

Chapter 2 Activities for the Trip

See also Section III: Field Trips

The activities in Chapter 2 are intended to be done during a visit to a redwood park or forest. They generally require the space or the organisms found there.

It is extremely important to visit the site prior to bringing students there. Park rangers, naturalists, interpreters, docents, museum staff, or others can point out suitable places to do activities, suggest other activities, and inform you of safety and environmental concerns. Even if you plan to lead your own trip, a greeting by park personnel can help set an appropriate tone for the trip. Some recommended activities may require you to leave the usual paths, pick leaves, or do other things for which you should get permission.

Reminder

All activities should be tried out by the teacher prior to having students do them in order to be sure that the directions are understood and that they can be done with your particular equipment and materials. This is important not only to be sure that the activities will work, but to be sure that they can be done safely.

Such details as time estimates are only approximate; as the teacher, you know your students best.

Be sure to consider the activities in Chapter 4: Activities for Any Time.

Creek Studies

ACTIVITY SUMMARY

Students investigate stream temperatures, velocities, and amounts of suspended material.

CONCEPTS TO BE LEARNED

1. Faster flowing water can carry more suspended solids.
2. Faster flowing water is often cooler than slowly moving water.

STANDARDS ADDRESSED

Focus Standards:

- Grade 4: Life Sciences 3.a: Ecosystems are characterized by living and non-living components.
 Science Investigation and Experimentation S.S. 6: Students ask meaningful questions and conduct careful investigations.
 Mathematics Number Sense 3.0: Solve problems
- Grade 5: Earth Sciences 3: Water moves...
 Science Investigation and Experimentation S.S. 6: Students ask meaningful questions and conduct careful investigations.
 Mathematics Number Sense 1.0: Computation
 Mathematics Number Sense 2.0: Calculating and solving problems
- Grade 6: Earth Science 2: Topography is reshaped by weathering and transportation of sediment
 Science Investigation and Experimentation S.S. 7: Students ask meaningful questions and conduct careful investigations.
 Mathematics Number Sense 1.0: Solving problems
 Mathematics Number Sense 2.0: Calculate and solve problems.
- Grade 7: Science Investigation and Experimentation S.S. 7: Students ask meaningful questions and conduct careful investigations.

Environmental Principles and Concepts

- Principle II: Humans affect natural systems.
- Concept a: Human populations and consumption affect natural systems.
- Concept b: Human extraction, harvesting, and use of resources affect natural systems.
- Concept c: Expansion and operation of human communities affect natural systems.
- Concept d: Human social systems affect natural systems.

ANTICIPATED OUTCOMES

1. Students will understand that stream velocity is a major factor in the amount of material carried by the stream.

GROUPING

Groups of six

TIME

15-30 minutes

MATERIALS: per group:

- Stop watches or watches with second hands
- Thermometer (preferably with carrying case)
- Tape measure (minimum 10 feet)
- Clipboards
- Pencils (work better than pens if the paper gets damp)
- Plastic gallon jar or bucket
- Coffee filter paper and funnel or filter holder
- Ruler (suitable for measuring stream depth)
- Towel
- Creek Studies Study Guide

TEACHER PREPARATION

1. When previewing the trip, locate sites where students can access a stream safely and without damaging the shoreline or vegetation. (Look for areas with varying velocities and conditions such as exposed shoreline, shoreline with vegetation, rocky shores, sandy shores, etc.)
2. Obtain the materials. If you use a plastic gallon jar (from the cafeteria or a restaurant?), carefully remove the "lip" that protrudes into the opening. Such a lip will keep some of the suspended solids from pouring from the jar with the water.
3. Try out the suspended solids collection in various sites. How many gallons or buckets does it take to obtain enough suspended material for the students to see?

PROCEDURE

1. Each team will be doing two studies: stream velocity and sediment load.
2. Assign the following jobs to team members:
 - a. recorder
 - b. launcher
 - c. finish line observer
 - d. water collector
 - e. timer
 - f. temperature and depth taker
3. Explain the procedures on the Study Guide and how to use the materials.



Caution the students **not to go into the stream**, accidentally or intentionally. Walking in the stream is likely to damage organisms living in or under rocks, and will stir up sediments.

Also caution them about slippery rocks and logs.

5. After the data are collected, have the teams share and compare their data.

VARIATIONS, ADAPTATIONS, DIFFERENTIATION

1. You may want to attach a bucket to a pole for collecting water away from the shore.
2. Plankton nets can be purchased from some of the sources listed in Appendix IV. (If collecting plankton, be sure to obtain a plankton key or guide for identification.)
3. Some sites may have rocks, logs, or low bridges that provide safe access to the center of the stream.

4.



If the stream is rarely visited or little used, you might consider having students enter the stream wearing shoes or waders to protect their feet. They can collect water/sediment samples and might use plankton nets or other nets to collect organisms that float downstream when rocks or logs are overturned. **I do not encourage doing this in heavily used streams, as the organisms in them already get disturbed too much.**

5. Some jobs such as finish line observer and temperature taker can be combined.

ASSESSMENT

1. Do students follow directions?
2. Do students make good observations and record data accurately?

ANSWERS TO SELECTED STUDY GUIDE QUESTIONS

1. Fast moving streams will usually contain more suspended material. As water loses energy, it slows down and doesn't have enough energy to carry suspended material.

In general, shallow, slow moving water will be warmer.

2. When dams slow or stop the flow of the water, suspended materials settle out and form sediments.
3. When dams slow or stop the flow of the water, the surface waters generally become warmer. Deep water may remain cool.
4. In general, deeper water will be cooler. (Cool water can hold more dissolved gases, such as the oxygen that fish need. An example of this can be seen when a glass of cold water is allowed to sit in the sun. Gas bubbles soon form on the side of the glass as air comes out of solution.)
5. If the dam results in warmer water, or fine sediments, salmon may not be able to successfully reproduce.
6. Plants provide shade, which helps cool the water. They also attract insects, which provide food for fish. Logging companies are now required to leave plants along streams to help provide suitable fish habitat.

REFERENCES AND RESOURCES

Shinkle, Jill: *Creek Watchers*

Creek Studies Study Guide

Today you are part of a team of scientists that will collect some data about a stream.

- Be sure to follow directions and make and record your observations carefully.
- Ask your teacher if you have any questions.
- **DO NOT go into the creek!** Walking in streams can harm plants and animals that live in the sand and under rocks.

Team Members and Jobs:

Recorder: _____ Timer: _____ Temperature/Depth Taker: _____

Launcher: _____ Finish Line Observer: _____ Water Collector: _____

Site description: Shore/edge: rocky, sandy, covered by plants, or? _____

Shady, sunny, or? _____

Stream bottom: rocky, sandy, algae covered, mixed, or? _____

Stream flow: slow and smooth, splashing around rocks, or? _____

Other:

- ✓ Find the starting point for your velocity test. This is the **launcher's** station.
- ✓ Find the ending point for the velocity test. The **timer** and **finish line observer** are here.
- ✓ Determine where the water sample will be collected. The **water collector, temperature and depth taker, and recorder** will be here.

