

This is

_____’s

Nature Note

Student Notebook

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Before You Begin

Hello there!

Welcome to the *Findings from the Field* student scientist community. *Findings* is a scientific journal published by the Gulf of Maine Research Institute in Portland, ME. It is filled with the work of students like you from Maine and New Hampshire, focusing on ecological and environmental investigations. You can explore the latest issue of *Findings* here - <https://www.gmri.org/resources/resource-archive/findings-field-volume-2>.

In this notebook, we will help you create a Nature Note. Along the way, we suggest a few topics for you to focus your Nature Note on. But you can focus on any local ecology or environmental science topic that interests you.

This notebook is designed to have everything you need, whether or not you have access to a computer or internet. If you can get online, we have included links to additional resources throughout that you can check out.

We are here to help you! You can join us for regular online sessions, watch some recorded videos, email us for help, or just use this guide. It has everything you need.

We can't wait to read your Nature Note!

What You're Learning!

Submitting your own Nature Note is one way to join *Findings from the Field*. A Nature Note is a detailed description of observations from the field. It is short (500 word limit). It is specific, and connected to what you know about a topic (we call that *background knowledge*). Nature Notes add to scientific knowledge and pose interesting questions for future research.

When you create a Nature Note, you can learn a ton of information that will help you become an even better scientist. Scientific observation is a key skill for scientists, and it is both about looking really carefully *and* connecting what you are observing to your background knowledge. As you build those skills, you will share them through your Nature Note.

Here's what your Nature Note should include:



Background Knowledge

Scientific observation connects to relevant background information so be sure to include:

- Reliable and cited background information that adds to the observation
- An explanation of what is interesting or noteworthy based on the background information



Careful Observation

As evidence of your careful observation, your Nature Note should include:

- An observation of a species or habitat that is interesting in some way
- Detailed description of when and where the observation(s) happened

You can also include a visual like a photo or field sketch that helps explain what you saw.



Putting the Pieces Together

Putting your observation together with your background knowledge should result in at least one of the following:

- A **tentative claim** about what might be happening, explaining how the observation and background knowledge are evidence to support your claim

OR...

- A **question** about what might be happening, explaining how the observation and background knowledge led you to that question.

You can also describe an **investigation** you would do to learn more.

Part 1: What is a Nature Note, Anyway?

Let's start by figuring out what a Nature Note is. To do that, we will look at an example of a Nature Note written by a professional scientist. Then we'll look at one by a student from the *Findings from the Field* community.

Nature Notes help us to communicate noteworthy observations. They include three major components:

- Background knowledge that explains what makes that observation interesting
- Careful observations from the world around us
- A claim or question we have as a result of the observations



Directions

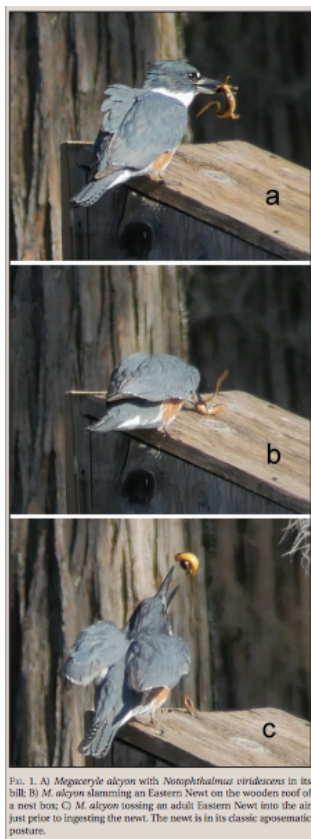
1. Read the Example Professional Nature Note on the next page.
2. Use the Nature Note you just read to fill in the graphic organizer on Page 7.
 - a. Draw a line between a piece of background knowledge and an observation that you think are connected.
 - b. On the line, describe the connection, using one of the phrases provided or write your own.
 - c. Look to find the researcher's claim or question. What ideas does she have about what she saw? Fill these in the "Question or Claim" box.
3. Reflect in the box below:

Time To Reflect!

Have you made observations like these in the past that you think would have been useful to share?

Example Professional Nature Note

NOTOPHTHALMUS VIRIDESCENS (Eastern Newt)



Toxic skin secretions in amphibians are assumed to serve an anti-predator function (Clarke 1997). Tetrodotoxin, a potent neurotoxin, is the main toxic ingredient in the skin of *Notophthalmus viridescens* (Brodie 1968). Experimental evidence has demonstrated that adult newts are unpalatable to many crayfish, insects, fish, amphibians, reptiles, birds, and mammals ... no birds have been reported as predators of the Eastern Newt (Hunsinger and Lannoo 2005).

