



The Golden Gate National Parks—with their fragile indigenous habitats and historic landmarks, ancient redwood groves and dramatic coastal preserve are also settings for one of the largest and most inspiring urban outdoor classrooms. Deeply committed to young people, the National Park Service, Golden Gate National Parks Conservancy, and Presidio Trust partner with educators, students, and the community to design programs that encourage inquiry-based learning linked to school curriculum. The goals and principles of the K–12 program confirm Golden Gate’s commitment to authentic, inclusive, and relevant education.

Crissy Field Center, located on the Presidio of San Francisco, is a partnership project of the Golden Gate National Parks Conservancy and the National Park Service. The Center offers multicultural programs that actively engage us with our environments and promote collaborations in building a more sustainable and environmentally just society.

Save-the-Redwoods League (SRL) is a nonprofit organization dedicated to preserving ancient forests so that all generations can experience the inspiration and majesty of these towering giants. In 1850, there were nearly 2 million acres of ancient coast redwood forests in California. Today, less than 5 percent remain. Our Education Grants Program seeks to foster a deeper understanding of redwood forests through personal visits and educational experiences among a broad, diverse audience. Save-the-Redwoods League is proud to help fund the "Into the Redwood Forest" educational program.

www.nps.gov/goga/forteachers/
www.crissyfield.org
www.savetheredwoods.org



Save-the-Redwoods League™
Education Grants Program



Overview

Into the Redwood Forest engages 3rd, 4th and 5th grade students in an environmental education program in which they learn about forest ecology, habitat and species interdependence. Students learn about and visit three different community environments found in forests (core, edge and riparian). The program provides a tangible model for students to explore the forest through learning activities in the classroom and in a National Park (Muir Woods).

Students are encouraged to use inquiry in their learning process, consider human impact on forest communities, reflect on their role in the ecosystem, and participate in responsible actions to preserve our national parks and forests.

Into the Redwood Forest is offered in partnership with the Golden Gate National Parks Conservancy (GGNPC). This educator's handbook has been prepared for classroom teachers and National Park Service (NPS) and park partner staff who together make up the Into the Redwood Forest education team.

Curriculum Organization

The program is divided into classroom-based introductory lessons, a field program at Muir Woods National Monument, and culminating projects in which students illustrate what they learned during the program. The lesson plans include a summary, expected duration, materials list, student handouts, and a facilitation procedure.



Authentic Assessment

Into the Redwood Forest is student-directed, with learning activities that allow them to explore their own ideas. Each activity builds on the previous to help students develop and build upon their understanding of science concepts through questioning, hands-on discovery and facilitated discussion.

Each lesson includes assessment materials. Students accumulate individual and group work to put into a student journal. The journals are created by the students (of recycled materials) and include notes from lessons, field observations, and individual reflections. These journals can be used to assess the students' understanding of important concepts and the evolution of their knowledge and attitudes.

Education Standards

Into the Redwood Forest focuses on science principles learned through field studies conducted in a national park. Students also practice math, language and visual arts skills. The program is an excellent vehicle for helping students obtain important life skills necessary to contribute effectively to their own community. The lessons in this program will help students achieve the following education standards.

Science	Observe and compare communities; Collect and organize data; Formulate hypotheses and draw conclusions
Visual Arts	Produce art through their observations and experience
English/Language Arts	Integrate listening, speaking, and writing skills
History	Learn about John Muir and his role in the conservation movement. Foster an awareness of the NPS in the protection of our nation's heritage.
Life Skills	Critical thinking; evaluation; ability to obtain information; cooperative learning; use of senses to observe; use of media to communicate



Preparation Lessons

Perspectives

- ◆ Redwood journal
- ◆ Crossword puzzle

Forest Ecosystems

- ◆ What a forest means to us
- ◆ Video and/or Photo Tour

Park Staff Classroom Visit

- ◆ NPS mission
- ◆ Redwood ecology / five senses
- ◆ Communities of the forest activity