(This should be a place where the sample can be collected **safely and without knocking sand or debris into the water.**)

Measure the distance the stream flows between the starting and ending points (from the launcher to the timer/finish line observer). It should be at least 10 feet. Distance: _____ feet.

To determine the stream velocity (speed):

- a. When the timer says "go," the launcher drops a small stick into the stream.
(Use a 2" - 4" stick from the ground. Do not pick a twig from a living tree.)
- b. When the stick reaches the end point, the finish line observer says "stop" and the timer notes the time that the stick took to travel the measured distance.
- c. The recorder records the data on the data table (other side of this page.)
- d. If the stick gets stuck on a rock, washes ashore, etc., disregard that trial and repeat.
- e. Calculate the stream velocity by dividing the distance by the time.
Example: If it took 5 seconds to travel 20 feet: $20 \text{ ft.} \div 5 \text{ sec} = 4 \text{ ft. per sec.}$
- f. Use the same stick to repeat the process 4 times and find the average.

To determine the suspended materials carried by the stream:

- a. Your teacher will tell you how much water to sample.
- b. Fold the filter paper so that it fits snugly into the funnel or filter holder.
- c. Use a bucket or jar to collect the proper amount of water. Be careful not to knock sand or other material into the stream, or to stir up the bottom by stepping into the stream, as this will affect your results.
- d. **Carefully** pour the water through the filter. Gently swirl the water as you do this so that material doesn't stay in the bucket. Material that was being carried by the water will be trapped by the filter. This is suspended material.

To determine the temperature and depth: At the place where the water is collected, carefully dip the end of the thermometer into the stream. Hold the thermometer in place for 2 minutes, being careful not to drop it or break it by bumping it on the bottom or a rock. Use the ruler to measure the depth where the water is collected. Record the temperature and depth.

Stream Velocity

Distance (include units)	Time (seconds)	Speed Distance ÷ time	Calculate average	notes
			Add the 4 speeds and divide by 4.	

Temperature: _____ ° _____ (note: are these F° or C° ?) **Depth:** _____ in.

Suspended Solids

Describe the **amount** of material collected on the filter.

Describe the **types** of materials collected on the filter...mud, sand, gravel, leaves, sticks, or?

Describe the **sizes** of the materials that you collected...all one size, varying. How big?

Questions:

1. Compare the data collected by different teams.
 - ✓ Which had more suspended material—fast moving water or slowly moving water?
 - ✓ Which was warmer?
2. If a stream is dammed, what do you think will happen to the suspended material?
3. If a stream is dammed, what do you think will happen to the water temperature?
4. How does depth affect temperature?
5. Salmon need cool, oxygen rich water to live. They need gravel (not sand or mud) in which to lay their eggs. What affect do you think a dam is likely to have on the salmon population?
6. If fire, landslides, logging or something else removes the plants from the side of the stream, what affect do you think that would have on water temperatures?

On salmon?

Duff Dwellers

ACTIVITY SUMMARY

Students observe organisms that live in the leaf litter or duff on the forest floor.

CONCEPTS TO BE LEARNED

1. Many organisms live in the leaf litter or duff on the forest floor.
2. Decomposers break down the leaf litter into soil components.

STANDARDS ADDRESSED

Focus Standards:

- Grade 4: Life Sciences 2.c: Decomposers recycle matter.
Life Sciences S.S. 3: Living organisms depend on one another and their environment.
Science Investigation and Experimentation S.S. 6: Students ask meaningful questions and conduct careful investigations.
- Grade 5: Science Investigation and Experimentation S.S. 6: Students ask meaningful questions and conduct careful investigations.
- Grade 6: Ecology (Life Sciences) S.S. 5: Organisms exchange energy and nutrients among themselves and with the environment.
Science Investigation and Experimentation S.S. 7: Students ask meaningful questions and conduct careful investigations.
- Grade 7: Science Investigation and Experimentation S.S. 7: Students ask meaningful questions and conduct careful investigations.

Other Standards:

- Grade 5: Life Sciences 2

Environmental Principles and Concepts

- Principle II: Humans affect natural systems.
 - Concept a: Human populations and consumption affect natural systems.
 - Concept b: Human extraction, harvesting, and use of resources affect natural systems.
 - Concept c: Expansion and operation of human communities affect natural systems.
 - Concept d: Human social systems affect natural systems.
- Principle III: Natural systems have cycles on which humans depend and that can be altered by humans.
 - Concept a: Natural systems have cycles.
 - Concept b: Humans depend on and utilize natural cycles and processes.
 - Concept c: Human practices can alter natural cycles and processes.

ANTICIPATED OUTCOMES

1. Students will increase their understanding of the diversity of life.
2. Students will increase their understanding of the importance of food chains, food webs, and especially the role of decomposers.

GROUPING

Groups of two to five students, depending on equipment availability

TIME

30-45 minutes

MATERIALS: for each group:

- A litter sifter (see below for various options)
- White plastic pan such as a dish pan
- Magnifier, two-way magnifier, or "bug box"
- Plastic spoon
- Forceps
- 3"x5" card
- Clear plastic cup(s), or cups with white insides
- Optional: trowel, clipboard and paper and pencil

Making a litter sifter:

1. Use duct tape to attach "hardware cloth"* screening material to a half-gallon milk carton, large juice can, coffee can, or #10 can (from a cafeteria or restaurant) from which the bottom and top have been cut**.
- or
2. Use duct tape to attach "hardware cloth"* screening material to a three to four-inch section of large (six to ten-inch) diameter plastic pipe**.



* Hardware cloth is available with various sizes of openings. If you only use one size, half-inch is recommended. Consider making sifters with various sized openings ranging from $\frac{1}{4}$ to $\frac{3}{4}$ inch.

**If you use a can, cover any sharp areas on the open top end with duct tape to prevent cuts. Also be careful with the cut edges of hardware cloth.

TEACHER PREPARATION

1. Make, or have parents or students make, "Litter Sifters."
2. Obtain the other materials.
3. Locate a site where there is ample duff or leaf litter accessible to the students.

PROCEDURE

1. While on the field trip, have teams of students sift through some leaf litter.
 - As they find different organisms, have the teams place them in plastic cups and show to the other teams.



Warn the students not to pick up spiders or centipedes with bare hands...they should use forceps, plastic spoons, or cards.

2. Since green plants are not part of the leaf litter, discuss where these duff dwellers obtain their food. Discuss their role as decomposers.
3. Discuss the importance of decomposers and decomposition to the ecosystem.
4. Discuss the fact that bacteria, which are too small to be seen without a microscope, are present by the millions in the leaf litter and are very important in the decomposition process.
5. After the students are finished with the litter, it should be returned to the collection site.

