phenology program. Throughout this Handbook we will refer to the Workbook and invite you to add your responses there.

First, it's important to consider **why** you are developing a site-based long-term phenology monitoring program. Thinking through the reasons you wish to utilize Nature's Notebook for natural resource management, scientific, or educational purposes will help you develop something sustainable.

Take a moment to think about why you want to develop a Local Phenology Program, and how Nature's Notebook can help fill those needs in your current programming or curricula.

Now record your “why” in **Section 1** of your **Program Planning Workbook**!

3. NATURE'S NOTEBOOK

The USA National Phenology Network (USA-NPN) was established to collect, store, and share phenology data and information. Our goal is to empower people to understand nature's changing rhythms so that we can all adapt to a changing world.

Nature's Notebook is the USA-NPN's flexible platform that engages observers in tracking the seasonal timing of plant and animal life cycle stages. To facilitate coordinated cross-site, cross-species, and geographically extensive phenological monitoring across the nation, the USA-NPN has developed monitoring protocols standardized across taxonomic groups and ecosystem types for terrestrial, freshwater, and marine plant and animal taxa. These standardized protocols are designed to quantify the onset, duration, and intensity of phenological stages of plants and animals to understand how life cycles track environmental variation.

Having standardized protocols ensures participants are utilizing the same framework when collecting data in the field. This is one reason why the USA-NPN staff requires that all educational and training materials created by partners communicate the protocol as designed by our data team. It ensures our data are of sound quality and usable by managers and researchers.

All observations submitted to *Nature's Notebook* are stored in the online National Phenology Database and can be accessed publicly and for free through several query and visualization tools. Thus far, the data have been used in 200+ scientific publications as well as in policy documents and extensively in the media.

The USA-NPN staff regularly write public-friendly summaries of scientific publications using *Nature's Notebook* data to help our observers learn what scientists are finding with their data. You can find these on the usanpn.org homepage or shared in our newsletters. We invite you to share these uses of *Nature's Notebook* data with your LPP participants.



"Learning how the data is being utilized by scientists is really inspirational. And sometimes it's eye opening to know about gaps in the data and what current researchers are looking for. For example, should we be sampling a higher diversity of species? Which species would be most helpful?"

- Jean Linville, Weir Farm National Historic Park Volunteer

4. ADVANCED PHENOLOGICAL OBSERVATIONS

Learning to use the *Nature's Notebook* protocols to observe a wide range of plant and animal species can feel overwhelming. This can be especially true if you are new to observing and collecting data in general! This is why it might be wise to start slow with the phenophases and intensities that you are most comfortable with. For example, it's ok to invite your LPP observers to only record observations for Leaves, Flowers, and Fruits until you are more comfortable and familiar with the protocols for transitional phenophases such as initial growth or pollen release.

The *Nature's Notebook* platform is flexible - adapt it to your needs!

Don't hesitate to embrace the ? and the Not Sure options on the *Nature's Notebook* protocols. Marking a phenophase with a "?" or "Not Sure" provides an opportunity for you to learn which parts you understand and where you are unsure. You can always go back to edit your observations later if you determine that the answer should have been "yes" or "no".

When trying to understand the protocols, it helps to understand the science behind the phenophases. You can learn more about why we selected the questions on the *Nature's Notebook* protocols, and how the information is used by researchers and decision makers, in [this paper](#) published in *Bioscience: Science and Management Advancements Made Possible by the USA National Phenology Network's Nature's Notebook Platform*.



Program Planning: What question are you trying to answer?

We have found that the most successful phenology monitoring programs have clearly defined goals (with outcomes) and at least one science question that can be answered with phenology data. You have already thought about what **needs** a *Nature's Notebook* program will meet and whether those needs are related to a science/management question or an education/outreach question. A science question can help guide you in selecting sites, plants, and animals for observation.

Using phenology data to answer local or regional phenology questions enhances volunteer experience. It helps give a purpose to your program and can help to motivate volunteers to come back time and time again to observe at your site.

Record your question in **Section 2** of your **Program Planning Workbook**!

5. PLANNING A LONG-TERM PROGRAM

The best advice we can offer for new Local Phenology Programs is simply: Start small, dream big!

Following these guidelines can set up your Local Phenology Program for success in the long term:

Plan: Have a goal for your phenology program that fits into existing programming or a need for targeted data.

Engage: Involve your observers in as much of the process as possible so that they feel partial ownership of the program.

Track: Check in often on your progress toward meeting the goals you have defined.