National Park Field Session

Core Community Investigation

- ◆ Park staff and teacher facilitate
- ◆ Students act as nature detectives using journals
- ◆ Students identify elements in the forest

Edge Community Investigation

- ◆ Park staff and teacher facilitate
- ◆ Students eat lunch and learn about garbage and recycling options
- ◆ Students explore edge community elements

Riparian Community Investigation

- ◆ Park staff and teacher facilitate
- ◆ Students use bugboxes and thermometers to explore the creek
- ◆ Students learn of erosion with face painting activity

Follow-Up Lessons

Showing What We Have Learned

- ◆ Teacher facilitates lesson in class
- ◆ Students review what they have learned
- ◆ Students use creativity to create brochures, field guides or postcards

Revisiting Our Nature Journals

- ◆ Teacher facilitates lesson in class
- ◆ Students review what they have learned in their journals
- ◆ Students produce a creative summary of their journal entries



Program Logistics

So that all students may participate in and enjoy their program day at Muir Woods National Monument, please take careful note of the following:

- ◆ The teacher and adult chaperones are ultimately responsible for the conduct and safety of the students.
- ◆ Clothing appropriate to the nature of the activities and weather conditions at the park is required. Advise students to dress in layers to accommodate the variable temperature characteristic of the woods. The program will go on regardless of weather conditions. We have enough raincoats for an entire class if needed.
- ◆ Students will conduct their investigation in groups of approximately four. These groups should be organized prior to the field session.
- ◆ Arrangements can be made to accommodate students with special needs. Please discuss specific circumstances with National Park Service staff prior to your visit.

Special Note: There are park rules and regulations that your class should be made aware of before their visit. Please share the following rules with them:

- ◆ The class will stay on the main trail at all times, unless directed by the park representative to do otherwise.
- ◆ No plants or other natural features can be removed from the park.
- ◆ Feeding or disturbing animals is not allowed in the woods.
- ◆ Portable radios, musical instruments, and electronic games will not be allowed on the field session.

Directions

Most classes will be taking buses to Muir Woods. Bus companies are familiar with the route.

For those classes that are carpooling:

Muir Woods National Monument is located on the South Side of Mount Tamalpais, 12 miles North of San Francisco. Take Highway 101 to Mill Valley in Marin County. Take the Stinson Beach / Highway 1 exit. Follow the signs to Muir Woods.

Note: The narrow, winding road leading to the park is not accessible by vehicles larger than 35 feet, according to the regulation of the California Highway Patrol (CHP). There is no public transportation to the park.



Cancellation Policy

Please let us know of any changes in rescheduling your program dates. Because of the volume of schools participating, there is little room to reschedule your original date. Please plan accordingly.



Teacher Preparation

The following are a few important reminders to help the teacher prepare for the woods visit:

- ◆ Please distribute the parental approval forms and photo and video release forms to students at least a week before the woods visit.
- ◆ The teacher is expected to facilitate each of the classroom lessons before and after the woods visit. Student work from the follow-up lessons should be returned to the park within three weeks of the woods visit.
- ◆ Please divide the class into four groups. To maximize the work performance within each group, consider separating students who potentially challenge the group dynamic. The teacher and chaperones will help to facilitate groups while at the woods.
- ◆ Please review the rules with students the day before the woods visit. Remind them to dress in layers and wear shoes that can get dirty. On the day of the visit, please check that all students have proper clothing.



Roles of participants

Each person involved in *Into the Redwood Forest* has a role to play in order to provide the students with a positive learning environment in the woods.