VARIATIONS, ADAPTATIONS, DIFFERENTIATION

1. The simplest way to do this lab is to have students dump the duff into a light colored plastic pan and remove large objects such as leaves and look for organisms as they sift through the remaining duff.
2. Have students compare the types and quantities of duff dwellers in different areas such as under redwood, tanoak, and madrone trees or in damp, shady areas as compared to dry, sunny areas.
3. Students can also examine leaves and twigs (detritus) from the bottom of a creek.
4. If organisms cannot be identified, have students sketch them in as much detail as possible for future identification.
5. If electricity is available, a "Berlese funnel" can be constructed. Use tag board and masking tape to make a funnel with a bottom "mouth" one to two inches in diameter. Cover the bottom opening with nylon or plastic window screening held in place with masking tape. Place the funnel over the mouth of a jar. Place duff, decaying leaf litter, or soil into the funnel, and place the funnel and jar under a warm light or in the sunlight. Soil and duff-dwelling organisms will move downward into the jar to escape the light and heat.

ASSESSMENT

1. Ask students to explain the importance of decomposers to the ecosystem.

REFERENCES AND RESOURCES

American Forest Foundation: *Project Learning Tree: Pre K-8 Activity Guide: "Nature's Recyclers"*

Outdoor Biology Instructional Strategies (OBIS): "Litter Critters"

Hunting for Treasure in the Redwoods

ACTIVITY SUMMARY

While on a field trip, students look for various things on a list.

CONCEPTS TO BE LEARNED

1. Being alert and making careful observations can help one enjoy one's environment.
2. Scientists must make careful observations.
3. Other concepts, depending on the Hunting for Treasure in the Redwoods list

STANDARDS ADDRESSED

Focus Standards:

- Grade 4: Science Investigation and Experimentation 6.a: observations
Others, depending on the teacher-generated list
- Grade 5: Life Sciences S.S. 2: Plants and animals have structures.
Science Investigation and Experimentation 6.a: classify objects
Others, depending on the teacher-generated list
- Grade 6: Depends on the teacher-generated list
- Grade 7: Life Science Structure and Function In Living Systems S.S. 5:
Anatomy and physiology
Others, depending on the teacher-generated list

ANTICIPATED OUTCOMES

1. Students will increase their ability to observe natural phenomena and objects.
2. Students will increase their ability to describe their observations.

GROUPING

Individual or groups of whatever size the teacher decides

TIME

Varies

MATERIALS (per group/team)

- Hunting for Treasure in the Redwoods Study Guide
- Hand lens/magnifier/"bug box"
- Clipboard and pencil (Pencils work better than pens when the paper is damp.)
- Plastic bag for collecting litter
- Optional: bag or other container for collecting items from the list

TEACHER PREPARATION

1. During a pre-trip visit, work with a ranger, interpreter, naturalist, or docent to develop the Hunting for Treasure in the Redwoods list.
2. Create and duplicate the Hunting for Treasure in the Redwoods list

PROCEDURE

1. Issue the Hunting for Treasure in the Redwoods Study Guide.

2. Tell the students the boundaries, time allowed, and any other limits.
3. Remind the students to be aware of poison oak, yellow jackets, etc.
4. Remind the students not to damage or kill anything.
5. Remind the students not to take anything home unless they have permission and a specific intended use. If the trip is to a park, remind the students not to take anything home.

VARIATIONS, ADAPTATIONS, DIFFERENTIATION

1. Some teachers like to encourage competition. Others do not. Use your judgment.
2. This can be done over the course of the trip, for a short time and space (15 minutes, within sight of the teacher, for example), or during a large part of the trip (after lunch, for example).

ASSESSMENT

1. Do the students follow directions?
2. Do the students describe, collect, point out, or? the items on the list?

REFERENCES AND RESOURCES

Cornell: *Sharing Nature With Children*.

Council for Environmental Education: *Project WILD® K-12 Activity Guide: "Microtrek Treasure Hunt"*

Hunting for Treasure in the Redwoods Study Guide

There is treasure to be found in the redwood forest. Listed below are a number of things that you may be able to find in the forest.

Follow your teacher's directions about whether to collect, describe, draw, or point out each of the things on the list.

Remember not to damage anything! Remember to return all natural things to the forest.

Be careful of such things as poison oak, stinging nettles, yellowjackets, etc.

Teachers: The following list is just a starting point. Work with park staff or volunteers to develop a list that will work at your site.

Suggestions for things to collect **from the ground**:

- Cones: redwood, Douglas-fir
- Acorns: tanbark oak, other oak
- A seed from a different plant (maple, berry, or?)
- Leaves: redwood, Douglas-fir, tanbark, other
- A feather
- Something round
- Something fuzzy
- Something sharp
- Something that you consider beautiful
- Something that you consider interesting (and be prepared to explain why)
- A leaf that has been chewed on (not by a person.)
- Something white, blue, red, black or?
- Two pieces of litter

Suggestions for things to point out, describe and/or draw:

- Evidence of animals (droppings, spider webs, gopher hole, bird or wood rat nest, a gnawed cone, the animal)
- Evidence of ways that humans have changed the area in the last five years
- Evidence of something that happened over 50 years ago
- Evidence of camouflage

I Never Knew That!

ACTIVITY SUMMARY

Students observe individual or groups of organisms for an extended period of time, recording their observations.

CONCEPTS TO BE LEARNED

1. Careful observation can reveal things about organisms that had not been previously known to the observer.

STANDARDS ADDRESSED

Focus Standards:

- Grade 4: Science Investigation and Experimentation S.S. 6: Students ask meaningful questions and conduct careful investigations.
- Grade 5: Life Sciences S.S. 2: Plants and animals have structures for various life processes.
Science Investigation and Experimentation S.S. 6: Students ask meaningful questions and conduct careful investigations.
- Grade 6: Science Investigation and Experimentation S.S. 7: Students ask meaningful questions and conduct careful investigations.
- Grade 7: Life Science...Structure and Function in Living Systems S.S. 5: Anatomy and physiology
Science Investigation and Experimentation S.S. 7: Students ask meaningful questions and conduct careful investigations.

ANTICIPATED OUTCOMES

1. Students will increase their ability to observe and record both anatomical and behavioral characteristics of organisms.

GROUPING

Individual or groups of two

TIME

Introduction: five minutes

Observation and recording time: varies...15-30 minutes

MATERIALS

- Pencils and notebooks or clipboards with paper
- Photocopies of the I Never Knew That! Study Guide
- Optional: magnifiers or binoculars

TEACHER PREPARATION

1. While previewing the field trip, find a place where students might be likely to be able to find insects, banana slugs, birds, fish, or other animals to observe. If there's any doubt, check with the park personnel to be sure that it is okay for students to sit in the area while they make their observations.