Connect: Take advantage of opportunities to connect with NPN staff and other Local Phenology Leaders.

Integrate: Connect science and outreach in your organization. Ask scientists which species would generate the most useful data. Involve your volunteer coordinators in each step in creating your program.

Program planning is all about creating a roadmap to help you achieve specific goals. Doing this planning before you begin helps you document what you'd like to achieve, visualize why and where you are headed, and keep you committed to moving forward.

There are many suggested methods for developing a program plan. The point is to think about:

WHAT you would like to achieve with your Local Phenology Program

HOW you will get there, and document your

MEASURES for success

Documenting this information creates accountability. It also is a fantastic way to share what you are doing with partners and those with a vested interest in your Program, including potential funders. We hope your Program Planning Workbook will be a living document that you can continue to update as your Program grows and evolves.



Program Planning: Goals, Actions, and Sustainability

You've thought about the relevance of phenology to your organization or community and stated a science question to shape your program.

Now you'll document your **goals** for the short, medium, and long term, lay out the **actions** for reaching these goals, and think about how to ensure your program will **sustain** for years to come.

Think about what you hope to achieve over the next 1, 2, 5 years. Who will you engage, what resources do you have, what resources do you need? What are the steps you will take to get to your goal? What are the nuts and bolts that someone would need to know to continue the program in your absence?

Complete these steps **Sections 3, 4, and 5** of your **Program Planning Workbook!**

Don't forget to complete our **Local Phenology Program Annual Survey** at the end of each year. We will send you a reminder via email starting in December each year. Your feedback is critical in informing new resources and soliciting support that we identify and develop for programs like yours.

6. DATA SUMMARY AND VISUALIZATION

Periodically checking in on the data collected by your Local Phenology Program will serve two purposes:

1. You will catch any errors in the data and make corrections as needed
2. You can share back results with your observers and any other individuals such as funders, partners, or visitors who would be interested in your data

Your Local Phenology Program is responsible for ensuring data quality of the observations you collect. Consider checking your data annually or even more regularly (e.g. monthly) to ensure that there are no issues with your data or the efforts to collect it. Issues may include phenophases reported as "yes" outside of the typical season of activity, or a phenophase sequence of "yes" "no" "yes" "no" during a period where only "yes" should be reported. If you keep regular tabs on your LPPs data, it will be much easier for an observer to recall whether something unusual was happening with a plant or animal or if they might have reported an error.

There are several tools offered by the USA-NPN to assist you with visualizing your LPP's data:

VISUALIZATION TOOL

The USA-NPN's Visualization Tool is a great way to explore patterns in your data. You can also use the Viz Tool to identify potential issues with your data, such as an observation made in error that needs to be corrected.

On the USA-NPN Visualization Tool webpage (usanpn.org/data/visualizations) we have linked a webinar where we walk through how to use each of the visualization types. There are timestamps to jump to each type of visualization.

Find a custom link to view your LPP's data on your LPP Profile page on the Data tab. This link will apply a filter to only display data collected by your LPP in the Visualization Tool. You can then proceed with selecting the visualization type, years, species, and phenophases of interest as described in the webinar.

LPP DASHBOARD

The Local Phenology Program Dashboard provides a summary of your observations and observer activity. You can use this dashboard to keep an eye on the consistency of your data collection and the impact of your recruitment efforts. You can also easily see which observers have consistently collected data (you may wish to recognize them for their efforts) or find observers that may have dropped off making observations to then offer any associated support they may need.

Find a link to view the LPP Dashboard on your LPP Profile page on the Data tab. Once you arrive on the LPP Dashboard page, follow the instructions on the page to unselect the default LPP and select your LPP. You will need to do this separately for all three dashboards on the page.

ANNUAL REPORT GUIDANCE

A phenology report is a document that describes the status of your phenological monitoring program, including participant statistics, data volume statistics, and patterns in the data. A phenology report provides an opportunity for you to check in on your progress toward goals that you have outlined. It also can provide a chance to review your LPP's data quality, to share back results of your data collection with observers or partners, and to reward observers with high amounts of activity or consistent data collection. It can be produced for any time scale, such as quarterly on an annual or biannual basis.

We offer an Annual Report Guide to help you with developing a report for your Local Phenology Program. Find it on the Planning tab of your LPP Profile page.

7. LOCAL PHENOLOGY PROGRAM MANAGEMENT

Once you are ready to officially create your Local Phenology Program, you will complete the request form on the USA-NPN's website. Once your request is approved, your LPP will be established in the *Nature's Notebook* database so that you can start creating sites, adding plants/animals, and even inviting others to join your LPP.