On 10 February 2016, at a pond in Leon Co., Florida, USA, we observed a Belted Kingfisher doing the following: at 0953 h it landed on top of a Wood Duck box with an Eastern Newt in its bill (Fig. 1A). The bird hit the newt on the top of the box once (Fig. 1B), shook it, and then swallowed it ~12 sec after landing. At 0956 h the kingfisher flew to the top of the nest box with another newt, hit the newt against the wood four times, and swallowed it ~23 sec after landing. At 1009 h the kingfisher repeated the above, this time hitting the third newt ~16 times and swallowing it ~41 sec after landing. Each time the newts were observed to curl backwards and flatten/widen or curl up their body and tail when they were in the kingfisher's bill (Fig. 1A, Fig. 1C).

On 2 March 2016, we observed a Little Blue Heron (*Egretta caerulea*) hunting from a small spit of land that extends into the same

pond. At 1518 h the bird caught an Eastern Newt (Fig. 2A). The heron dipped the newt in the water and shook it at least six times... (Fig. 2B). The heron then swallowed the newt at 1520 h...

Slamming the newt on the wooden roof of the nest box by the kingfisher might have facilitated killing and relaxing the newt, thus making it more easily swallowed. Dipping the newt in the water half a dozen times... might have been an attempt to wash the toxins off the newt before swallowing it... these first published observations of avian predation on the aquatic adult phase of the Eastern Newt indicate that at least two species of aquatic birds have found ways to circumvent newt toxins.

TARA TANAKA, Digiscope Photography, 4797 Lakely Dr., Tallahassee, Florida 32303, USA (e-mail: h2otara@comcast.net); D. BRUCE MEANS, Coastal Plains Institute and Land Conservancy, 1313 Milton St., Tallahassee, Florida 32303, USA (e-mail: means@bio.fsu.edu) Excerpts from "Natural History Notes" *Herpetology Review* 48(1)2017



Background knowledge

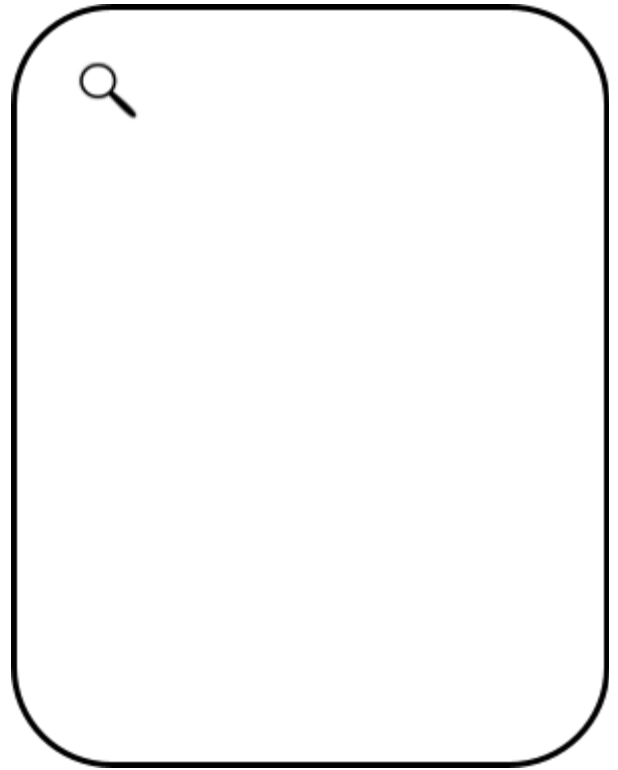
What the scientist knows
Knowledge that is relevant to
the observations