PROCEDURE

1. Discuss with the students the importance of careful observation when studying organisms.
2. Discuss the idea that scientists can observe both physical characteristics such as markings, color, number of legs, or body shape, and behavioral characteristics such as how an organism moves, how it reacts to sound, or how it feeds.
3. Pass out the I Never Knew That! Study Guide and explain that the students are to make and record careful observations of an organism.
4. Discuss safety issues such as staying in the study area, poison oak, etc.
5. Inform the students of the time limits.

VARIATIONS, ADAPTATIONS, DIFFERENTIATION

1. This activity can be done in any environment, including the home, neighborhood, or school grounds.

ASSESSMENT

1. Are observations accurately recorded?
2. Were both physical and behavioral observations recorded?
3. Were the objective terms used in the descriptions (as opposed to subjective terms)?
2. Did students follow instructions?

ANSWERS TO SELECTED STUDY GUIDE QUESTIONS

Will vary according to the students' observations.

REFERENCES AND RESOURCES

Roa, Michael: *A Guide to the Side of the Sea*

I Never Knew That! Study Guide

Careful observation and accurate recording of observations are extremely important for scientists. For the next few minutes, you are going to be a scientist studying an animal more carefully than you have ever studied an animal before. Be sure to record your observations carefully and accurately. Drawings may help.

Also, be careful...some animals can bite or sting, and don't get into poison oak!

Hint #1: Drawings may help...You don't have to be an artist to sketch your animal

Hint #2: When you record your observations, try to use terms that everyone will understand. Using numbers may help with this. Think about these examples:

Clear	Not so clear
Has 6 oval shaped spots on its back	Has spots on its back
Crawled 2 feet in 3 minutes	Crawled slowly
Is 3 inches long	The biggest slug I've ever seen!
Body gray in color with brown on stomach	Grayish with some brown

Hint #3: Be sure to include observations about how the animal looks **and** how it acts.

Hint #4: It may be useful to record your observations every 10 or 20 seconds, every minute, or ?

Observations (continue on the back if necessary):

What kind of animal are you observing? _____

What does this animal look like....**physical** observations. Look carefully and try to notice something that you have never noticed before.

Drawing

Description...things that I notice:

Observations of **behaviors**:

Something that I observed that I hadn't observed before is:

A question that I have is:

Micro-hiking

ACTIVITY SUMMARY

Students make observations while "hiking" by crawling for a short distance, keeping their heads no more than a foot above the ground.

CONCEPTS TO BE LEARNED

1. Careful and close observation can reveal things that we don't normally notice.

STANDARDS ADDRESSED

Focus Standards:

- Grade 4: Life Sciences S.S. 3: Living organisms depend on one another and their environment.
Science Investigation and Experimentation S.S. 6: Students ask meaningful questions and conduct careful investigations.
- Grade 5: Life Sciences S.S. 2: Plants and animals have structures for various life processes.
Science Investigation and Experimentation S.S. 6: Students ask meaningful questions and conduct careful investigations.
- Grade 6: Ecology (Life Sciences) 5: S.S. Organisms exchange energy and nutrients among themselves and with the environment. Science Investigation and Experimentation S.S. 7: Students ask meaningful questions and conduct careful investigations.
- Grade 7: Life Science...Evolution 3.a: Biological evolution accounts for diversity. Life Science...Structure and Function in Living Systems S.S. 5: Anatomy and physiology
Science Investigation and Experimentation S.S. 7: Students ask meaningful questions and conduct careful investigations.

ANTICIPATED OUTCOMES

1. Students will increase their ability to observe and describe their observations.
2. Students will observe things that they have not previously noticed.

GROUPING

Teams of two

TIME

10-30 minutes

MATERIALS: for each team of two students:

- 5' of string
- Clipboard, paper, pencil
- Optional: hand magnifier

TEACHER PREPARATION

1. Obtain the materials above.
2. While on a pre-trip visit to the site, find an area where students can crawl along the ground safely.

PROCEDURE

1. Give each team the materials.
2. Tell them to spread their strings along the ground (or across a log, on a tree, over a rock, or?) in such a way that they won't interfere with other groups. Encourage them to look for things that they have never before noticed.
3. One student crawls along the ground (either on "all fours" or on their belly), keeping his or her head no more than 1 foot above the ground. As the student crawls, he or she describes what is seen.
4. The second student records the observations of the first. Of course, the second student is encouraged to check out for himself/herself what the first student describes.
5. After the first student has "hiked" the string, the students place the string in another area and trade roles.

VARIATIONS, ADAPTATIONS, DIFFERENTIATION

1. Rather than "hiking" along a string, students can explore a small area determined by tossing a loop of string.

ASSESSMENT

1. Do students look closely and describe accurately?

REFERENCES AND RESOURCES

Cornell, Joseph: *Sharing Nature with Children*

The Only Constant is Change: Succession in Action

ACTIVITY SUMMARY

Students observe examples of succession, or changes in dominant species, in the field.

CONCEPTS TO BE LEARNED

1. Environments change over time.
2. Over time, the dominant organisms living in a place will change.
3. Different organisms inhabit a place at different successional stages.

STANDARDS ADDRESSED

Focus Standards:

- Grade 4: Life Sciences S.S. 3: Living organisms depend on one another and their environment.
Science Investigation and Experimentation S.S. 6: Students ask meaningful questions and conduct careful investigations.
- Grade 5: Science Investigation and Experimentation S.S. 6: Students ask meaningful questions and conduct careful investigations.
- Grade 6: Earth Science 2.d: Landslides and floods change human and wildlife habitats.
Science Investigation and Experimentation S.S. 7: Students ask meaningful questions and conduct careful investigations.
- Grade 7: Science Investigation and Experimentation S.S. 7: Students ask meaningful questions and conduct careful investigations.

ANTICIPATED OUTCOMES

1. Students will increase their understanding of succession in biological communities.

GROUPING

Whole class and individuals

TIME

varies

MATERIALS

- Paper and pencils
- clipboards

TEACHER PREPARATION

1. When you do the pre-trip site visit, locate places where students can see various stages of succession such as:
 - Bare earth or rock
 - Grasses (on earth) or lichens (on rock)
 - Non-woody herbaceous plants
 - Small woody plants
 - Trees

It would be ideal if you can locate an area where a fire, landslide, logging, or other disturbance has obviously set succession back. Also, look for places such as a meadow or field where the forest was cleared some time ago. Look for bushes or forest trees growing along the edge of the meadow.

PROCEDURE

1. While on the field trip, point out to students different plants growing in different areas.
 - Discuss the concept of succession, wherein a group of plants and animals affect and change their environment, resulting in other plants and animals becoming dominant.
 - Discuss how such things as fire, road clearing, landslides, or logging can set succession back to an earlier stage.
 - Discuss the idea that the plants and animals in a successional stage don't just appear. They are present but not dominant during the previous stage. Often, shade-tolerant plants survive and thrive in the shade of less shade-tolerant plants, eventually becoming dominant.
2. Have students draw and label the different vegetation types from bare soil to a forest with a canopy, sub-canopy, and understory.