STEPS FOR SETTING UP A NEW LPP IN *NATURE'S NOTEBOOK*:

1. Create a *Nature's Notebook* account
2. Complete the LPP Request Form
3. Fill in details on your LPP Profile
4. Create your site(s) and add plants/animals
5. Invite observers to create a *Nature's Notebook* account and join your LPP

On the LPP request form you will be presented with a choice of two different types of Local Phenology Programs.

1. **Traditional Local Phenology Program** - observers collect data at one or more shared locations (sites)
2. **Personal Site Network** - observers collect data independently at their own personal sites

Most programs will select "Traditional Local Phenology Program," as they will engage observers in collecting data at locations such as a park, trail, or other shared space. A Personal Site Network can be useful for an educator who invites students to create their own individual sites for observation at their home or somewhere near where they live. It can also be useful for state-wide or other larger efforts that engage observers in tracking a shared list of species at their own personal sites.

LOCAL PHENOLOGY PROGRAM ROLES AND PRIVILEGES

The person who requests your LPP will be the default Administrator for your Program.

Administrators can edit details about your LPP including your project description, location, and contact information, as well as create and edit sites, plants, and animals. They can also view and remove members of their LPPs.

The Administrator can also appoint other members as Administrators or as Data Entry Technicians. The **Data Entry Technician** role allows a member to enter data on behalf of other members or edit data entered by other members. An Administrator can also be appointed as Data Entry Technician to have these additional privileges.

LPP Role	View sites/submit data	Add/edit sites/plants/ animals	View/remove LPP members	Add/Edit data on behalf of another LPP member
Administrator	✓	✓	✓	
Data Entry Technician	✓			✓
Member	✓			

Members that are not Administrators or Data Entry Technicians can view sites, plants, and animals and enter data, but cannot edit sites, plants, or animals or add or edit data on behalf of other members.

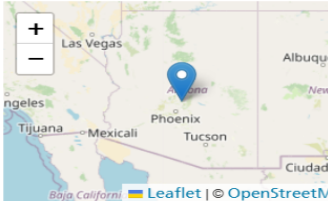
LOCAL PHENOLOGY PROGRAM PROFILE PAGE

Once your LPP is requested and approved by USA-NPN staff, you will receive a link to your LPP Profile Page. This is the publicly facing page for your LPP. Your LPP will also be added to the map on the Local Phenology Programs page.

McDowell Sonoran Conservancy Phenology Trails

[JOIN PROGRAM](#)

McDowell Sonoran Conservancy Phenology Trails' data collected in Nature's Notebook will be valuable in performing ecological research through partnerships and citizen science for the long-term natural resource management of the Scottsdale McDowell Sonoran Preserve while providing educational opportunities for the community and contributing to broader scientific knowledge.



DetailsDataMembersResourcesPlanning

LPP Creation Date	12-01-2016
Organization Name	McDowell Sonoran Conservancy Phenology Trails
Organization Website	www.mcdowellsonoran.org
Category	Conservation Organization,
Address	Brown's Ranch Road, Scottsdale, US, 85262

[EDIT DETAILS](#)

Observers can **Join your Program** by clicking the button (or they can join via the *Nature's Notebook* app).

Each LPP Profile includes the following tabs:

Details - Basic contact information for your Program

Data - Quick links to view custom cuts of your data in the Visualization Tool, download a spreadsheet of your data from the Phenology Observation Portal, or view metrics about your Program participation

Members* - View the list of your Program members, check their data, assign Administrators and Data Entry Techs, and remove members

Resources* - Links to frequently used resources including the LPL Community of Practice, Education Resources, and Workshop and Event Resources

Planning* - Guides to help you plan and implement your long-term phenology monitoring program

*These tabs are only visible to Administrators of your Program

Use the **Edit Details** button toward the bottom of the page to change your Program Description, website, category, location, and more

MANAGE LOCAL PHENOLOGY PROGRAM MEMBERS

The Members tab includes a list of your Program members, a place to promote a member to LPP Admin or Data Entry Technician or Remove User from Program

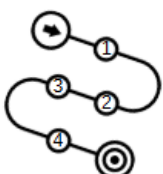
You can also download a data file for each individual user that displays all of the observation records they have recorded.

