



# Yearlong Phenology

**Grade:** Grade 8

**Place of Focus:** Braintree Town Forest (including Cranberry Brooke)

**Citizen Science Protocol:** National Rivers and Streams Assessment,  
National Phenology Network Plant Phenophases

## Massachusetts Curriculum Framework for Science and Technology/Engineering Standards

- **1-ESS1-2.** Analyze provided data to identify relationships among seasonal patterns of change, including relative sunrise and sunset time changes, seasonal temperature and rainfall or snowfall patterns, and seasonal changes to the environment.
- **2-LS4-1.** Use texts, media, or local environments to observe and compare (a) different kinds of living things in an area, and (b) differences in the kinds of living things living in different types of areas.
- **3-ESS2-1.** Use graphs and tables of local weather data to describe and predict typical weather during a particular season in an area.
- **3-LS4-4.** Analyze and interpret given data about changes in a habitat and describe how the changes may affect the ability of organisms that live in that habitat to survive and reproduce.
- **7.MS-LS2-4.** Analyze data to provide evidence that disruptions (natural or human-made) to any physical or biological component of an ecosystem can lead to shifts in all its populations.



## Learning Objectives

***By the end of the field lesson, students will:***

- Describe and record observations regarding the conditions of a watershed's forest and river ecosystems
- Analyze and describe how conditions in the watershed change over time

## Pre-Visit Learning

***Prior to the site trip, students should understand:***

- Leave No Trace Principles
- How to observe a location
- How to identify a specific species
- What is a watershed

## Essential Questions

- What is a watershed?
- Why do we make long-term observations at a certain site?
- How do we monitor changing conditions in a watershed?

## Guiding Questions

1. How does the Braintree Town Forest change throughout the year?
2. Where does Cranberry Brook go?
3. What is in our local waterways?
4. Why do species grow where they do?



## Field Visit Preparations

### Time

1 x 44 minute class period per month

### Materials and Supplies

- Cameras (1 cell phone camera per group)
- IR surface thermometers
- Submersible thermometers
- Clipboards
- Field Guides
- Water testing kits

### Logistics

Braintree Town Forest is across the street from South Middle School. Students should be reminded the day before each field visit to dress appropriately for the expected weather via class discussion, looking at the forecast and sending a reminder post on Google Classroom. Students will be reminded to visit the bathroom before leaving the school building.

A second adult will join the class on the trip. For classes without a regularly scheduled second adult, arrangements will be made for an administrator to come.

### Scientific Protocol

Protocol 1: Tree Phenology

- Nature's Notebook "How to Observe" ([attached](#))
- Tree Phenology Data Sheets
- Cover Sheet - General Data Sheet

*(see next page)*



### Scientific Protocol (cont.)

#### Protocol 2: Stream Observations

- National Rivers and Streams Assessment Field Operations Manual Wadeable ([attached](#))
- Water Chemistry Procedure - page 38 of Field Operations Manual
- Water Chemistry Form - page 36 of Field Operations Manual

## Field Visit Outline

### Introduction

- Students gather materials (clipboards, data sheets, thermometers)
- Walk to Braintree Town Forest and establish boundaries for site selection (must be in visual range of teacher, dry feet on solid ground)

### Learning Tasks

- Select, photograph, and record location notes for observation site (2-3 organisms for species or a spot along Cranberry Brook)
- Small groups complete the general observation sheet recording:
  - Ground Cover: Snow? Bare Wet Dirt? Bare Dry Dirt? Moss? Grass? Other?
  - Ground Surface Temp via IR thermometer
  - Sky color/percent cloud cover
- Small groups complete observation data sheet (either Tree Phenology or Brook Testing)

### Reflection

- As time allows students share their site with other groups
- Walk back to school, put away materials, file completed data sheets



## Post-Visit Learning

Using this data and experience, students will be able to apply the following skills in future units:

- Predict yearlong phenology patterns
- Describe seasonal change in their local area
- Propose impacts of climate change on seasonal change

## Full Unit Outline

In this curriculum unit, students learn about watersheds and the history of the Braintree Town Forest. The field visit lessons, which occur once each month, serve as an opportunity to monitor and analyze seasonal changes in the forest and river ecosystems of the watershed over the course of the school year.