VARIATIONS, ADAPTATIONS, DIFFERENTIATION

1. *Project Learning Tree* has a classroom succession activity called "Nothing Succeeds Like Succession." See American Forest Foundation, *Project Learning Tree: Pre K-8 Activity Guide*, 2006.
2. Succession can be observed in the classroom by simply obtaining some unpurified water, perhaps from a creek or pond while on a field trip (or adding some straw or other "contaminant" to some tap water), and keeping it in an aquarium or jar on a windowsill and observing the changes over time as different groups of organisms grow.

ASSESSMENT

1. Look for various stages in the students' drawings.

REFERENCES AND RESOURCES

American Forest Foundation: *Project Learning Tree: Pre K-8 Activity Guide*.

The Other Senses

ACTIVITY SUMMARY

While seated in the redwoods, students use senses other than sight to make observations.

CONCEPTS TO BE LEARNED

1. Senses other than sight can be used to make observations.

STANDARDS ADDRESSED

Focus Standards:

Grade 4: Science Investigation and Experimentation 6.a: observations

ANTICIPATED OUTCOMES

1. Students will increase their ability to use senses other than sight to make observations.
2. Students will increase their appreciation of the sense of sight.
3. Students will increase their ability to describe what they sense.

GROUPING

Individual

TIME

10-30 minutes

MATERIALS

- Notebook, 3"x5" card, or clipboard and pencil

TEACHER PREPARATION

1. Obtain the materials
2. On a pre-trip site visit, locate an area where the students can be safely and comfortably seated (preferably on the ground or logs, as opposed to picnic tables).

PROCEDURE

1. Call on a couple of students to make an observation and tell it to the class. Ask the students what sense they used. Students will almost always make a visual observation.
2. Ask students to name the other senses besides sight.
3. Tell them that they are going to use their other senses to experience the redwoods.
4. Tell the students how long they will be sitting and whether they will be writing down their observations afterwards.

5. Tell them to remember one thing that they sense so that they can describe it to the group afterwards.
6. Either lead students to their sites, or have them select their own.
7. Students should be comfortably seated and close their eyes.
8. After the allotted time, have students open their eyes, write down one or two things that they noticed, and then get the group together to share.

VARIATIONS, ADAPTATIONS, DIFFERENTIATION

1. Working in partners, students can be led to a tree, bush, rock, or other natural object while blindfolded. They then describe the tree or other object without using their sense of sight.



Be sure to caution students to be careful while leading the blindfolded student, and also to avoid poison oak, stinging nettles, eye level branches, etc.

2. If you pick out the leaves, students can taste various plants and attempt to describe their taste.



Of course you must be sure of what you're picking!

ASSESSMENT

1. Do students cooperate by keeping their eyes closed?
2. Do students use senses of touch, hearing, and smell?

People Pictures

ACTIVITY SUMMARY

Students "take pictures" by pointing their partner's eyes towards something that they find interesting.

CONCEPTS TO BE LEARNED

1. Natural objects can be very interesting when viewed close-up.

STANDARDS ADDRESSED

Focus Standards:

- Grade 5: Life Sciences S.S. 2: Plants and animals have structures for various life processes.
- Grade 7: Life Sciences...Structure and Function in Living Systems S.S. 5: Anatomy and physiology

Other Standards:

- Grade 4: Science Investigation and Experimentation 6.a: observations

ANTICIPATED OUTCOMES

1. Students will increase their ability to observe and describe details.

GROUPING

Teams of two students

TIME

10-20 minutes

MATERIALS

- Index card or notebook and pencil

TEACHER PREPARATION

1. Obtain the materials

PROCEDURE

1. Tell the students that they are about to become nature photographers: One will be the camera, and one will be the photographer. They will then change roles.
2. Demonstrate how to "take a picture:"
 - a. The "camera" closes his or her eyes.
 - b. The photographer carefully leads the "camera" to the place where the photographer finds something interesting to "photograph."
 - c. The photographer then carefully points the camera at the subject and tells the subject whether this will be a close up, medium, or long-distance photograph. (This helps the camera to focus quickly on the subject.)

- d. When the camera is ready, the photographer taps the camera on the shoulder and says "click."
- e. When the camera hears "click," he or she opens his or her eyes and takes in the site visually. (No talking...cameras don't talk!)
- f. Once that picture is taken, the camera then closes his or her eyes and is guided to another picture site.
- g. After a number of pictures (five to ten), or about five to ten minutes, the photographer and camera switch roles.
- h. After both students have taken their pictures, have them sketch the favorite picture that they took. They may do this from memory, or they might return to the site.

Note:



Be sure to warn the students to be careful as they guide their "cameras," and not to position the camera where he or she might poke an eye. Also tell them of any "off limits" subject matter such as trash cans, roads, or other people.

VARIATIONS, ADAPTATIONS, DIFFERENTIATION

1. Students can "pan" their cameras by moving the student's head slowly from side to side or up or down.
2. Students can write stories about one or more of the scenes that they saw.

ASSESSMENT

1. Do students cooperate and are they careful?
2. Do their drawings and/or stories show attention to detail?

REFERENCES AND RESOURCES

Cornell, Joseph: *Sharing the Joy of Nature*

Poetrees

ACTIVITY SUMMARY

Either during or after a trip to the redwoods, students create poems.

CONCEPTS TO BE LEARNED

1. Poetry can be used to express feelings and thoughts.
2. There are various kinds of poetry.

STANDARDS ADDRESSED

Focus Standards:

- Grade 4: English Written and Oral Language Conventions 2.2.4: Recite brief poems.
- Grade 5: English Listening and Speaking Strategies Standard Set
- Grade 6: English Listening and Speaking Strategies Standard Set
- Grade 7: English Listening and Speaking Strategies Standard Set

ANTICIPATED OUTCOMES

1. Students will increase their willingness and ability to write various types of poetry.

GROUPING

Individual

TIME

Varies

MATERIALS

- Notebook or clipboard, paper and pencil
- Copies of Poetrees Study Guide (two-sided)

TEACHER PREPARATION

1. Before the trip, introduce various types of poetry. The Poetrees Study Guide may be useful for this.
2. Obtain the above materials.
3. Find a place where students can sit quietly to write.

PROCEDURE

1. Use the Poetrees Study Guide to review various types of poetry and to prepare to write.
2. Have the students find a comfortable place, apart from each other, where they can write. Tell them that they will need to spend at least (10? 15? 20?) minutes at their site, so they should take their time rather than rush through this writing assignment.

VARIATIONS, ADAPTATIONS, DIFFERENTIATION

1. Students can practice writing poetry before the field trip.
2. Students can write their poems on drawn or cut-out shapes such as trees or animals.
3. Student poems can be compiled into a booklet or on a tree-shaped bulletin board display.
4. Consider saving some samples of student poems to use as examples.