Observation ID	Observer	Observation Date	Plant Nickname	Phenophase	Abundance Category	Abundance Category Value	Raw Abundance	Category	Phenophase Name	Scientific Name	Common Name	Latitude	Longitude	Site Name
26938508	8/26/2021	1:26:00 PM	saguaro-1	Yes	How many flowers and flower buds are present?	For NULL	Flowers	Flowers	Flowers or flower buds	Carnegiea gigantea	saguaro	33.64935	-111.858536	Gateway
45459906	3/20/2025	12:00:00 AM	jojoba-2 (Male)	Yes	How many young leaves	11 to 100	NULL	Leaves	Young leaves	Simmondsia chinensis	jojoba	33.64935	-111.858536	Gateway
45459907	3/20/2025	12:00:00 AM	jojoba-2 (Male)	Yes	How many flowers and flower buds	1,001 to 10,000	NULL	Flowers	Flowers or flower buds	Simmondsia chinensis	jojoba	33.64935	-111.858536	Gateway
45459908	3/20/2025	12:00:00 AM	jojoba-2 (Male)	No	What percentage of all fresh flowers (buds plus open)	0 to 100	NULL	Flowers	Open flowers	Simmondsia chinensis	jojoba	33.64935	-111.858536	Gateway
45459909	3/20/2025	12:00:00 AM	jojoba-2 (Male)	No	How many fruits are present?	0 to 100	NULL	Fruits	Fruits	Simmondsia chinensis	jojoba	33.64935	-111.858536	Gateway
45459910	3/20/2025	12:00:00 AM	jojoba-2 (Male)	No	What percentage of all fruits (unripe plus ripe)	0 to 100	NULL	Fruits	Ripe fruits	Simmondsia chinensis	jojoba	33.64935	-111.858536	Gateway
45459911	3/20/2025	12:00:00 AM	jojoba-2 (Male)	No	How many mature fruits have dropped seeds or have	0 to 100	NULL	Fruits	Recent fruit or seed drop	Simmondsia chinensis	jojoba	33.64935	-111.858536	Gateway

Your Program Roster includes a link from your members emails and usernames to their Person ID, also known as their Observer ID. The Roster also includes the date that each observer first registered for *Nature's Notebook* and the virtual badges they have earned.

SETTING UP YOUR LOCAL PHENOLOGY PROGRAM SITES

There are many ways to implement your phenological data collection program in *Nature's Notebook*. You might create a site for each ecosystem type at your Park or set up a single observation trail at your nature center. You may wish to assign individual plants to observers or ask observers to track the phenology of each species on a given trail.



Consider a trail with your plants in a sequence, such as in the graphic at left. You can change the nickname of your plants to add a sequence of numbers to more easily link up your plants with physical markers at your site.

If you have a class of students who will be observing with *Nature's Notebook* for class credit, consider the following ideas:

- Students adopt individual plants that they observe independently during the semester or school year
- Students work in teams to observe one or more plants, alternating observation visits so that plants are tracked every few days

LPPs tracking large numbers of plants and/or animals may wish to create custom versions of printed datasheets to optimize the available space on paper.

Please remember to maintain the integrity of the *Nature's Notebook* protocols. Do not alter the questions or phenophase definitions, as these were carefully crafted and vetted by experts. You are welcome to use a subset of the questions on the datasheets, simply omitting the yes/no phenophase questions or intensity questions that your observers are not comfortable with.

TIPS FOR RECRUITING, TRAINING, AND ENGAGING OBSERVERS

RECRUITMENT

- Target certain existing groups - Master Naturalists, Master Gardeners, native plant society members, Audubon chapter members, Sierra Club members
- Promote your program by hosting a booth at a local festival, farmers market, and/or other tabling events
- Offer a phenology or biodiversity walk with naturalists to find potential volunteers
- Plan and host a local bioblitz event to promote interest in your program



“If you engage a teacher that is interested, you never have a lack of observers, so long as school is in session. For students, a letter of recommendation for college applications is a great incentive.”

- Marianne Lancaster, Santa Rosa Plateau Phenology Group

ONBOARDING AND MANAGEMENT

- Offer different roles to volunteers to fit with their interests - data collector, trainer, naturalist (i.e. consult on species id, species natural history), photographer, data entry

for others, data quality checker, newsletter writer, storyteller, social media poster, outreach and recruitment, social activity organizer (plan potlucks, book clubs, etc.).

- Recruit experienced observers to serve as mentors for new observers and consider requiring a term where new observers accompany experienced observers to collect data in teams.
- Offer a phenophase identification workshop to teach observers about confusing phenophases.