TEACHERS

- ◆ Attend teacher workshop
- ◆ Divide students into cooperative groups
- ◆ Facilitate classroom activities to prepare students for the program
- ◆ Assist students with activities in the woods
- ◆ Monitor student conduct and evaluate programs

STUDENTS

- ◆ Work cooperatively in small groups
- ◆ Participate in all activities
- ◆ Follow rules in woods at all times

ADULT CHAPERONES (includes parents)

- ◆ Assist students with activities at the woods
- ◆ Act as positive role models in cooperative learning and stewardship

PARK STAFF (includes volunteers and interns)

- ◆ Conduct the teacher workshop
- ◆ Facilitate classroom lesson and lessons in the woods
- ◆ Coordinate transportation when appropriate and confirm dates with teachers
- ◆ Maintain equipment and supplies
- ◆ Assure each student has a signed parental approval form and photo / video release form
- ◆ Assess program and student work



Pre-Visit Activities

Perspectives

Summary

Teacher facilitates this classroom lesson. Students read a short biography of John Muir and discuss aspects of his life. They then create personalized nature journals to record their thoughts and ideas throughout the program. Students also learn about the National Park Service mission through an activity. They then complete a vocabulary crossword puzzle and discuss their questions and answers.

Time

Determined by class

Materials

- John Muir biography
- Recyclable paper
- Cardboard
- Two-Hole punch
- Rubber Bands
- Stick or Pencil
- Vocabulary list
- Crossword puzzle and answer sheet

Lesson - Part 1

Have the students read the biography of John Muir. Have a discussion on what they read and about the importance of keeping a journal. John Muir, deeply moved by the beauty of nature, wrote personal feelings, encounters, and observations in his journal. Likewise, the students will be personally moved by things they learn in the class and at Muir Woods. This journal will serve as each student's account of his or her personal activities, reflections, feelings and observations.

Have each student create his or her own personalized journal. You may want to use the blank side of recyclable paper and cardboard for the back. The students may want to design their own cover. Punch two holes in the top and thread a rubber band through the holes. Use a stick or pencil to hold it in place.



John Muir Biography

Muir Woods National Monument has lots of visitors each year who come to discover the beauty of an ancient redwood forest. Many of those visitors ask the rangers, "What is a Muir?" Well, a Muir is not a thing, but a very important person who dedicated his life to writing and informing people of the wonders of nature.

John Muir, who the park is named for, was born in Dunbar Scotland in 1838. When he was 11 years old his family immigrated to the United States and settled in Wisconsin on land that they turned into a farm. They all worked very hard on the farm, sometimes working 16 hours in one day. John had a curiosity of the plants and animals that lived near his home. He also loved to read and would awake in the very early morning while his family slept so he would have the time. His favorite books were on mathematics.

John also was an inventor. He thought there was a better and easier way to do things. He invented a thermometer, clocks, and a bed called a "early-raising machine". It was a bed that worked like an alarm clock. When it was time to get up, the bed would rise and tip you onto the floor. Everyone was impressed with his inventions and encouraged him to go to the Wisconsin state fair in Madison to display them. So, at the age of 22, John left home and went to Madison. He was the hit of the fair. Newspaper articles were written about John and his amazing inventions.

John had a desire to continue his education and wanted to attend the University of Wisconsin, so he started to take jobs to save money for his education. He was accepted into the University and found that botany, the study of plants, was his favorite subject. At the university he made a good friend, Jeanne Carr, she had studied botany for many years. He stayed at the university for four years but his yearning to be in nature and finding and learning about plants started his journeys.

First John went to Canada and wandered and drew and wrote about the plants he saw in his journal. He moved to Indiana and needed to work to earn some money, so he got a job in a factory. One day while working on a



machine a part flew off it and hit him in his eye. This made him go temporarily blind. The doctor told him he need to stay out of the light for four months and his sight may come back. John was very fearful that he might never see the beauty of nature again and made a pact with himself, if his eyesight did come back, he would go on a trip and see and write about all the plants, his thoughts and adventures.

John's eyesight did return and he said good-bye to all his friends and family and left on a 1,000 mile walking trip from Indiana to Florida. All along the way he recorded in his journal everything he saw and did. His journey did not end there. He then took a boat to Cuba and then a ship to San Francisco. He had read about the beauty of Yosemite Valley and desperately wanted to visit it. He arrived in San Francisco in 1868 and immediately started off for Yosemite.

