

**Focus:** Ecology & Life Sciences

**Grade:** 9th—12th

**Timeframe:** 1 hour

## Lesson: Draw your Ecosystem

*Allow your students to explore surrounding ecosystems and to engage in naturalist-style field journaling, focusing on the different components of ecosystems. Students should be familiar with the components of ecosystems—abiotic & biotic factors, cycles and changes—as a prerequisite to this activity.*

### Objectives

Students will reinforce their understanding of the components that make up ecosystems- abiotic factors, biotic factors, cycles and changes.

Students will engage in naturalist field journaling and learn the importance of representing their observations accurately with both drawings and writing.

Students will envision the effects of a large disturbance or change in the ecosystem they've observed.

### Materials

- Paper
- Pens, Markers, Crayons, etc.
- Clipboards, books or any other hard surface to provide to students for drawing

### Vocabulary

**Ecology:** The study of how living (biotic) and nonliving (abiotic) parts of the environment interact with each other.

**Ecosystem:** A system formed by the interaction of a community of organisms and their physical environment.

**Abiotic:** Non-living factors in the environment. The abiotic factors of the environment include light, temperature, soil, climate, and atmospheric gases.

**Biotic:** Living factors in the environment.

**Cycle:** A natural process in which elements are continuously moved in various forms between different compartments of the environment. Examples include the energy, water, and nutrient cycles.

**Changes:** Differences or disturbances of the environment most often caused by human influences and natural ecological processes. Environmental **changes** include natural disasters, human interferences, or animal interaction.

### Preparation

Pull together the supplies mentioned in the Materials box above.

Find an area outdoors—in your school yard, on your campus, in your community, etc. that can act as an “**ecosystem**” students can explore, observe, and draw/write about. Ensure there are adequate examples of **abiotic** factors, **biotic** factors, and evidence of **cycles** in the area you choose.

### Accommodations

This activity can be facilitated in a range of different environments, depending on your access and students' mobility and comfort level. Any outside environment, or even a room with a window for students to look out, will work.

 20 minutes

## Activity—Part I: Introduction to Field Journaling

### Instructions:

1. Explain to your students that they will be doing an activity where they will be acting as field naturalists and journaling their observations.
2. In order to introduce the concept of field journaling, students will read an excerpt from Clare Walker Leslie & Charles E. Roth's book, *Keeping a Nature Journal: Discover a Whole New Way of Seeing the World Around You*, found at the end of this document

### Discussion Questions:

*What is the importance of recording all of the preliminary information for your entry? (Name, Date, Place, Time, Weather, etc.)*

*What strategies did you learn in the reading about how to capture your observations in a field journal entry?*

 30 minutes

## Activity—Part II: Observe & Draw your Ecosystem

### Instructions:

1. Bring your students outside to the ecosystem you've chosen to have them study. Make sure that everyone has the clothing they need to be comfortable outdoors.
2. Explain to your students they are doing an activity where they will be tasked with field journaling and creating a visual representation, with associated labels and short descriptions, of the ecosystem. Ensure that students understand that they'll be focusing on ecosystems on a small scale—only what they can see and observe in the space you will be using.
3. To explain further:
  - a. Each student will be given a sheet of paper and markers, pens, pencils, etc. - clip boards or other hard surfaces should be made available to those students who'd like to use one.
  - b. Each student should visually represent components of the **ecosystem** they are in—make sure to explain that the visual representation should include both drawings and writing (Students who are more comfortable drawing could include more drawings than writing; students who are more comfortable with words could include more writing than drawings).
  - c. Students should be especially focused on visually representing both **biotic** and **abiotic** component of the ecosystem and on drawing connections between the two.
  - d. Students can consider spatial aspects and where components are in relation to each other in their visual representations, or they could choose not to incorporate that characteristic.
  - e. Give enough time for drawings, but not so much time that your students become restless.