"We have groups of two or three people go together to observe. Having a specific time to meet and walk to observe the plants inspires friendship and responsibility. This unity among participants keeps them involved and enjoying the experience of observing."

- Steve Amesbury, Master Gardeners Phenology Group, Tucson

- Offer calibration trainings where the team meets periodically, in-person or online, to help ensure that everyone is "on the same page" with phenophase recognition and to provide a live opportunity to answer questions. These meetings build camaraderie and fuel enthusiasm for your program and the larger team effort.
- There are many scheduling resources to help you set up an observation schedule where your observers can rotate observation visits (e.g. Volgistics, Google Calendar, print a simple spreadsheet, etc.).



"Our Botanical Gardens awards credit for hours of observation that can be used to retain volunteer status. They also provide perks like free entry to the entire Garden and discounts in the stores and restaurant and more webinars, field trips, and more."

- Sandy, Albuquerque BioPark Botanic Garden

RETENTION

- Acknowledge your observers' efforts with physical or virtual badges or recognize them and their respective efforts in group and/or agency communications (e.g. "observer of the month").
- A phenology book club can keep observers engaged during slower winter months.
- Bring observers together for a potluck or social gathering and invite them to share photos or stories from their observation visits.



"I send out newsletters and photos with interesting things that are currently happening in the area. I focus not only on the plants we are observing but other aspects of nature. I co-host virtual meetups with my colleague who runs stewardship programs to include the Barking Slopes project among the volunteer opportunities offered by our organization. Phenology is also incorporated into other guided nature programs. These are a great way to get new people involved."

- Sara Klingensmith, Barking Slopes, Allegheny Land Trust

- Invite observers to gather at one of your plants or sites to talk about other aspects of the species besides phenology (e.g. economic value, medicinal uses). Invite an expert guest speaker if possible.
- Communicate with your observer community via a seasonal newsletter. Use USA-NPN's tools like the Data Visualization tool or Phenology Calendars to show findings from the group's observations and make connections to your own program.

8. LOCAL PHENOLOGY PROGRAM SUSTAINABILITY

The USA-NPN has many resources that can help your program last far into the future. Stay connected with other Local Phenology Programs via our community, social media, and other channels; share our training resources with your LPP's observers; use our outreach and education resources to enhance your LPP's offerings.

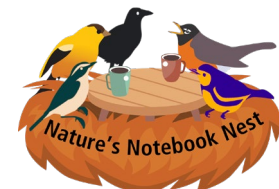
STAY CONNECTED VIA THE *NATURE'S NOTEBOOK* COMMUNITY

The Connection newsletter

Every other month, the USA-NPN staff send out a newsletter to thousands of Local Phenology Leaders and other USA-NPN partners with relevant updates, resources, and opportunities. See past editions and sign up to receive your own copy at www.usanpn.org/news/newsletters

The *Nature's Notebook* Nest

Standing calls on the first Monday of each month that offer a chance to get your questions answered by USA-NPN staff and talk with fellow observers and Local Phenology Leaders.



Monthly Murmurations

Flock together with us in focused discussions including Q & As with experienced Leaders, instructional webinars, and focus groups to give your input on key features in the new mobile app and many other engaging topics. These will be scheduled several weeks in advance and you can select which calls to attend based on topics of interest to you.

Social Media

We invite you to connect with us on social media! We will happily follow your organization on any of the following platforms:

Instagram [@usa_npn](#)

BlueSky [@usa-npn.bsky.social](#)

Threads [@usa_npn](#)

Facebook [@usanpn](#)

LinkedIn [@usa-npn](#)

YouTube [@usanpn1](#)

TRAINING RESOURCES

OBSERVER CERTIFICATION COURSE

The Observer Certification Course provides an orientation to using *Nature's Notebook* to collect data on the timing of plant and animal life cycle events. We highly recommend Local Phenology Leaders take the course, and also encourage their observers to take the course as well.

The Course covers the basics on setting up sites, selecting plants and animals to observe, collecting data with the mobile app, an in-depth look at the plant and animal phenophases and intensity measures, and a chance to practice making observations.

Upon successful completion of the course, you will become an official Certified Observer. You will receive a completion certificate, a badge for your Observation Deck, and you will be tagged in the *Nature's Notebook* database as a Certified Observer.

The Course consists of five modules:

- How to Observe with *Nature's Notebook*
- The *Nature's Notebook* Mobile App
- Plant and Animal Phenophases
- Intensity Measures
- Practice Making Observations

We estimate the entire course takes approximately 5.5 hours to complete. Your progress will be saved while you are taking the course and you can return to the modules after completion to review the material at any time.