Connections

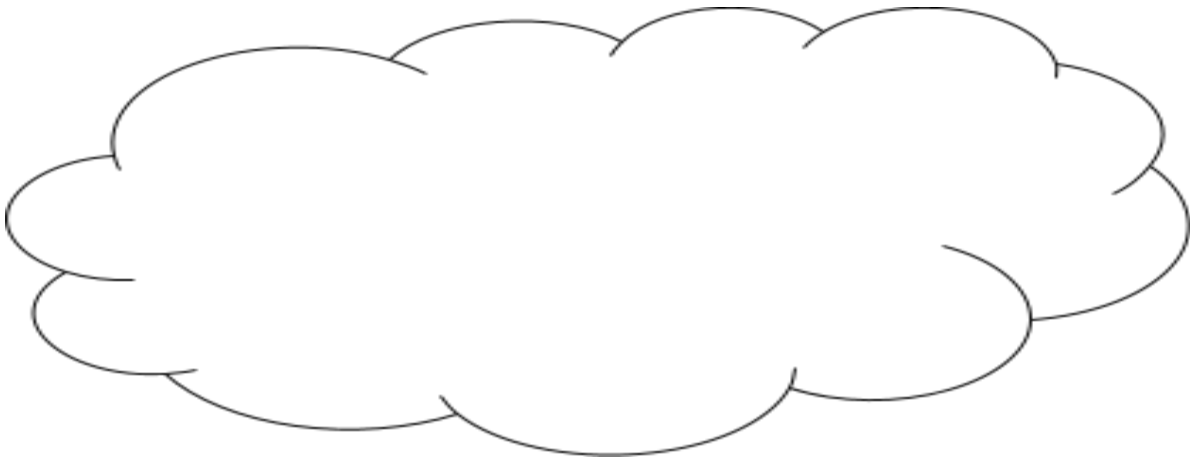
... stood out because ...
... was unexpected
because...

Observations

What they saw, heard,
smelled

**Question or Claim**

(What does the scientist think might explain what they observed? What new ideas or questions have come up?)





Part 2: Build Background Knowledge

To build background knowledge, you first need to decide what you want to focus your observations on. What plants or animals will you study? Below are some suggestions for what you could focus on, and ways to build your background knowledge. You can also choose your own topic or pick from the suggested topics at the end of this student guide.

Choosing a Topic

Things to consider:

- What are some habitat types that you have near your home?
- What are some species you have seen before near your home?
- What is a local ecology topic that you have been wanting to learn more about?
- What is a good topic given the season?
- Do you have friends, family members, or neighbors who can share expertise with you on a possible topic of study?
- Do you have magazine articles, newspapers, encyclopedias, dictionaries, or nature-related TV shows or documentaries available to you in your home to help give you ideas?

Suggested Topics

The section at the very end of this full student notebook includes four suggested topics and supporting resources. These topics are perfect for springtime right in your own backyard. Use the resources to help build your background knowledge, and complete the Background Knowledge Building Notes below.



Background Knowledge Building Notes

Whether you choose one of the suggested topics, or another topic, use the background resources to build your knowledge.

My topic is:

I chose this topic because:

Things I already know and things I'm curious about:

The new things I learned:

Making Your Observation Plan

Based on what you have learned and the amount of time you have, make an observation plan.

Keep in mind:

- You might not see something that seems interesting right away
- You might not see something interesting in a single observation session
- What is interesting to you might be different from what is interesting to your classmates

So, allow enough time for you to observe something interesting to you.

Where will you conduct your observations?

How long will you spend on each observation?

What things will you pay special attention to as you're observing?

What time of day will you conduct your observations?

How many observations will you conduct?

Part 3: Make Scientific Observations

Now it's time to make your observations!!

Now that you know a little more about your topic, you are ready to see something interesting. Remember, this might take more than a few minutes, and it might take more than a single observation session. We've included space for three separate observation sessions in the following observation recording sheets.

- Have an extra pen or pencil just in case.
- Have extra paper ready in case you need it.
- Record what you see, hear, and smell.
- Record any observations of the species that you are focused on.

Observation Details
Date: Time: Detailed description of the location:
Observation Notes
What I saw, heard, smelled:
Space for a sketch (or more notes):

Observation Details
<p>Date:</p> <p>Time:</p> <p>Detailed description of the location:</p>
Observation Notes
<p>What I saw, heard, smelled:</p>
<p>Space for a sketch (or more notes):</p>

Observation Details
Date: Time: Detailed description of the location:
Observation Notes
What I saw, heard, smelled:
Space for a sketch (or more notes):



Part 4: Draft the Nature Note

Organizing observations and making connections

Directions:

1. Look back at your background knowledge notes.
2. Fill in the graphic below with the background knowledge that you think will be most connected to your observations.
3. Review your observation notes and put a ✓ next to the notes that are interesting to you.
4. Record any of the observations that you “checked” in the graphic below.
5. Draw lines to connect background knowledge to related observations.
6. On the line, describe the connection.
7. What questions do you have? What ideas do you have about what might be happening? Record those below.