### Discussion Questions:

*Have students share their visual representations with the rest of the class. Did anyone make any particularly good connections between the components or mention good evidence of cycles or change?*

*How is what we did and what ecologists and naturalists do to record their learning and observations similar? Different?*

**Instructions:**

1. Now that your students have visually represented the ecosystem, they should envision what it would look like after a **change** or disturbance to the ecosystem.
2. To explain further:
  - a. Using the ecosystem representation they created in the previous activity, students should brainstorm a realistic change or disturbance that could occur in this ecosystem (for instance: a wind storm takes down several trees, a new plant species is introduced, etc.).
  - b. Once they've decided the change or disturbance they'd like to incorporate, students should write a few sentences in their field journal page describing the cascading effects of that change on the ecosystem. This can include how they see the effects of that change, questions they have, etc.

**Discussion Questions:**

*What examples of change or disturbance did you choose to depict in your ecosystem? What effect did this change have on the other components of the ecosystem?*

*Are there any local examples of change or disturbance that you can think of? How did this change affect other components of the ecosystem?*

**Standards**

This online curriculum introduces and covers topics incorporated into the following national standards:

**Next Generation Science Standards (NGSS)**

**HS-LS2- 6 Ecosystems: Interactions, Energy and Dynamics:** Evaluate claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

**HS-LS2-4 Ecosystems: Interactions, Energy and Dynamics:** Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

**HS-LS4-4 Biological Evolution: Unity and Diversity:** Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

**NH Science Competencies**

**All Grades:**

Energy and Matter in Systems

Systems & System Models

## **Keeping a Nature Journal: Discover a Whole New Way of Seeing the World Around You**

By Clare Walker Leslie & Charles E. Roth

In order to introduce the concept of field journaling, students will read an excerpt from Clare Walker Leslie & Charles E. Roth's book, *Keeping a Nature Journal: Discover a Whole New Way of Seeing the World Around You*, found at the end of this document.

Clare Walker Leslie is a naturalist and artist who has devoted her work toward engaging others in her deep love with the world around her. Charles E Roth is a teacher of science and the environment. Together, their book invites us all to break out our daypacks, paper and pencils, and head outside to discover and observe.

The excerpt is the authors' introduction to field journaling, and will walk you through a few steps that will help set the framework for your field journaling activity.

## Entering Observations

You are ready to begin recording your observations. Although there are numerous ways to format a journal, the following is one that we use.

### I. Basic Information

In either the upper right- or the upper left-hand corner of your page record the following, using both written word and illustration, as appropriate and desired:

**1. Name.** If you don't already have it written on the outside of your bound book, or you are using loose pages, add your name.

**2. Date.** This establishes the season and month in relation to the year. How would things look outdoors in spring? In winter?

**3. Place.** What town and state do you live in? Compare habitats to get a sense of place or home. How is this place like someplace else where a relative or friend lives? How does this place differ from other places you have traveled or seen pictures of?

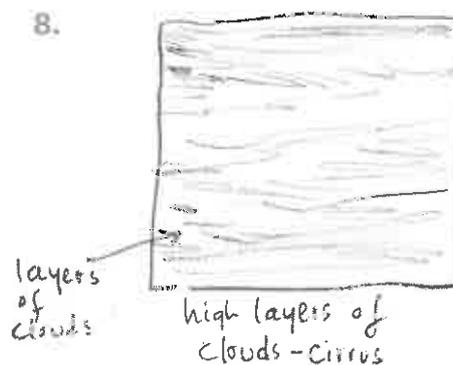
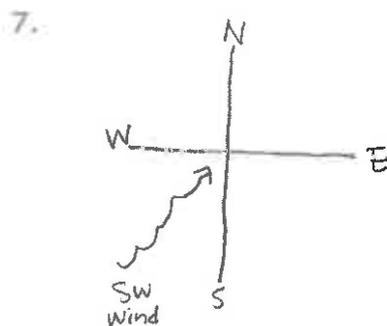
**4. Time.** This does not have to be accurate clock time; it can be simply "early afternoon," "late morning," or the like. Animals and plants respond to light conditions. What would be happening outdoors at 2 a.m., as distinct from 2 p.m., or 6 a.m. and 6 p.m.?