ASSESSMENT

1. Do the students follow the conventions (if any) of the poetry styles?

REFERENCES AND RESOURCES

American forest Foundation: *Project Learning Tree Pre K-8 Environmental Education Activity Guide: "Poet-Tree."*

Shinkle, Jill: *Creek Watchers: Exploring the Worlds of Creeks and Streams*

Poetrees Study Guide

Just as carpenters use boards and nails to build houses, and bakers use spices and other ingredients to make cakes, poets use words to create poems. Today you are going to write one or more poems about the redwood forest. First, though, you will need to collect your tools—words. To get you started, a few examples have been given below.

List eight nouns (things) that have to do with the redwood forest:

trees air fog

List seven adjectives (words that describe things) that have to do with the redwood forest:

green gigantic wet

List six verbs (action words) that have to do with the redwood forest:

fall grow whisper

List five adverbs (words that describe verbs, other adverbs, or adjectives) that have to do with the redwood forest:

slowly quietly majestically

There are many different kinds of poems. Several types are described below. Use the words above **or others** to write a poem that shows something about how you feel about the redwoods.

Haiku poems, which originated in Japan, have very a particular structure. Haiku poems have three lines: the first has five syllables, the second seven, and the third has five. Haiku usually are nature poems, and the last line is often surprising or strong.

Reaching for the sky
Green needles growing, tall tree
Look – the wet fog comes!

Continued on the other side

Cinquain poems have five lines and have a specific structure. Each line has a specific purpose or structure:

Line 1: title line in two syllables or two one-syllable words	Tall Trees
Line 2: four syllables or words, describe the first line	Red, green, and brown
Line 3: six syllables or words, describe action	Growing slowly in sun
Line 4: eight syllables or words, describe a feeling	Soft shade makes us smile as we rest
Line 5: another word for the first line/title in two words	Redwood!

Diamante poems are shaped like a diamond. An example of a diamante poem structure might be:

Noun	tree
adjective adjective	tall green
participle participle participle	sprouting growing dying
noun noun noun noun	roots stems needles cones
participle participle participle	reaching holding feeding living
adjective adjective adjective	strong plentiful alive
noun	redwood

An **acrostic** is a series of words or phrases that begin or end with the letters of a word written vertically or horizontally.

Strong	T R E E
Enriching	a e v x
Quiet	l d e c
Upright	l r e
Overgrowing	g l
Inspiring	r l
Awesome!	e e
	e n
	n t

Free verse has no set formula or style.

We grow
 tall, strong, silent.
 We live
 years – hundreds, thousands.
 Hear us.
 We welcome you!

Prints of the Redwoods

ACTIVITY SUMMARY

Students make leaf prints, leaf and/or bark rubbings, and/or plaster casts of animal tracks.

CONCEPTS TO BE LEARNED

1. Plants and animals have various anatomical features that enable them to live.

STANDARDS ADDRESSED

Focus Standards:

- Grade 4: Science Investigation and Experimentation 6.a: Observations and inferences Science Investigation and Experimentation 6.b: Measure and estimate.
- Grade 5: Life Sciences S.S. 2: Plants and animals have structures for various life processes.
Science Investigation and Experimentation 6.a: classify objects
- Grade 7: Life Science ... Structure and Function in Living Systems S.S. 5: Anatomy and physiology
Science Investigation and Experimentation 7.a: Use tools to perform tests, collect data, and display data.
Science Investigation and Experimentation 7.d: Construct scale models to communicate knowledge.

Other Standards:

- Grade 6: Science Investigation and Experimentation 7.g

ANTICIPATED OUTCOMES

1. Students will increase their knowledge of plant and animal anatomy.

GROUPING

Individual or groups of two to three

TIME

Five -Fifteen minutes per rubbing or print

MATERIALS

Part 1: Leaf Prints

- Tempra paint (Carry plastic bottles in re-sealable plastic bags.)
- Paint brushes and/or brayer, stored in re-sealable plastic bags
- White or colored paper—construction paper works well
- Water and towels for cleanup (carry in re-sealable plastic bag)
- Leaves of various plants, possibly leaves that have fallen
- Newspaper (with a large plastic bag for carrying back for recycling)

Part 2: Leaf and/or Bark Rubbings

- Plain white paper (Typing/copy paper works better than construction paper.)
- Dark colored crayons with paper peeled off. Large "primary" crayons will be less likely to break.

Part 3: Plaster Casts

- Plaster of Paris (from hardware store) (If it doesn't come in a plastic container, transfer it to a plastic container with a tightly sealing lid.)
 - The amount will depend on the number of tracks you want each student to make. Plan for about ½ cup per track.
- Water (water bottle or water from a creek, in which case you'll need a cup, plastic bottle, or some such thing with which to scoop it from the creek)
- Cups in which to mix the plaster
- Spoons with which to mix the plaster
- Baby powder
- Something with which to form a "dam" to hold the plaster:
 - A three-inch section of a milk carton or...
 - A three inch x ten inch strip of plastic or cardboard + two small binder clips or some masking tape
- Plastic pan(s) with lids, or boxes with which to transport casts
- A five-gallon plastic bucket can carry the materials, leftovers, and waste.

TEACHER PREPARATION

1. Talk with a park ranger about if and where you might pick leaves for prints and where animal tracks might be found.
2. Obtain materials as needed.
3. Find a place with flat surfaces such as picnic tables where the prints can dry, perhaps during lunch.
4. Test the materials that you plan to use to be sure that they will work with the types of leaves or bark that you have available.

If you are making plaster of Paris casts, practice with your particular material to determine the amount of water needed to make a mixture that has the consistency of a thick cream – about two parts plaster to five parts water. If it is too thin, it will take longer to set up. If it is too thick, it won't flow into the details of the track. Mix the plaster by adding the plaster to the water rather than the water to plaster.

PROCEDURE

Part 1: Leaf Prints:

1. Spread the newspaper on a flat surface such as a picnic table.
2. Place a leaf on the newspaper with the veined side upward.
3. Use a paint brush or brayer to apply an even coat of paint to the leaf.
4. Carefully lift the leaf and press the painted side on the paper. Spread the leaf flat.
5. Carefully lift the leaf from the paper and set the paper aside to dry. Use a rock or piece of wood to keep the paper from blowing away.

Part 2: Leaf or Bark Rubbings:

1. Leaf and Bark
 - a. Leaf: Find a leaf with prominent veins and place it on a hard flat surface, vein side upward.
 - b. Bark: Place the paper over the bark. Have a partner help hold it flat and smooth against the bark.
2. Gently but firmly rub the side of the crayon over the paper so that the texture of the leaf or bark shows up on the paper.