Background knowledge

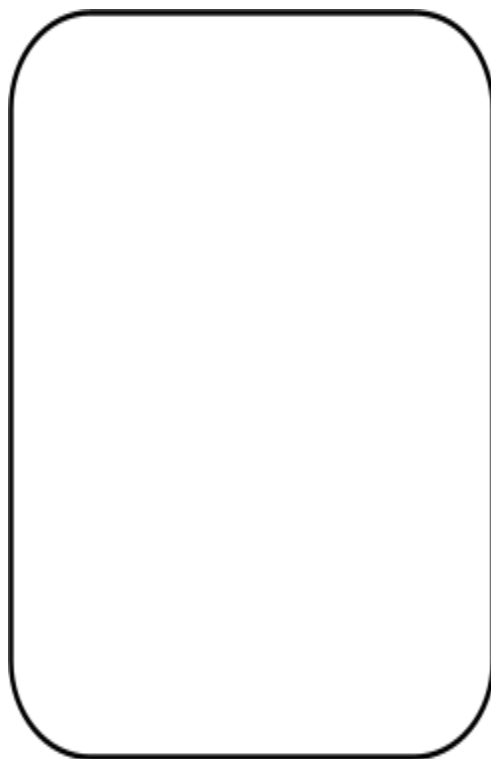
What the scientist knows
Knowledge that is relevant to
the observations

Connections

... stood out because ...
... was unexpected
because...
... confirms previous
knowledge because...

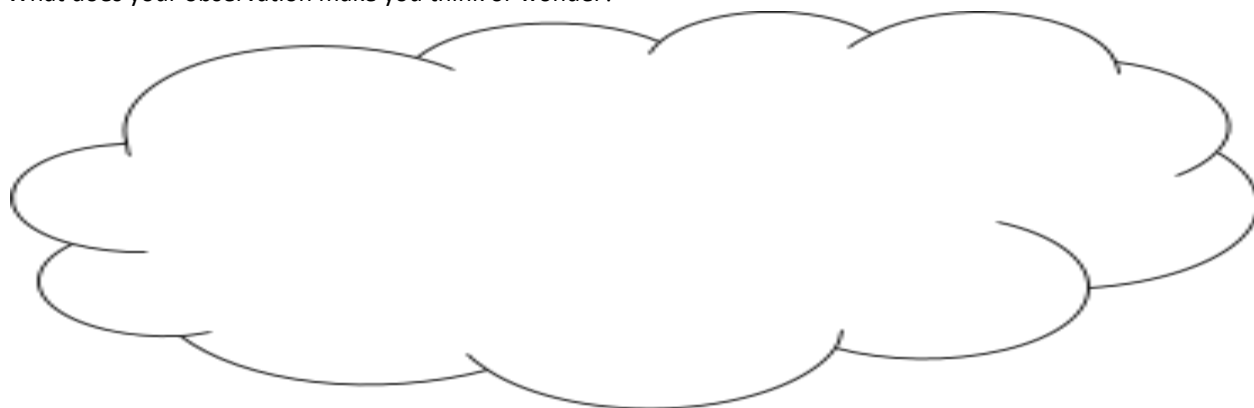
Observations

What they saw, heard,
smelled



Question or Claim

What does your observation make you think or wonder?



What additional information do you still need to better understand your observation?



Nature Note Writing Frame

You have developed your background knowledge. You have done your observations. You have organized your observations. Now it's time to write a Nature Note!

Directions:

1. In each section of the writing frame, choose one or two sentences to complete.
2. Add more information where needed.

Set the Stage	
Where were you when you? When was it?	<i>I went out to conduct fieldwork on (date, time)</i>
What were your surroundings like?	<i>at (location)</i>
	<i>I was surrounded by...</i>
The observation	

<p>What did you observe?</p> <p>Provide a detailed description. Focus on what was interesting or surprising.</p>	<p><i>I observed ...</i> <i>I noticed...</i> <i>I was surprised to find...</i></p>
<p>Connect to background information (include citations)</p>	
<p>Why was your observation interesting?</p> <p>How does what you observed connect to what you already know?</p>	<p><i>This was interesting/stood out to me because I had learned that...</i> <i>I was/was not expecting this because of what I know about...</i> <i>This connects to what I already know because...</i></p>
<p>Pose a claim or question</p>	



Space to Rewrite your Nature Note

Directions:

1. Using the draft in the writing frame, rewrite your Nature Note in the space that follows (use extra paper if needed).
 - If you are working on a computer, copy your text from the writing frame to make a draft version of your Nature Note.
2. As you rewrite, look for ways you can improve what you've written.
3. Keep in mind, your Nature Note should be no more than 500 words.