John spent many years hiking around Yosemite and recording his thoughts and findings in his journal. He would send all his writings to his friend Jeanne Carr who was now living in Oakland. She encouraged him to write about his journeys and what he has seen using his journals. So, John started writing very popular articles that were in many magazines. People from all over the country were reading and learning from his articles. President Theodore Roosevelt visited Yosemite and requested that John take him on a camping trip. Because of his writings and love of Yosemite, it is now a National Park.

John married and lived in Martinez, California with his wife and two daughters. They owned an orchard. It is now a National Historic Site that you can visit. He still traveled to new places continuing to keep his journal and writing about his travels.

When Muir Woods National Monument was named after him in 1908, John Muir was very honored. He said, "This is the best tree lovers monument that could possibly be found in all the forests of the world. You have done me great honor, and I an proud of it."



Part 2

Background Information: The mission of the National Park Service is to preserve, protect and provide for future generations to enjoy (the three P's). To **preserve** is to take care of the land, keeping its true value in good condition. To **protect** is to keep the park safe from potential danger. Preserving and protecting the national parks will allow us to **provide** these parks for children in the future.

Teacher forms five different student groups. Each group is given one of the four pictures. The front of is a drawing of an animal or plant, the back is a statement about the image.

As a group they will decide what is portrayed in the picture by reading the clue, and why we are protecting and preserving it. Each group then presents their findings to the class.

Redwood: I'm the tallest living thing in the world.

Spotted Owl: I'm nocturnal bird that is endangered.

Banana Slug: I'm known as the recycler of the redwood forest because I'm a decomposer.

Mountain Lion: I'm a carnivore and the top of the food chain.

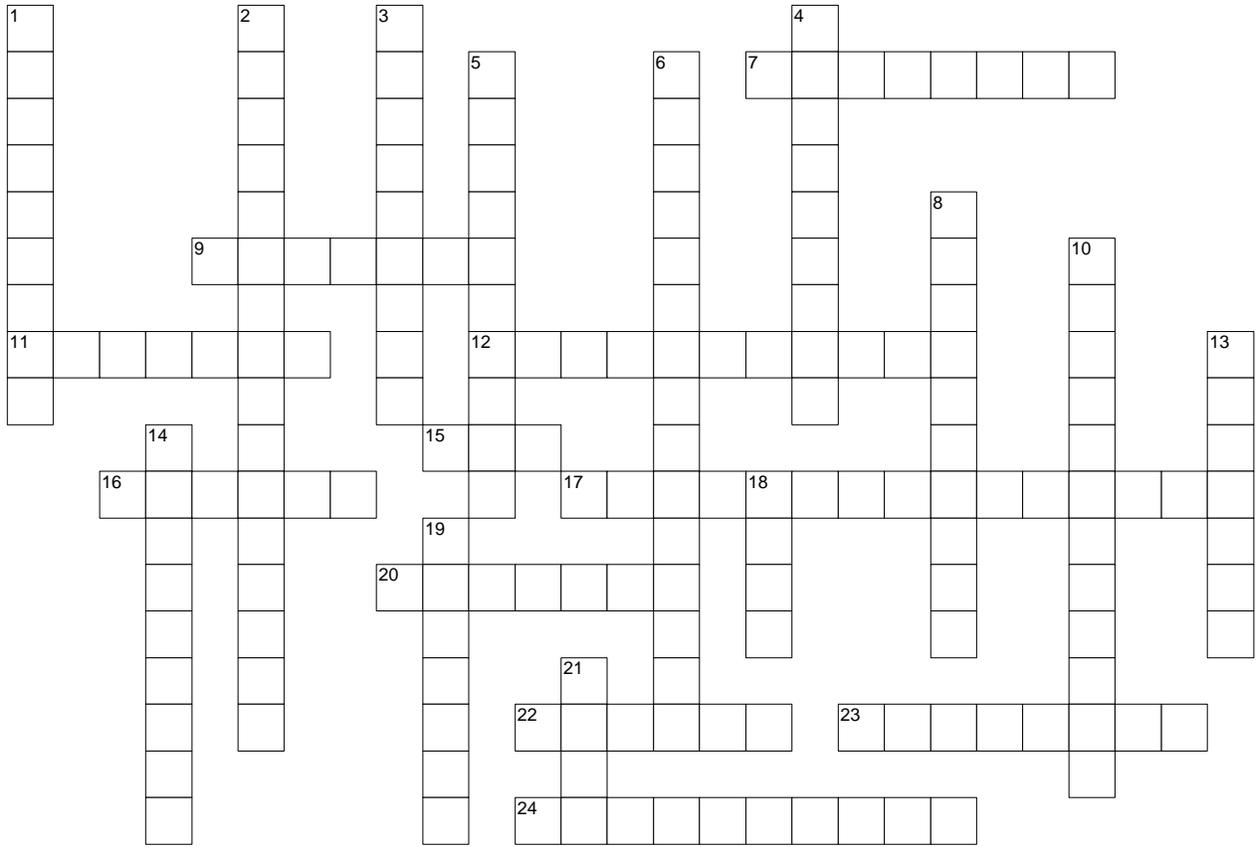
Black Tail Deer: I'm the largest herbivore in the redwood forest.

