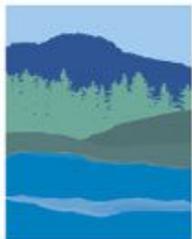


# Nature Rangers

Field Trip and Educational Kit Overviews

Plus Supplemental Activities



**SANTA CRUZ MUSEUM**  
of natural history

## **About the Museum**

The Santa Cruz Museum of Natural History is a leader in environmental education in Santa Cruz County, serving more than 30,000 children and adults each year.

Our school programs connect youth with nature, engage them in scientific exploration and discovery, and cultivate the next generation of environmental stewards. We cover a wide variety of natural history topics such as watershed science, animal adaptations and habitats, and the history and culture of Native Peoples. All of our offerings aim to create a personal understanding of the natural world around us and our role in it.

All of our programs support state standards and diverse learning styles. Click [here](#) for in-depth NGSS, CCSS, and HSS alignment.

## **Transportation Scholarships**

The Museum is happy to offer transportation scholarships to classes who request assistance, but cannot guarantee the availability of funds. Please let us know if you are interested in a scholarship to help either fully or partially cover the cost of a bus.

## **Sponsors**

Thanks to our school program supporters: Captain Planet Foundation · City of Santa Cruz · Community Foundation Santa Cruz County · David & Lucile Packard Foundation · Helen and Will Webster Foundation · Monterey Peninsula Foundation, host of the AT&T Pebble Beach Pro-Am · Project Learning Tree, a program of the Sustainable Forestry Initiative, Inc. · Santa Cruz Beach Boardwalk · Save the Redwoods League

# Part I: Nature Rangers Program Overview

**Title:** Nature Rangers

**Grade:** 4th

**Topic:** Students practice being naturalists by making observations and comparing natural communities and different ecosystems as they go on a 2-mile hike through Pogonip Open Space Preserve. Thinking about nature as a system, physically connecting these ecosystems by walking through them and collecting data to compare them, help students better understand the environment and begin to realize they too are part of natural systems.

**Why is this a relevant and interesting topic?** In the process of developing observation skills in nature, students also build and apply foundational knowledge in the fields of biology, ecology, geography, and history. This unique learning environment allows students of multiple learning intelligences to thrive and connect to nature and science. Repeating observations, finding patterns, and making connections as they move through different habitats is an engaging and rewarding way for students to develop common science practices that will benefit their science education in the classroom. Thinking about nature as a system, and physically connecting these ecosystems by walking through them, helps students to come closer to the environment and begin to realize that they too are a part of natural systems.

**Stewardship Goals:** Students create a concrete connection to the natural world through observation and exploration and be inspired not only to return to a local natural setting, but to look closely at it and realize their role in it. They will be prepared to:

1. Make choices that demonstrate an understanding that the health of their environment influences their own health and that of their community.
2. Notice plants and consider their value/use for food, tools, shelter, etc.
3. Take action to conserve resources with an understanding that all animals, including humans, are connected and need clean food, air, water, and space to survive.

**Primary Objectives** *By the end of the program, students will:*

1. Correctly identify three local natural communities, the features that distinguish them, and how they fit into a model of ecological succession.
2. Understand how both living and nonliving factors cause change in these communities, as well as the role of water in shaping the characteristics of each.
3. Share examples of how humans affect these ecosystems, including management and historical use.
4. Identify edible and medicinal plants, and plants that were used by native people in the area thousands of years ago.

## Standards

We are actively working on developing our curriculum and helping teachers to identify ways in which our program supports and relates to Common Core, CA History-Social Science Frameworks, and Next Generation Science Standards. [Click here](#) for a more detailed look at the standards and how this program supports them.

Next Generation Science Standards		
Performance Expectations		
<p><b>4-LS1-1:</b> Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.</p> <hr/> <p><b>4-ESS2-1:</b> Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</p>		
<b>Science and Engineering Practices</b>	<b>Disciplinary Core Ideas</b>	<b>Crosscutting Concepts</b>
<p><b>Engaging in Argument from Evidence</b></p> <hr/> <p><b>Planning and Carrying Out Investigations</b></p>	<p><b>LS1.A: Structure and Function</b></p> <hr/> <p><b>ESS2.A: Earth Materials and Systems</b></p> <p><b>ESS2.E: Biogeology</b></p>	<p><b>Systems and System Models</b></p> <hr/> <p><b>Cause and Effect</b></p>

# Part II: Nature Rangers Field Trip Content

## Pre-Trip Preparation:

The Pogonip Open Space is an exciting place to explore, but it is not an urban park. There are no accessible bathrooms or water fountains in the area. We recommend you have your students use the restroom and fill up water bottles before leaving school; our docents have toilet paper and hand sanitizer in their field backpacks for emergencies on the trail. [Parking is fairly limited](#), so it is best to consolidate space as much as possible if your group is carpooling. You may also want to go over the topic of poison oak and ticks ahead of time with your class, although our experienced outdoor education team runs through a safety talk on these subjects at the beginning of every field trip.