EVIDENCE OF LEARNING

Careful Observation

- ☐ An observation of a species or habitat that is interesting in some way
- ☐ Detailed description of when and where the observation(s) happened

Background Knowledge

- ☐ Reliable background information that adds to the observation
- ☐ An explanation of what is interesting

Putting the Pieces Together

- ☐ A tentative claim about what might be happening

OR

- ☐ A question about what might be happening



Part 5: Review and Revise the Nature Note

Evidence of Learning Checklist

Use the Nature Note “Evidence of Learning” checklist to see if you have what you need in your Nature Note.

Directions

1. Review your Nature Note.
2. As you see an item from the checklist in your Nature Note, check the box.
3. Record some thoughts on strengths and areas of improvement.
4. Edit and improve your Nature Note until you are satisfied with it.

Careful observation: <input type="checkbox"/> An observation of a species or habitat that is interesting in some way <input type="checkbox"/> Detailed description of when and where the observation(s) happened	
Strengths	Areas for improvement
Background Knowledge <input type="checkbox"/> Reliable background information that adds to the observation <input type="checkbox"/> An explanation of what is interesting	
Strengths	Areas for improvement
Putting the Pieces Together <input type="checkbox"/> A tentative claim about what might be happening OR <input type="checkbox"/> A question about what might be happening	
Strengths	Areas for improvement

Submit your Nature Note

Once you are happy with it, you can submit your Nature Note to *Findings from the Field*!

To submit your Nature Note, you have some options! You can...



email electronically



or mail a paper version to your teacher.

Your teacher will submit it for final review. Nature Notes can be submitted anytime before **Wednesday, June 1, 2020.**



Celebrate!

Volume 3 will be published by the end of the school year. We will let your teacher know when it's ready. Please share with your parents, your family, your community, and beyond!



Suggested Topics for Your Nature Note

In the pages that follow, we have included some suggested topics along with background research on those topics. If one of these topics interests you, use these resources to help build your background knowledge and support your observation planning.

Springtime Bird Behavior

Spring in Maine is an exciting time to observe bird behavior! As it gets warmer here, birds begin to migrate back from southern areas for the spring and summer. Birds arrive at a certain time of spring based on the temperatures and how far they have to travel. Canada geese and robins are two common birds that show up in Maine in March and April, before many other birds.

Once birds arrive, they need to find food! Feeding takes up a lot of birds' time, and this behavior can look different for each bird. For example, robins feed by running around on open grassy areas like a lawn or field, then pausing. When they see an insect or a worm, they stop and grab it up in their beak. Robins often forage together in groups, unless they have mates, in which case they look for food alone. In contrast, Canada geese almost always feed in flocks. They graze on plants, seeds and berries while walking on land. Sometimes they submerge their heads in marshes or ponds to find crustaceans or tiny fish to eat. If you're not sure a bird you're observing is feeding, you can rely on background knowledge or make an educated guess about what that bird might eat.

In the spring, when birds aren't feeding, they may also be nesting. Again, this can look different depending on the bird. Male robins defend their nesting territory by singing and fighting other male robins. Meanwhile, female robins do most of the nest building. They construct a cup of twigs onto a mud foundation, then line it with fine grasses. They also put their nests 5-20 feet off the ground on a horizontal branch or ledge. Male Canada geese also defend their territory by lowering their heads to the ground, hissing, or honking. Female geese build their nests on the ground by lining a small indentation with grasses, small twigs, and soft feathers.



An American robin foraging for worms.
Image by [Daniel Roberts](#) from [Pixabay](#).



Two Canada geese defending their territory.
Image by [Annette Meyer](#) from [Pixabay](#).

Observing birds can tell you a lot of information about the timing of their life cycles. If a bird spends more time feeding or interacting with other birds, it may not have a nest or a mate yet. If it seems busy with nesting behavior, it is probably more focused on taking care of its family! Or it may be doing both. *Ornithologists*, or bird scientists, combine careful observations with the information they already know about each specific bird to try and understand what the birds in their area are up to. If birds are not nesting at their usual times, it may be because there is not enough food, there are not enough mates, or they can't find enough suitable habitat to raise

their young. These are all things ornithologists want to keep track of so they can ensure healthy populations of birds in the future.

Observation Suggestions

First, **select your observation area**. This may be your backyard, your street, or a grassy area down the road from your home. Remember that some parks in your area may have closed. If you're not sure where is a good place for you to observe birds, check in with an adult.

Now **you're ready for your first observation**. Ornithologists should have paper and a pencil, something to write on, comfortable clothes, and outdoor shoes. Find a comfortable place to sit for 20-30 minutes.