Part 3

Divide the students into 5 smaller groups. Assign each group a set of vocabulary words (without definitions.) Ask them to work together to create a possible definition for each of the words. Have the class compile all of their definitions. Distribute the class vocabulary list to each student.

Distribute the crossword puzzle to each student. Ask the students to work in their smaller groups to solve the puzzle. Tell them to refer to their vocabulary list to help them. They will compare their own definitions with the clues for the crossword. Ask them to complete as much of the puzzle as possible.

Review each of the vocabulary words with the class. Have the students share their understanding of the words and ask other students to add to the definition. They may want to modify their original definitions to reflect their new ideas. We have provided a teacher's copy of the vocabulary list for you to consult.



www.CrosswordWeaver.com

Clues can be found on the following page.



Across

- 7 A person who studies the science of plants.
- 9 A place where a plant or animal has all the things it needs to survive.
- 11 To search in hope of discovery.
- 12 The degree of heat shown on a standard scale.
- 15 Particles of water suspended in the air at or near the ground.
- 16 The top layer of leaves and branches on the forest's tallest trees.
The ceiling of the forest.
- 17 A person that helps protect land and natural resources.
- 20 To make available.
- 22 A dense growth of trees and understory covering a large area.
- 23 To keep in perfect or unaltered condition.
- 24 A member of the ecosystem that recycles dead plants and animals by feeding on them.

Down

- 1 All the living and nonliving things in an area.
- 2 Plants, animals, water, soil and other materials found in nature.
- 3 The height of something from a point of reference.
- 4 A natural group living together, either plant, animal, human etc.
- 5 Plant life.
- 6 Relationships among living things where all depend upon one another.
- 8 The smaller trees and plants growing under the tallest trees.
- 10 Protected areas across the country for people to use and enjoy.
- 13 To keep from being damaged or injured.
- 14 Small pieces or parts.
- 17 The community on the outer most part of the forest. It is dry and warm and is at a higher elevation.
- 19 To destroy by wearing away.
- 21 The community that is the central part of the forest. There is a low amount of light and a high population of tall trees.





Vocabulary List

Botanist: A person who studies the science of plants.

Canopy: The top layer of leaves and branches on the forest's tallest trees. The ceiling of the forest.

Community: A natural group living together, either plant, animal, human etc.

Conservationist: A person that helps protect land and natural resources.

Core: The community that is the central most part of the forest. There is a low amount of light and a high population of tall trees.

Decomposer: A member of the ecosystem that recycles dead plants and animals by feeding on them.

Ecosystem: All the living and nonliving parts in an area.

Edge: The community on the outer most part of the forest. It is dry and warm and is at a higher elevation.

Erosion: To destroy by wearing away.

Explore: To search for the purpose of discovery.

Fog: Particles of water suspended in the air at or near the ground.



Forest: A dense growth of trees and understory covering a large area.

Habitat: A place where living things live and are most likely to be found.

