



# Lesson 4: Phenology in the Schoolyard

Grades: 7-12

## Key Concepts:

- Seasonal change in our climate can be seen in subtle ways.
- Some annual climate changes are indicated by changes in physiology and behavior of animals.
- We can observe and predict changes in our natural world, and monitor its health, by noticing these indicators.

## Skills:

- Observation
- Data recording
- Predictions

## Materials:

- *Phenology Chart*
- *Journal Entry Chart*
- Student journals/notebooks
- Rain and snow “meter”
- Thermometer
- Weather data website

## Outdoor Alert:

- *Flowering or green plants must be available to complete this activity.*
- *Bee and insect allergy alert!*

## Objective

Students will keep a record of their local phenology (seasonal changes and their effects on nature) by recording data in class charts and/or individual journals. The charts are a collaborative and visible record of seasonal events and the date observed. The journal is a venue for students to record observations, drawings and interpretations of seasonal events. Both charts and journals entries will serve as jumping off points for conversation about, and engagement with the schoolyard environment.

## Background

Phenology is the study of seasonal changes that occur in the environment and their effects on plants and animals in a given location. Recent studies have indicated that children are unfamiliar with the natural world. If we want students to become adults who care about our environment the first step is to facilitate their relationship to the natural community. In this lesson students will observe and record the seasonal occurrences of weather, plants and wildlife in the familiar surroundings of their schoolyard. Through consistent observation and data collection students will increase their awareness of nature.

## Procedure

### 1. Introduction

**Phenology:** an account of seasonal changes and their effects on plants and animals in a given location, and the biological effects of those changes.

Introduce the word phenology and give a few examples, such as the first freeze in the fall or the first monarch butterfly in the spring. Then ask students if they have noticed any evidence of the seasons changing. Ask students to share ideas about why it might be important to know seasonal weather, plant and animal patterns. One example is the relationship of weather to the success of an agricultural crop that we depend on as a food source and for economics. Specifically, apples require above freezing temperatures in the spring to maintain the flower bud development that will produce fruit in the fall. Through discussion, help students understand phenology as a means of monitoring the health of the environment.

### 2. Use the following means of recording phenology on a regular basis with your students.

- **Phenology charts:** The chart can be a copy of the list from the *Phenology Chart* handout or events can be divided into smaller categories. You can observe them all or choose a few. Students

should record their predictions and then the actual date of the occurrences, either on a classroom wall or in individual journals. Explain how to record information on the charts. All of the events that are “firsts” will have only one date. Events that are “peak” or “last” will have a number of dates until the true “last” or “peak” is revealed, such as the last rain in the fall. Incorporate incentives for students to participate. Perhaps assign specific events to individual students and it is their job to observe their particular seasonal event and record it on the class list. You can also design a large classroom chart to be a visible part of your classroom. It is important to lead a class discussion on a weekly basis to discuss the relevance of the events and observations as a class.

- **Rain and Snow Chart:** Keep track of the total accumulation of rain and snow by recording the daily measurable amounts on a vertical meter on the wall. At the beginning of the year have students predict how many inches of rain and snow will fall during the school year and compare their guesses with the results from the class chart at the end of the season. For this chart students will either measure the rainfall and snowfall or take the measurements from the newspaper. Each addition will be recorded to a “growing” column up the wall.
- **Open Forum on Phenology:** Provide a time or place for students to share their weekly phenology observations. Students can write or draw on a large sheet of butcher paper on the wall to share their wildlife and weather sightings. You can also provide time each week for students to tell the class about their observations.
- **Individual journals:** Students can predict and keep track of multiple seasonal “events” in their journals. Use the *Journal Entry Chart* included or modify. Another suggestion is to assign a student or a pair of students to observe a plant or space of land over the seasons. Allow students 15 minutes to observe and record their observations and questions about their plant or space of land at regular intervals throughout the year.