1. Sam Austin
2. October 5
3. Brown elementary School  
Reading, MA
4. 9:30 am
5. Cloudy, cool  
a little wind  
around 55° F

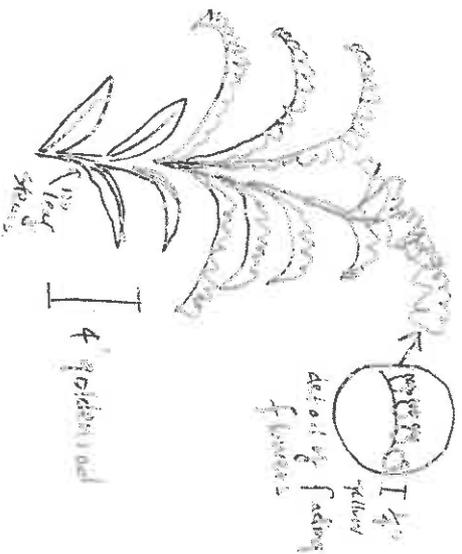
 Waxing moon  
Sunrise = 6:40 am  
Sunset = 4:38 pm

6. leaves turning color  
fall flowers  
insects - crickets  
flies  
ants  
birds  
squirrels  
fall seeds, nuts, fruits

I hear:  
leaves  
wind  
bird  
people's feet  
car

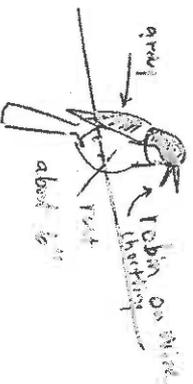
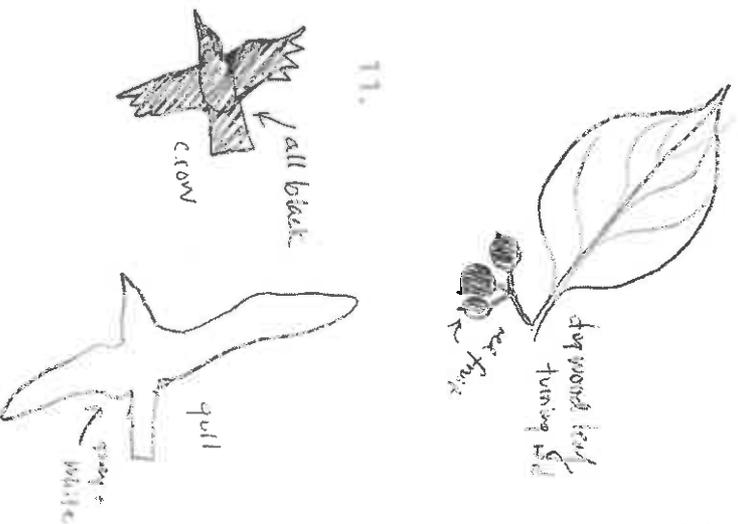


10.

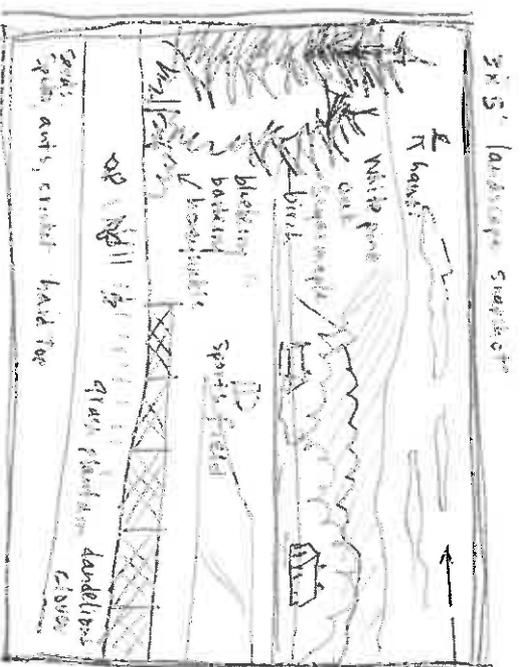


**10. Eye-Level Observations.** Standing up so you are free to move around, draw what comes into view at eye level — particular leaves, tall plants, shrubs, low nests, insects on surfaces, birds. Don't worry about your ability to render the objects realistically at this point. Label the object and describe what it's doing or is part of.