Interdependence: Relationships among living things where all depend upon one another.

Natural Resources: Plants, animals, water, soil and other materials found in nature.

Preserve: To keep in perfect or unaltered condition.

Protect: To keep from being damaged or injured.

Provide: To make available.

Temperature: The degree of hotness shown on a standard scale.

Understory: The smaller trees and plants growing under the tallest trees.

Vegetation: Plant life



What a Forest Means to Us

Summary

Teacher facilitates this classroom lesson. Students produce a visual picture of what they believe they will find in the woods. Students then discuss their findings. Students also watch a video (*Into the Forest*) and/or view a photo tour about Muir Woods and discuss what they have seen.

Time

Determined by class

Materials

- Art supplies
- Magazines
- Glue
- Large sheets of paper
- TV, VCR, *Into the Forest* Video and/or Photo Tour

Lesson Part 1

Students form four groups. Explain that each group will discuss what they expect to see, feel, smell, hear and taste in the forest. They will use their redwood journals to write down what they imagine. Each group then produces a collaborative picture of what they have come up with. This activity is the beginning of their exploration of the forest. The five senses play an important role in the investigation of the communities of the redwood forest at Muir Woods.

Option: The groups can look through old magazines and newspapers to collect images that would represent their forest. Once they've collected a significant amount of images, paste them on a piece of paper to make a collage.

Part 2

Teacher presents the video and/or photo tour to the class. Please stop the video or photo tour at appropriate times to have short class discussions and/or have the students keep a record of their thoughts in their journals.

Part 3

Students read about the three communities of the forest (core, edge, and riparian). A classroom discussion is facilitated about the characteristics of each community. Have the students record their findings in their journals. This information will be used during the park staff classroom visit.



Core Community

The core community is in the middle of the forest. It has the tallest trees, which creates a canopy or a ceiling for the forest. Sun may shine through in spots, but it is usually very shady and cool. The smaller plants and trees have adapted and can survive with very little light, or they grow towards the light, bending and twisting.

Edge Community

The edge community is the outermost part of the forest. It is dry, warm, and high in elevation. This community's temperature is usually the warmest because the canopy, or ceiling the trees create, is thin and lets lots of sun into it. The plants in the understory, the plants that grow beneath the trees, get lots of sun.

Riparian Community

The riparian community occupies land next to water. The ground is damp and plants that are water-loving live here. It is low in elevation. The temperature can be cool or warm depending on the weather. The canopy here lets some sunlight shine into the community.



Park Staff Classroom Visit

Summary

A representative of the NPS from Muir Woods will visit the classroom. Park staff will lead a discussion regarding NPS mission, redwood ecology, the five senses and the four R's (Recycle, Reuse, Reduce and Rot). Park staff will also lead a short activity about the communities of the forest and a discussion on interdependence. Questions asked may include:

What plants were found in more than one community?
Why would they be in more than one community?
What animals do you find in more than one community?
Why are they in more than one community?

Time

1 Hour

Materials

- Journals
- Plant and animal guides (provided by NPS)



Muir Woods Site-Visit

Nature Detectives

Summary

Teacher and park staff facilitate this lesson. Students use journals and plant identification guides to investigate the core community. They record their findings, feelings and thoughts in their journals. Park staff facilitate closing of program when done.

Time

60 Minutes

Materials

- Journals
- Plant identification guides
- Binoculars
- Pencils
- Rain gear (if needed)

Lesson

Park staff welcomes the students. Students are given plant identification guides and binoculars. Students also prepare journals for investigation. Park staff reviews important safety rules.

Students divide into groups. Park staff leads groups through Muir Woods' main trail, stopping at various locations for student investigation. Core investigation ends with a "silent walk". Students are directed to a side trail, where they use their five senses while hiking alone.

The groups share findings and questions generated by their investigation with classmates.

Groups take a ten minute bathroom / water fountain break.



Lunch on the Edge

Summary

Park staff directs students on a hike to the edge community. Students use picnic area to eat lunch. Park staff facilitates discussion about edge characteristics. Students determine where the waste from their lunches will end up.