## Outline

We will do our best to adhere to the following outline. Please let our staff know as soon as possible if your class has specific needs with respect to timing, such as needing to leave early. Late arrivals or early departures may result in the exclusion of some parts of the program.

Greeting: 15 minutes

Walking Tour: 2.5 hours

Conclusion: 15 minutes

*Total program time: 3 hours*

## Greeting

**Time:** 15 minutes

**Location:** Pogonip Creek Nature Loop Trailhead

**Objectives:** Review safety information about poison oak and ticks, review the concept of communities, get students into “observation mode”.

**Vocabulary:** Community, senses, observation, biodiversity

## Hike\*

\*Docents have planned activities (listed below) that happen on every tour and allow for hands-on learning about subjects related to communities and ecological interactions. Because our outdoor setting provides many unplanned learning experiences, your docent may not get to every activity.

## Skull Observation

**Time:** 10 minutes

**Location:** Along the trail

**Objectives:** Students spend hands-on time observing, discussing, and asking questions about two sample skulls (a coyote and a deer). They are engaged in conversations about how animals from different communities interact.

**Vocabulary:** adaptations, camouflage, canine teeth, herbivore, carnivore

**Materials:** replica deer and coyote skulls

## Food Chain Game

**Time:** 10 minutes

**Location:** Anywhere

**Objectives:** Students learn about different ecological interactions and their influences on each other through a game similar to Rock-Paper-Scissors. As a group choose 4 organisms - a primary producer (plant), a primary consumer (herbivore), a secondary consumer (carnivore) and a decomposer, i.e. clovers, deer, mountain lion, and worms. Make up a symbol for each and then have students pair off and play just like Rock-Paper-Scissors. The winner advances to the next tier up, i.e. two clovers face off and the winner becomes a deer. You can ONLY play against someone who is the same organism as you. As more students advance the food chain, there will be more rounds happening at the same time, demonstrating complexity. Stop whenever seems convenient.

**Vocabulary:** Food chain, food web

**Materials:** None

## Meet a Tree

**Time:** 10 minutes

**Location:** Redwood forest

**Objectives:** Students spend time observing a tree in partners and developing their ability to focus on interesting minutiae and practice asking questions. There are a couple ways to run this activity - the first involves students using blindfolds or closing their eyes and getting walked to a tree, then walked away and asked to find it. The other way involves pairs or small groups of students choosing a tree and coming up with as many different observations and questions about it as they can. Students then share what they observed or asked with the whole group and discuss what they learned and still don't know.

**Vocabulary:** Canopy, reiteration, nurse log, adaptation

**Materials:** Access to nearby trees

## Woodrat Nest Spotting

**Time:** 10 minutes

**Location:** Mixed-Evergreen forest between Redwood forest and trailhead

**Objectives:** Students silently observe around them as they slowly walk a 500-foot section of trail that has multiple woodrat nests along it. One is pointed out for them and then they are tasked with finding as many as possible on their own for a couple minutes of silent hiking. Students then compare their results with one another.

**Vocabulary:** Nest, camouflage, midden

**Materials:** None

## Woodrat Nest Creations

**Time:** 10 minutes

**Location:** Anywhere with forageable materials nearby

**Objectives:** Students create imitation woodrat nests out of whatever materials are available *that are already dead*, i.e. fallen plates of bark, fallen branches, leaves, sticks, etc. This can be done after they observe the nests so they can imitate what they've seen. Additional challenges can be added such as build a certain sized room or space inside the nest, make it two different levels, or a certain height, etc.

**Vocabulary:** Nest, camouflage, midden

**Materials:** Tree bark, sticks, branches, dead leaves

## Data Collection

**Time:** 10 minutes

**Location:** One stop in each of the three main plant communities

**Objectives:** Throughout the hike docents engage students in moments of observation that help them discover the differences and similarities (and sources of change) in the three communities. At three locations they determine their location using a map, measure and document temperature, canopy cover, and ground composition (i.e. bare soil, leaves or duff, or growing plants).

**Vocabulary:** Canopy cover, groundcover, temperature, soil, community

**Materials:** Thermometers, small rounded mirrors, Pogonip map

## Conclusion

**Time:** 15 minutes

**Location:** Pogonip Creek Nature Loop Trailhead

**Objectives:** Review the data collected during the hike, compare results and interpret what they mean. Compare and contrast plant communities and adaptations that plants and animals need to survive there. Answer any lingering questions.

# Part III: Nature Rangers Educational Kit Outline and Supplemental Activities

## Why do we provide the Educational Kit?

This activity kit is designed to familiarize your students with topics presented in the “Nature Rangers” field trip, and to provide a depth of experience and opportunity to apply knowledge after the trip. The activities within this kit will give your students a better understanding of such topics as **adaptations, community connectivity, human influences** and **change over time** using unique artifacts and hands-on exploration. They are designed to build a strong background for the field trip itself, thereby enhancing your students’ outdoor experience.