11.



12.



View NW to town & low hills

for suggestions on techniques refer to pages:  
birds — p  
plants — p  
animals — p  
landscapes — p

**11. Overhead Observations.** Look up. Choose a tree to draw — deciduous or evergreen. The sky is an ever-changing show. Record the colors you see. Illustrate any objects, such as birds, insects, planes, or snow, flying or drifting through the sky. Draw the clouds and how their shapes are changing. Indicate the moon, if it's visible, and what phase it's in. Write some words about how viewing the sky makes you feel.

**12. Whole-Landscape Observations.** Landscape drawing can be overwhelming; it helps if you divide the landscape into simple shapes and label what is there. (See pages 180–181 for tips on drawing landscapes.) Keep your shapes simple. Like pictograms. Label the elements so that you, and others, will know what you have drawn.

**5. Weather.** Weather conditions affect the activity of most living things. Record such things as *temperature*, which affects animal activity and plant growth; *barometric pressure*, which affects animal behavior and activity, and the movement of air masses that generate weather; and *moon phase and daily sunrise and sunset*, which can be found in local newspapers or *The Olde Farmer's Almanac*. Recording this data helps keep you aware of monthly and annual astronomical cycles. Some plants bloom only with long daylight periods, for instance, and others with short daylight periods. Goldenrod blooms only in the late summer, and daffodils only bloom in early spring. The time of year birds and animals court is determined not only by weather conditions, but also by the amount and quality of light.

**6. First Impressions.** Once you're outdoors or beginning your walk, take a few moments of silence to orient yourself. Listen. Write what you hear. This helps acclimate you to what you may be observing and drawing. Brainstorm mentally, or on paper, what you might expect to find out here to observe and draw—new flowers, insects, birds you hear singing.

**7. Wind direction.** Locate and draw the points of the compass. Then add wind direction by looking at which way flags or even your hair is blowing.

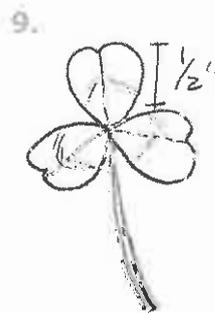
**8. Cloud patterns and cloud cover.** Cloud patterns can be drawn; cloud cover can be recorded by drawing a

small box and adding an illustration of the clouds or the kind of sky you see. Write a description of the sky below the box. Add the names of the cloud types, if you know them: stratus (layered); nimbostratus (rain clouds); stratocumulus (puffy layers); cumulus (puffy, large). Put the moon in, if you see it. (*A Field Guide to the Atmosphere* by Vincent Shaefer is a good reference. See Suggested Reading.)

## II. Begin Drawing

To get started, you may find this sequence of observations helpful; they get you looking at different distances from where you are standing or sitting. This pattern gets you in the habit of observing all around you.

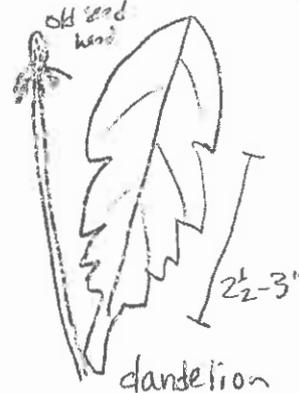
**9. Ground Observations.** Anywhere there is ground, even if partially paved, look around. Get close to individual objects, where you can readily examine a leaf, flower, insect, rock, or earthworm "casting." Try to draw everything actual size. Draw two or three objects and move on. Label each item if you know what it is. Take no more than five minutes per drawing. Give size measurements. Estimate using your knowledge of your own body parts: "The last joint of my thumb is about 1 inch, my forearm is about 17 inches," and so forth. For further learning, try writing down one question about each object: How did it get there? Where does it go in winter? Can it also be found in other habitats?



clover leaf - white?  
in school yard



Norway maple  
Seed



dandelion