Focus on one bird that you see or hear, even if you don't know what kind it is. Take as many observations as you can. Here are some things you might choose to note:

- 1) Details about the bird's size, shape, distinguishing features/colors, and habitat that may help you identify it later (*long legs, wide/stubby/long beak, white patches on wings, orange bill*)
- 2) Do you hear any song or calls from the bird? (*high notes, loud squawk, dee-dee-dee, no call*)
- 3) What was the bird doing (*on the ground, flying, walking, swimming, picking something up with its beak, eating, visible, hiding under brush, standing out in the open, alone*)? Is it interacting with other birds or not?
- 4) Any other observations you think are noteworthy about the bird.
- 5) Do you think you observed feeding or nesting behavior? Why or why not?
- 6) What do your observations suggest about the bird(s) you saw?

Sources

<https://www.manitobacooperator.ca/country-crossroads/bird-behaviour-changes-with-the-arrival-of-spring/>

<https://www.audubon.org/field-guide/bird/canada-goose>

<https://www.audubon.org/field-guide/bird/american-robin>

Trees and Shrubs in the Spring

What is Phenology?

Especially in New England, spring is when plants and animals wake up. Leaves emerge, flowers bloom, insects and animals get active. There is a science focused on studying when things like these happen. It's called phenology. Phenology is the scientific study of the rhythm and timing of events in nature.

What is Leaf Out?

One first sure sign of spring is when leaves appear on trees and shrubs. This is called leaf out. Leaves allow plants to photosynthesize. So why don't they leaf out as early as possible? Early leaf out can be risky since the weather can change quickly. Leafing out early means that the plant might experience damage from freezing temperatures. Some plants are better able to manage those conditions than others.

To manage these risks, leaf out can be determined by a complex combination of signals. The combination of those factors varies based on the species. Long-lived trees like oaks and beech rely on a combination of the number of days of cold, days of warm, and amount of daylight. Tree species like birch, hazelnut, and poplar leaf out in response to the number of cold and warm days. They don't rely on the length of daylight. Some species, like lilacs, leaf out in response just to warm spring temperatures. Invasive shrubs like honeysuckle and Japanese barberry also often leaf out earlier.

The timing of leaf out can vary a lot from year to year even for the same plant. It also depends on the location of the plant. Factors like how sunny or shady the spot is can impact when a tree's or shrub's leaves emerge. For a tree that gets more sun on one side, the side of a tree that is in the sun might even have leaves before the side that is in the shade.



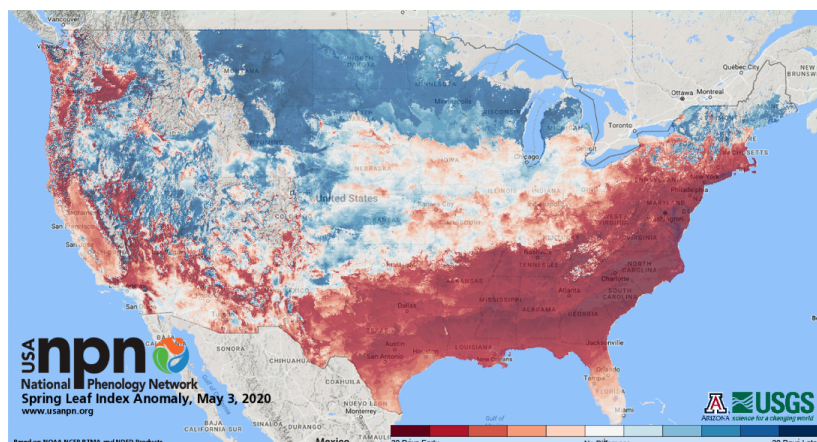
Common lilac (left) and invasive Japanese barberry (right), observed in southern Maine on April 6, 2020. Both were in sunny locations.

Phenology and Climate Change

Data from satellites and citizen science show that spring is arriving earlier. Some trees and shrubs are changing the timing of leaf out because of warmer temperatures. Other species don't respond as quickly and will take longer to adapt. They might not be able to adapt fast enough. All the animals that have evolved to rely on those trees and shrubs, might not respond to the same cues. Animals rely on leaf out for food and shelter. When the timing of leaf out changes, it might create a mismatch in the timing for those species.

Understanding phenology, and how climate change alters it, is important. Citizen science projects that invite people to contribute phenology data. Satellites are also used to study events like leaf-out. This map from the National Phenology Network shows how early or late spring leaf out is so far this spring. Red areas are early and blue areas are late.