## How does it work?

We provide different activities that will help students build a more comprehensive understanding of relevant concepts. These activities can be adjusted to different age or learning groups by adjusting the level and amount of reading and writing, and choosing appropriate vocabulary. For example, if you feel that there are too many words for a younger age group, you can omit the included worksheets and focus purely on observational activities. Conversely, if you feel that your students would benefit from more written analyses, the kit’s curriculum includes extensional writing prompts with particular activities, which help to further understanding and scientific observational skills.

## Nature Rangers Kit Contents

1. Supplemental Activity Curriculum Descriptions
2. Materials to support curriculum
3. Visual Aids to support curriculum, including photos, diagrams, and worksheets
4. Artifacts to foster hands-on learning

## List of Activities and Key Concepts Covered

1. **Pogonip Timeline** - *Community connectivity and human influence*  
Students learn the history of Pogonip from first inhabitants to modern time, exploring how people and the environment have been connected and how it has changed.
2. **Bill Nye Rock and Soil DVD** - *Rock cycle and environmental change over time*  
Students learn about the rock cycle and soil types, then follow up with discussion questions.
3. **Pogonip Pandemonium** - *Adaptations and connectivity*  
Students explore animal adaptations and how animals, plants and the environment are connected.

4. **Peek inside the Bean Seed** - *Adaptations and biology*  
Students observe a bean seed as it starts to grow into a bean plant.
5. **Stuck in the Web of Life\*** - *Connectivity and web of life*  
Students play an interactive role in the food web using string to explore connectivity and the effects of population on the food web.
6. **Follow The Signs** - *Tracking and evidence*  
Students learn to identify local animals by studying their tracks.
7. **Tree Cookie Detectives** - *Dendrochronology and data collection*  
Students learn how to use tree rings to study past growth patterns based on rainfall data.
8. **I Will Survive** - *Adaptations and change*  
This activity models how generalist species survive changes to their environment better than specialist species.

\* This activity is described below. The Educational Kit includes the visual aids and materials for all activities, but many can be recreated with materials in most classrooms.

# Stuck in the Web of Life

## Learning Objectives

Through this activity, students will:

- Become familiarized with the interconnectedness of living and nonliving things.
- Understand how different organisms play different roles in an ecosystem
- Learn how removing an organism from an ecosystem can affect other parts of it.

## Background Information

Every organism on the planet depends on a variety of other organisms, as well as non-living things, for survival. Organisms interact with their environment and each other in many ways. The study of these interactions is called ecology. Some interactions are *exploitative*, like carnivores eating other animals, herbivores eating plants, or parasites living off of host organisms. The basis of exploitation is that one organism benefits while the other is harmed. Other interactions are *facilitative*, where one organism benefits and the other is either unharmed or benefits as well. Examples include a cattle bird eating the bugs being scared up by cattle trampling around, or cleaner fish eating parasites out of the mouth of a large-mouthed wrasse. Organisms interact with nonliving things as well -- plants use the sun for energy, animals need water to live, and geological shapes can change the suitability of habitats.

## Materials

- 3x5 notecards with organism or component titles
- Marker
- Large ball of yarn, string or rope

## Procedure

1. Have the class form a circle around a large open space.
2. Give each student a 3x5 card with names and or pictures of living and nonliving things. Let students assume the part of their picture and try to think as if they truly embody the role that they are playing.
3. Give yourself a role as well and start the game by holding the loose strand of yarn and tossing the ball to a student that you have a relationship with (i.e. competitor, predator, etc). Explain type of interaction that you have with that student once you have tossed them the yarn. The relationship can be something you eat, or a habitat that you need to live in, or something that eats you, or something you are affected by.

4. Now students can throw the yarn ball to other students and explain their interactions one by one. Indirect interactions are acceptable if adequately explained by the student.
  - a. Make sure that no one gets the yarn twice, go around until everyone has the yarn and then have the last student throw it back to you.
5. Now you can tell the students that you are going to tug on the yarn and that they should pull on it as soon as they feel the tug. This will allow them to feel their connectedness to everyone around them.
6. Now you can introduce an extinction event. Boom! An asteroid hits and wipes out all the mammals! Have all mammals let go of the yarn and "die". Have students pull on the string and see the big mess left behind once these animals were removed from the ecosystem.
7. Have the class discuss what they have lost now that the mammals (or other roles) have been removed. Has everyone been affected by this extinction event? Why is it important for ecosystems to have high levels of diversity?

## Possible Roles:

**Living:** Deer, squirrel, rabbit, coyote, bobcat, mountain lion, wolf, cow, hawk, song bird, salmon, redwood tree, grass, oak tree, human, bat, bear, elk, lizard, moss, lichen, salamander, newt, wildflower, bee, fly, mushroom, etc

*(sticking with one type of biome may make it easier to determine connections for students)*

**Non-living:** Water, wind/air, dirt, cave, the sun, the ocean, a lake, a river, rock, light, temperature, humidity, cloud, rain, etc.