Part 3: Plaster Casts of Tracks

1. Gently blow or brush away any sticks, rocks, or leaves that are in the track.
2. Dust the track and soil around it with baby powder. This should help dry the area and help keep the plaster from sticking to the dirt or sand.
3. Surround the track with a dam made from a section of a milk carton or a strip of plastic or cardboard that has been clipped or taped to form a ring.
4. Use a spoon to mix the plaster of Paris in a cup as indicated.
5. Gently pour the plaster evenly into and over the track until about one inch deep.
6. Let the plaster harden for at least 30 minutes. The time will depend on how wet the ground is, the mixture that you created, humidity, etc. You might consider setting up a couple of test casts to remove before removing the actual track casts.
7. When the plaster is hard, gently lift it straight up. Carefully dust off any dirt. (You may want to let it cure (harden) for a while more before cleaning it.)
8. **It may take a couple of days for the plaster to completely cure. It will be fairly fragile until then. Place the cast(s) in a plastic pan with newspaper packing or use some other way to protect the casts while being taken home or to school.**

VARIATIONS, ADAPTATIONS, DIFFERENTIATION

All parts:

1. Consider teaching and practicing the techniques at school before the trip.

Part 1: Leaf Prints

1. Students can use different contrasting colored paints and paper.
2. Students can make prints of different species on one page.
3. Students can make booklets with prints from several species.
4. A piece of cord and clothes pins can be used to hang prints to dry.

Part 2: Leaf or Bark Rubbings

1. Students can make booklets with rubbings of different types of bark or leaves.
2. Orally or as a writing assignment, have the students try to describe the different bark or leaf patterns and textures so that others can identify the leaf or bark being described from the rubbing or print.
3. Leaf prints can be made after the leaves have been used for rubbings.

4. Several bark rubbings can be glued or taped to a cylindrical tube such as a carpet roll so that they simulate a tree trunk.

Part 3: Plaster Casts of Tracks

1. A paper clip can be inserted through a slit in the "dam" so that $\frac{3}{4}$ of it projects into the plaster to serve as a hanger.
2. Students can also make leaf prints in plaster.
3. Use these casts when you discuss the formation of fossils.
4. The cast is an impression of the foot of the animal that made the track. To make another track (which would be similar to a fossilized track or leaf impression), coat the cast with petroleum jelly, place a dam around it, and pour one to one and a half inches of plaster into the dam. (Sometimes the original cast will stick to the track being made, so don't do this unless you don't mind "sacrificing" the cast.)
5. Casts can be painted, lacquered, or left natural.
6. Other casting materials will produce harder, more durable casts, but are more expensive. See Appendix IV: Sources, or check at a hardware or craft store.
7. Some of the sources listed in Appendix IV sell rubber or plastic replicas of animal prints (or even animals) that can be used to create tracks or molds. Some of the sources also sell kits for casting and field guides of tracks.

ASSESSMENT

1. Are the prints or casts done as directed?
2. Can the students identify the plant parts and describe characteristics shown in the prints or casts?

REFERENCES AND RESOURCES

There are numerous resources available for teaching and learning about tracks and other signs of animals. See the resources in Appendix IV: Sources of Materials.

Some useful books include:

- Burt, William and Richard Grossenheider: *Peterson Field Guides: Mammals*
- Elbroch, Mark: *Mammal Tracks & Sign: A Guide to North American Species*
- Farrand, John: *National Audubon Society Pocket Guide: Familiar Animal Tracks of North America*
- Lowery, James: *The Tracker's Field Guide*
- McDougall, Len: *The Encyclopedia of Tracks and Scats*
- Olaus, Murie, Mark Elbroch, and Roger Tory Peterson: *Peterson Field Guides: Animal Tracks*
- Sheldon, Ian: *Animal Tracks of Northern California*
- Stall, Chris: *Animal Tracks of Northern California*
- Whitaker, John: *National Audubon Society Field Guide to North American Mammals*

The Root of the Matter

ACTIVITY SUMMARY

While in a stand of redwoods, students examine the root system of a fallen tree.

CONCEPTS TO BE LEARNED

1. Roots are used to anchor plants and to absorb water and nutrients.
2. Coast redwood trees have a relatively shallow root system.
3. Coast redwoods have evolved the ability to form new layers of roots if their roots are buried by sediments.

STANDARDS ADDRESSED

Focus Standards:

- Grade 4: Life Sciences 3.a: Living and non-living components
Life Sciences 3.b: Some survive well; some don't.
- Grade 5: Life Sciences S.S. 2: Plants and animals have structures for various processes.
- Grade 7: Life Science 5.b: Organisms depend on properly functioning organs and organ systems.

Other Standards:

- Grade 5: Earth Sciences 3
- Grade 6: Earth Science 2
- Grade 7: Life Science...Evolution 3

ANTICIPATED OUTCOMES

1. Students will increase their understanding of the importance of roots.
2. Students will increase their understanding of redwoods' adaptations to living in flood-prone alluvial flats.

GROUPING

Whole class

TIME

A few minutes while in the field

MATERIALS

- Specimen of downed redwood tree showing root system
- (optional) trowel

TEACHER PREPARATION

1. While previewing the field trip, talk to a ranger, naturalist, docent, or other person familiar with the site and locate a large downed redwood tree that shows the root system. Look for a tree that shows more than one layer of roots, indicating the growth of new layers in response to covering by sediments during flood events.



Be aware of whether the students are going to be able to view the roots without trampling other plants.

2. Ask about digging up a plant (preferably a non-native plant with a large tap root, such as a dandelion) to show the students a root system. If this is not possible, show a plant's root system before the trip so that students have a better understanding of how extensive some plant roots are.

PROCEDURE

1. If you have obtained permission to do so, dig up a plant such as a dandelion and show the students the root system. Discuss:
 - a. the functions of roots (anchoring the plant, absorbing nutrients)
 - b. what would happen if a plant's roots died
 - c. the idea that roots need air as well as water and that compaction of soil can kill a plant's roots
 - d. the value of roots in holding soil in place, thereby reducing erosion
2. Compare the size of the root system to the above ground portion of the plant.
3. Have the students predict how deep they think a 300-foot-tall redwood's roots might go into the soil.
4. Have the students observe the roots of a fallen redwood. Point out that:
 - a. The roots are broken, so they aren't seeing the whole system, but the whole system for a tree several hundred feet tall only went down six to twelve feet, and may have a spread of 50 feet in all directions.
 - b. When the tree was alive, the roots probably intertwined with neighboring trees, which gave it added support.
 - c. Different layers of root systems are formed after floods cover lower layers.
 - d. Measurements of a tree's height change not only as a tree grows, but also as the base is buried with sediments.

VARIATIONS, ADAPTATIONS, DIFFERENTIATION

1. If fallen trees of other species are visible, have the students compare their roots to redwood trees' root systems.
2. If the park has built boardwalks, fences, or other ways to prevent compaction or other damage to plants, be sure to point out those to the students and discuss why they are needed.
3. Discuss root functions besides absorption and anchoring – like storage of food in beets, carrots, and potatoes.