(Map source: USA National Phenology Network. Find a current map at <https://www.usanpn.org/news/spring>)



Observation Suggestions



- Look at the trees and shrubs in your backyard, in a nearby park, or along a nearby trail.
- Choose 2-3 trees or shrubs to look at more closely.
- If you can, identify the species of those trees or shrubs, but you don't have to.
- If you know if they are native or invasive, make a note.
- For each plant, make observations about whether or not leaves have emerged.
- Note how sunny or shady the spot seems. If you are in a forest, how much tree canopy is over your head?
- Note any insects, birds, or other animals that seem like they might be impacted by changes in timing of the phenology of this plant.
- Make observations as many times as you are able.

Sources

<https://www.usanpn.org/>

https://www.usanpn.org/files/LeafOutHighlightChange_Arnoldia_.pdf

<https://extension.umaine.edu/signs-of-the-seasons/>

<https://mynasadata.larc.nasa.gov/recent-topics/seeing-climate-through-lives-plants>

Test your knowledge with this phenology Kahoot!

https://kahoot.it/challenge/01723744?challenge-id=b6188c14-3fc2-46ae-b0be-fa4adfb4980f_1588624787331

Dragonflies Springing Out

During the winter, baby dragonflies, or *nymphs*, live under the ice. In the spring, when the ice melts, adult dragonflies return to Maine's freshwater habitats. Meanwhile, the nymphs start to leave their watery homes and molt into adults. You can find dragonfly nymphs in any slow-moving pond, lake, stream, or swamp. Adult dragonflies are much easier to spot, since they are usually flying around near the water. Spring is the time adult dragonflies eat a lot to prepare for summer mating season. They lay their eggs in the water near the end of the summer. Once they hatch, dragonflies spend one to five years as nymphs before molting into adults.



Dragonfly nymph by [Greg Schechter](#) from [flickr](#)



Adult Autumn Meadowhawk Dragonfly, *Sympetrum vicinum* by [Paul VanDerWerf](#) from [flickr](#)

What do dragonflies tell us about freshwater habitat health?

Dragonflies spend part of their lives in water as nymphs. That means the quality of water they live in can affect them in a negative or positive way. Freshwater habitats can quickly become polluted by lawn fertilizers, pet waste, liquids that leak out of your car, and more. Certain algae thrive in that polluted



An extreme algal bloom in a farm pond by [Soil Science](#) from [flickr](#)

water. These populations of algae can grow out of control into large *algal blooms*. When that algae dies and breaks down, it uses up oxygen which means less oxygen for dragonfly nymphs to breathe. So, when we find a freshwater habitat with few or no dragonfly nymphs, it may be due to pollution. They are also pretty low on the food chain. A lot of dragonflies means a lot of food for bigger animals like birds, fish, and frogs. A freshwater habitat with only a few or no dragonflies means there is less food for those animals.

What else should I know about dragonflies?

Dragonfly nymphs are ferocious predators. They eat a lot of harmful aquatic insects like mosquito larvae. They are prey for other freshwater animals like frogs, fish, lots of birds, and other aquatic insects. Adult dragonflies like nymphs, eat lots of mosquitos as well. They also eat other flying insects like gnats, mayflies, and sometimes butterflies and moths. The adults are an important source of prey for frogs, birds, and other animals. There is another flying insect, called the damselfly, that looks a lot like the dragonfly. There are a few ways to tell the difference. Damselflies are longer and thinner than dragonflies, who are shorter and bulkier. When resting, damselflies also fold their wings together while dragonflies keep theirs open. Use the pictures below as a guide.



Blue damselfly by [Umbert Salvagnin](#) from [flickr](#)



Dragonfly by [makamuki0](#) from [pixabay](#)

Observation Tips

- Most freshwater areas will have dragonflies flying about looking for food, or resting on plants. Nymphs are usually hiding on or under freshwater plants, dead leaves, or in the mud. The easiest way to find them is to use a net or plastic container to scoop up material. Then, sift through what you catch. Keep trying and you will find nymphs!
- Choose no more than three freshwater areas to monitor closely.
- How clear is the water? How much algae do you see?
- Are there a lot of mosquitos for adult dragonflies to eat?
- How many nymphs versus adult dragonflies are you finding?
- What else do you notice about the freshwater habitat? Does it look unhealthy? Can you see a lot of trash or a drain pipe that empties into the water?
- What dragonfly predators do you see?