BOTANY AND PHENOPHASE PRIMERS

Learning some basic botany can help make sense out of the seasonal changes of the plants you observe. We have developed Botany and Phenophase Primers to provide resources for observers to better understand plant biology. You can download or print a pdf of the Primers or order a hard copy at www.usanpn.org/nn/Primers. The pdfs are also free to distribute amongst your students and volunteers.

OUTREACH AND EDUCATION RESOURCES

NATURE'S NOTEBOOK CAMPAIGNS

By participating in one of our regional campaigns you can help researchers answer key questions, get info-rich emails with localized results, and an end of season summary. If you opt to participate in one of the campaigns, be sure to sign up to receive campaign-specific email messages! These messages, arriving approximately once every four to six weeks, will provide project updates and early results, helpful tips, and campaign-specific opportunities.

PHENOLOGY LESSON PLANS AND ACTIVITIES

Whether you are an outdoor educator, classroom teacher, or a higher education faculty member we have everything that you need to incorporate phenology into your curriculum. We offer programs and lesson plans that give your students the opportunity to make observations and participate in the scientific process through hands-on learning experiences.

Visit the “Bring Phenology to your Classroom” section of our website (www.usanpn.org/nn/education) for more information and learning tools. You can use the filters to find activities and lesson plans by grade level, language (English or Spanish), indoor/outdoor, and more.

We also have editable flyers, info sheets, and printable resources for any event. View them on your LPP Profile page on the Resources tab.

GLOSSARY OF TERMS

Administrator - a role in a Local Phenology Program that includes the following privileges - view sites and submit data, add/edit sites/plants/animals, view and remove LPP members.

Campaign - a focused data collection effort organized by the USA-NPN that engages observers in collecting data on a set of species that are of particular interest to scientists and/or decision makers.

Data Entry Technician - a role in a Local Phenology Program that includes the following privileges - view sites and submit data, add or Edit Data on behalf of another LPP member.

Local Phenology Leader - Local Phenology Leaders (LPLs) manage Local Phenology Programs. LPLs are often educators, volunteer coordinators, or even volunteers themselves who take a more active management role in their Programs.

Local Phenology Program - Range from small, local-scale efforts up to larger regional networks made up of many LPPs working toward a common goal. Many organizations, including nature centers, arboreta, museums, schools and colleges, Master Gardener and Master Naturalist chapters, and land conservancies and trusts have recognized Nature's Notebook as a relevant project to build into their education and outreach programming.

Nature's Notebook - *Nature's Notebook* is the USA National Phenology Network's flexible platform that engages observers in tracking the seasonal timing of plant and animal life cycle stages with standardized protocols. Collected data are stored in the online National Phenology Database (NPDb) and can be accessed publicly and for free through several query and visualization tools. Thus far, the data have been used in 200+ scientific publications, policy documents, media, etc. Observers in *Nature's Notebook* can participate independently, at a location such as in their backyard, or with a group of observers at publicly accessible locations that are part of a Local Phenology Program (LPP).

Phenology - Phenology is the study of the timing of seasonal activity of plants and animals. Phenology is easy to observe and has connections to many fields including ecology, allergies, invasive species management, and tourism and recreation. It is also an important indicator of climate change. Phenology datasets that consist of observations of multiple life cycle stages collected on a regular interval at the same locations over many years help support scientific discovery and decision-making.

Phenology Observation Portal - the USA-NPN's tool that allows a user to download custom data collected by Nature's Notebook observers. Filters available for years, locations, species, phenophases, and Local Phenology Programs.

Personal Site Network - a type of Local Phenology Program where observers collect data independently at their own personal sites.

Phenophase - An observable stage or phase in the annual life cycle of a plant or animal that can be defined by a start and end point. Phenophases generally have a duration of a few days or weeks. Examples include the period over which newly emerging leaves are visible, or the period over which open flowers are present on a plant.

Site - a location registered for observation in Nature's Notebook. A site can be a private to a particular user, such as a backyard, or shared by many users via a Local Phenology Program at a much larger public nature center.

USA-NPN - The USA National Phenology Network (USA-NPN) was established to collect, store, and share phenology data and information. Our goal is to empower people to understand nature's changing rhythms so that we can all adapt to a changing world.

Visualization Tool - the USA-NPN's Tool for visualizing data collected by Nature's Notebook observers. Multiple visualization types are available. A filter can be set to only display data collected by a particular Local Phenology Program.