### **Monthly Themes** (adapted from teacher Larry Weber, Duluth, MN):

#### **September:** The Cooling Month

Watch for changes in: mushrooms, raptor and duck migrations, changes to fall plants like goldenrod and asters, deciduous tree leaves, insect presence (use sweep nets to collect, count, sort), spiders

#### **October:** The Leaf-Dropping Month

Watch for insect presence (use sweep nets to collect, count, sort, compare to September), spiders, deciduous leaves.

#### **November:** The Cloudy Freeze-Up Month

Watch for signs of animals – droppings, galls, tracks, nests, non-flowering green plants

#### **December:** The Dark Month

Watch for tracks and scat of larger mammals, winter birds, snow and ice. (Look at some snow using a hand lens).

#### **January:** The Cold Month

Watch for winter weather. Identify conifers on your school grounds. Measure ice depth if you have a water source nearby. Compare air temperature to the temperature of the snow.

#### **February:** The Dry Month

Watch for humans and their response to weather. Discuss how we dress to stay warm and what does and does not work (and why). Teach students about hypothermia and frostbite. See if kids can find evidence of flowers in the garden and identify them from their seed pods. Notice the shapes of the bare deciduous trees.

March: The Crusty Snow Month

Dig under the snow to watch for the first signs of life. Look at some snow and top soil under the microscope. Watch tree buds and see if they change.

April: The Thawing Month

Watch for the first blossoms – snow drops, pussy willows, aspen and silver maples. Watch for the early spring migrants (waterfowl) to arrive. Near water, look for and listen for frogs. Compare the month's precipitation to that of January, February and March.

May: The Greening Month

Watch for spring wildflowers as the sun hits the ground in wooded areas, before trees are fully leafed. Watch and measure leaves from week to week. How much do they grow in a week? Examine the perennials in your schoolyard every few days and measure their changes. Watch for the first insects.

# Journal Entry Chart

Name:		
Location:		
Date:	Time:	Temperature:
Sky:	Precipitation type:	
New observations:		
Updates on previous observations:		
Questions:		
Drawings:		

# Weekly Weather Observations

	Monday	Tuesday	Wednesday	Thursday	Friday
Hi Temp					
Low Temp					
Rain or Snowfall					
Sunrise					
Sunset					
Birds at a Feeder/ Schoolyard					

# Monthly Plant Change Observations

	Plant #1	Plant #2	Plant #3
September			
October			
November			
December			
January			
February			
March			
April			
May			
June			

# Phenology Chart

Season	Category	Event	Date(s)	Prediction Dates
Fall/Winter	Weather	First 40 F night		
		First 30 F night		
		First 20 F night		
		First 24 hours below 32 F		
		First tree to loose leaves		
		First Snow		
		Last Rain		
		First frost		
		First ice on puddles		
		Lakes freeze across		
		First snow over 4"		
	Plants and Mushrooms	Peak Mushroom growth		
		Peak deciduous tree color		
		Last flower in bloom		
		Leaves off of trees		
	Animals	First migrating geese		
		Last butterfly		
		Last mosquito		
		Last insect		
		Last grasshopper		
		Last chirping cricket		
		Last chipmunk		
		Crows congregate		
		Last squirrel burying nuts		

Spring	Weather	First 60 F day		
		Last freezing		
		Last snowfall		
		Last snow to melt		
		First spring rain		
		First thunderstorm		
		Ice off nearby creek		
		Ice off nearby lake		
	Plants	Green grass		
		First lawn-mowing		
		Sap flowing		
		Silver maple in bloom		
		Bloodroot bloom		
		Crocus bloom		
		Dandelion bloom		
		Shrubs green		
		Tulip bloom		
		Lilacs bloom		
		Leaves on trees		
		Animals	First jumping spider on wall	
	First red-winged blackbird			
	First great blue heron			
	First migrating geese			
	First birds nest			
	First spring chipmunk			
	First bat			
	First mosquito			
	First wood tick			
	First earthworm			
	First butterfly			
First monarch				
First dragonfly				
First bumble bee				
First orb weaver				