Sources

<https://www.maine.gov/dep/water/monitoring/biomonitoring/sampling/bugs/dragonsanddamsels.html>

https://www.epa.gov/sites/production/files/2015-03/documents/facts_about_nutrient_pollution_what_is_hypoxia.pdf

<https://ucmp.berkeley.edu/arthropoda/uniramia/odonatoida.html>

<https://lifeinfreshwater.net/dragonfly-nymphs-odonata-anisoptera/>

<https://sciencing.com/dragonflies-important-10068965.html>

Stink Bug Invasion



You may have seen brown marmorated stink bugs crawling around your home this winter. But now that it is spring, these stink bugs leave their winter hideouts for the outdoors. These insects are an *invasive species*, which means that they are not native to Maine. They are also harmful to Maine's ecosystems. Stink bugs originated in regions with warm climates. Scientists first saw stink bugs in Pennsylvania in 2001 and now we see them all over the US, including in Maine.

A brown marmorated stink bug

by [The Bugwood Network](#) from [wikimedia](#)

Why is it important to study invasive species?

Invasive species cause damage to ecosystems that they are not native to. In a new ecosystem, they do not have any natural predators to keep their populations in check. For example, a stink bug's natural predator is a species of wasp found in Asia. Here in Maine, though, there are no predators to stop stink bug populations from getting out of control. By studying invasive species we can learn where they are, how many of them there are, and what kinds of damage they do. Then scientists can come up with a plan to stop the invasive species or at least minimize the damage.

Why are stink bugs harmful?

Stink bugs eat using their *proboscis* (which is a lot like a straw with a pointed tip). They pierce fruits and leaves with their proboscis and suck out the inside. The parts of the leaf or fruit around the hole die because the stink bug saliva is toxic, which damages the plant. Since there are no natural predators of stink bugs in Maine, it's easy for the stink bugs to damage lots of plants. In many communities, stink bugs also hurt the fruits and vegetables that farmers grow.



Fruit damage (brown spots) by [Alpsdake](#) from [wikimedia](#)



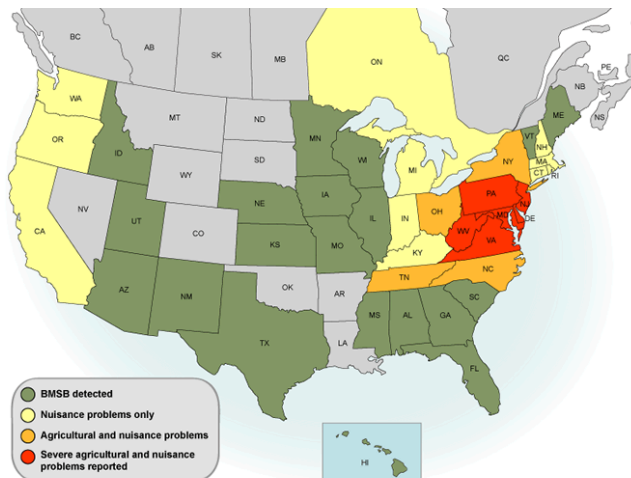
Leaf damage (dead brown spots) by [Judy Gallagher](#) from [flickr](#)

Stink bugs and Climate Change

Citizen scientists like you have collected data on stink bugs in communities all over Maine. This data suggests that stink bugs are spreading across the state. One of the biggest factors causing this is climate

change. Climate change causes warm spring temperatures to happen sooner. This gives stink bugs more time to eat and breed, which keeps the population growing.

In parts of northern Maine, cold temperatures used to keep stink bugs away. Now that temperatures are warming, farmers in northern Maine are experiencing fewer cold days. This means that their crops are vulnerable to stink bugs. Knowing where stink bugs are tells scientists and farmers a lot about how much crop damage they can expect. This map tells us since 2013 where stink bugs are found in the USA. Green areas are where they were spotted, and yellow and red spots are where stink bugs are causing a lot of damage.



Stink bug USA and Canada map by [PintCanMan](#) from [wikimedia](#)

Observation Tips

- You can find stink bugs in gardens, fields, orchards, and inside homes. It is easier to find signs of stink bugs eating than actual stink bugs. So, make sure to note brown/black spots on leaves and sunken areas of fruit on trees and bushes. These may be signs of stink bugs.
- Choose a few small spots to check closely. Instead of searching through an entire park, find a few small areas within the park and explore them thoroughly.
- Finding no signs of stink bugs is just as important as finding them!
- Stink bugs are invasive but you should leave them alone when you find them outside. Write down where you saw them, how many you found, what they were doing, and any other information that seems interesting to you.
- Make observations as many times as you can!

Questions to frame your thinking

- If you don't see evidence of stink bugs, why do you think that is? Do you think you might see them later in the spring? Why or why not?
- Before you go out, do you think you will find stink bugs? Why or why not?
- Based on your evidence, what kinds of plants, fruits, or other living organisms do the stink bugs eat? One kind or many kinds?

Sources

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