ASSESSMENT

1. Can students tell two functions of roots and how redwoods are adapted to living in areas where floods deposit sediments?

Similar, But Not the Same!

ACTIVITY SUMMARY

Students compare Douglas-fir trees with coast redwood trees.

CONCEPTS TO BE LEARNED

1. Careful examination can reveal anatomical differences between species of trees.

STANDARDS ADDRESSED

Focus Standards:

- Grade 4: Science Investigation and Experimentation 6.a: observations
Science Investigation and Experimentation 6.b: measure
- Grade 5: Life Sciences 2.a: structures for various life processes.
Science Investigation and Experimentation 6.a: classify objects
- Grade 7: Life Science 3.4: Classification
Life Science S.S. 5: Anatomy and Physiology
Science Investigation and Experimentation S.S. 7: Students ask meaningful questions and conduct careful investigations.

ANTICIPATED OUTCOMES

1. Students will increase their ability to make detailed observations.
2. Students will learn to tell the difference between coast redwood and Douglas-fir trees.

GROUPING

Individuals or teams of two

TIME

10-20 minutes

MATERIALS

- Notebooks or Similar But Not the Same! Study Guide
- Pencils

TEACHER PREPARATION

1. During a pre-trip site visit, locate an area where students will have access to both Douglas-fir trees and coast redwood trees.

PROCEDURE

1. At the site, ask students to suggest what they might look at to tell the differences between various kinds of trees. Elicit such things as leaf/needle appearance, bark, cones, and overall growth pattern (shape).
2. Point out the Douglas-fir and redwood trees. Have students compare the two by writing observations and making drawings in their notebooks, or use the Study Guide below.

VARIATIONS, ADAPTATIONS, DIFFERENTIATION

1. Similar comparisons can be done with other species.
2. This activity can lead to the use of dichotomous keying activities.

ASSESSMENT

1. Do the students accurately describe the differences and similarities?

ANSWERS TO SELECTED STUDY GUIDE QUESTIONS

	Coast redwood	Douglas-fir
Bark	Fibrous (stringy-looking), soft, fibers run up and down the trunk May have lichens growing on it	Not fibrous, looks like jigsaw puzzle, flaky-appearing and hard May have lichens growing on it
Leaves: Individual	Needles end in sharp points Leaves are needle-like, ¾" - 1" long	Needle ends are blunt Leaves are needle-like, ¾" - 1" long
Leaves: arrangement on the twig	Needles of lower branches stick out to the side...flat, like a fan Needles from the top of a tall tree may lie close to the twig, scale-like.	Needles go around the twig, like a brush
Cones	About the size of an olive (less than an inch long) Hang down from ends of branchlets	1.5 inches or more in length, with soft 3-forked "bracts" protruding from the cone Hang downward from branches
other		

REFERENCES AND RESOURCES

Guiney, Miriam: *Redwood Parks Activity Book*

**Similar But Not the Same!
Study Guide**

Sometimes it is easy to tell the difference between different kinds of trees. Coast redwood trees and oak or madrone trees, for example, look very different.

Sometimes, however, it is not so easy. Coast redwood and Douglas-fir trees are similar in many ways. They are both "evergreen," meaning they don't lose their leaves (needles) in the winter. They both produce cones that have seeds in them. Both are important lumber trees and can grow very tall.

Use the table below to compare coast redwood and Douglas-fir trees. Look for both similarities (how they are the same) and differences.

Sketches might be very helpful!

	Coast redwood	Douglas-fir
Bark		
Leaves: Individual		
Leaves: arrangement on the twig		
Cones		
other		

Other Activities for During the Trip

Trash Patrol

Before leaving the parking lot at the start of the field trip, provide each group with a five-gallon plastic bucket or trash bag. (The bucket is more easily reusable and can be used to carry other things.) So that one person doesn't feel "stuck" carrying the container, determine a rotation system. Consider using two containers, one for trash and one for recyclable materials.

Caution the students about sharp glass or metal, poison oak, etc. After the litter has been collected, the students can sort it into categories, including recyclable, decomposable, and other. Discuss what people could have done rather than bring these things to the redwoods and leave them behind, including alternatives to disposable packaging. Dispose of the material properly, recycling what you can.

STANDARDS ADDRESSED

Focus Standards:

Grade 4: Mathematics 3.1: Using addition and subtraction.

Grade 6: Mathematics 1.4: Calculate percentages.

Environmental Principles and Concepts

Principle II: Humans affect natural systems.

Concept a: Human populations and consumption affect natural systems.

Concept b: Human extraction, harvesting, and use of resources affect natural systems.

Concept c: Expansion and operation of human communities affect natural systems.

Concept d: Human social systems affect natural systems.

Principle IV: The exchange of matter between natural systems and human societies affects the long-term functioning of both.

Concept a: Effects of human activities on natural systems depend on quantities of resources used and the quantity and characteristics of the byproducts of use.

Concept b: Byproducts of human activities affect natural systems.

Concept c: The ability of natural systems to adjust to human-caused alterations depends on several factors.

Redwood Log Activities

Plan time in the trip for the students to have some alone time. Find a place where they can be spread out far enough to discourage talking, but where they can be observed for safety reasons. If students have made journals or notebooks ("Redwood Logs"), they can be given a simple assignment such as:

- Sketch your favorite redwood forest organism and tell why it is your favorite.
- Write a brief note to a redwood organism. Tell the organism what you liked or what you learned in the redwoods, or what you wonder about.
- Write a brief poem about what you saw or learned today.
- Write a note to your parents or family. Tell them something interesting about the redwoods.
- Sit quietly, close your eyes, listen and smell. Arrange to have an adult tell you when five minutes are up. Write down what you heard, felt, and smelled.
- Go to a spot that is "natural" (not a parking lot or picnic table). Spend 5 minutes looking as closely as you can at an area half the size of a piece of binder paper. Write and sketch what you see. Write down five questions about what you see.

A commercially available book called *My Nature Journal*, by Adrienne Olmstead, includes numerous ideas for nature writing and other activities.

REFERENCES AND RESOURCES

Olmstead, Adrienne: *My Nature Journal*

Roa, Michael: *A Guide to the Side of the Sea*

End of the Trip Activities

As a class, discuss what was seen and learned while it is still fresh in the students' minds.

- What was most interesting?
- What was most surprising?
- What would they like to see again, or what did they miss?
- What do redwood organisms do: (These will require some thought and conjecture. Are the students' responses logical and reasonable?)
 - ✓ At night?
 - ✓ When it rains?
 - ✓ When a fire approaches?
 - ✓ When a stand is logged?
- What can they as individuals, and as a class, do to help protect the park?

REFERENCES AND RESOURCES

Roa, Michael: *A Guide to the Side of the Sea*

Before leaving the lunch area or parking lot, have students do a litter patrol. Recycle whatever is possible. Leave the area cleaner than you found it.