Time

45 minutes

Materials

- Binoculars
- Journals
- Pencils
- Bugboxes
- Garbage, recycling and compost bins

Lesson

Students use picnic area to eat lunches. Park staff facilitate discussion of Edge community. The following are examples of questions:

- What differences do you notice from this community and the Core?
- Can you hear or see any evidence of birds or wildlife?
- What do you notice is different about the plant life here?
- What are the four R's? (reduce, reuse, recycle and rot)
- What can be made from a bottle? A bag? A newspaper? An apple?

Students have some time to explore edge area after lunch using bugboxes and binoculars.

Groups take a ten minute bathroom break.



Creek Exploration

Summary

Park staff and teacher facilitate this activity. Students are led to the creek exploration area. Groups re-assemble and are given directions and safety information. Group leaders are given thermometers and creek insect identification guides. Groups conduct exploration of life in the edge of the creek, and note their findings in their journals.

Time

60 minutes

Materials

- Bugboxes
- Insect identification guides
- Pencils
- Journals
- Water thermometers

Lesson

Students are first given a safety lesson in the dangers of poison oak and stinging nettle.

Students divide into their groups. Students use thermometers to check water temperature and bugboxes to trap insects, recording findings in their journals. Identification of small fish and Banana Slugs is facilitated by park staff. Students learn of creek and salmon ecology.

Students learn about erosion by using creek rocks to make face paint.

Group are re-assembled, materials are collected and students are led to bus/bathroom area. Park staff thank the students for their attention and recap the day's events.



Post-Visit Activities

Showing What We Have Learned

Summary

Teacher facilitates this classroom lesson. Students review what they have learned about Muir Woods and forest community ecology. Each student will create a brochure or field guide about a plant or animal that lives in one of the communities. Students can present their brochure to the class during a teacher facilitated discussion. Students are encouraged to send the brochures (or copies) to Muir Woods.

Time

Determined by class

Materials

- 1 sheet paper (for each student)
- Markers, crayons, pencils, paint, etc.
- Muir Woods brochure example

Lesson

Each student should receive a sheet of paper folded in three equal sections. Using art supply materials, students should draw and label the element they have chosen on the front side (first section). On the second section students can describe that element in paragraph, story or poem form. On the final section the students can describe how the element uses or contributes to each community found at Muir Woods.

Students should be encouraged to think of connections between the element's role in Muir Woods and a similar role in their community. For example, a Banana Slug might be shown driving a garbage or recycling truck.

Students can discuss afterwards as a class the special qualities of the element they chose. Questions to ask here might include:

- What (if any) uses that element for food / shelter / habitat?
- What would happen if a non-native plant or animal entered the scene?
- What effects would global warming, drought, floods, fire or litter have on their element?

Students should present ways in which all their elements are interconnected. (Lesson can be adapted and presented as a “post-card” activity as well)



Revisiting Our Nature Journals

Summary

Teacher facilitates this classroom lesson. Students use their journal entries from the program to produce a review of what they have learned and accomplished. Students will produce an account, a story, a poem or a letter that describes their own personal experience in nature. Students are encouraged to send these summaries (or copies) to Muir Woods.

Time

Determined by class

Materials

- Student journals
- Pencils

Lesson

Students take time to revisit the entries in their nature journals. They should look for connections and themes that may now be apparent after having time to digest what they have learned.

Students sort out their findings into a clear idea and sum up what they have learned. Students are given some options on how to present this:

- A story about the forest communities from the perspective of a plant/animal
- A factual account of the ecological connections at the woods
- A set of poems, Haikus or detailed drawings reflecting their feelings about the woods
- A letter to a friend describing their experience

Students should be reminded of John Muir and his journaling experience. Teachers should inform students that taking notes, making sketches and noting their feelings while in nature is only a part of the experience. Revisiting these notes after time will allow for connections and larger themes to become apparent. Students should also be reminded that a nature journal is never finished, as there is always something that can be added.