



Nature Rangers Kit Teacher's Guide

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Welcome to the Nature Rangers Kit!

Please take some time to familiarize yourself with the activities in the kit so that you are able to maximize its potential for your class during your rental period. We hope you and your students find these activities educational, engaging, and enjoyable!

Overview of Activities

The binder contains descriptions and step-by-step instructions for each activity in this kit. Additional materials required for the activities can be found in the kit. We have also added a table (see following page) that provides an overview of all the activities and key information for each one. The themes of the activities range from identification and adaptations of local plant and animals, history of Pogonip, geology and soils, landscape change over time, plant biology, and impacts of climate and weather on the ecosystem.

How to Read this Kit

5 E's of Education

The Santa Cruz Museum of Natural History uses the 5E approach to learning when designing educational curriculum. Each activity in this kit has been assigned an “E” based on how it fits into the broader scheme of the kit. You may choose to sequence the activities by starting with an “Engage” activity, then moving to an “Explore,” and so on. Most activities are written in such a way that you cycle through “Engage, explore, explain” and so on within each individual activity as well. If you would like more information about the 5E model, please visit <https://www.science4us.com/educational-model/>

Next Generation Science Standards

The Museum is committed to developing programs and materials to support Next Generation Science Standards (NGSS). We hope we can serve as a resource for teachers working toward integrating NGSS in the classroom. On the intro page for most activities in the kit, you will find the Disciplinary Core Ideas (DCIs), Science and Engineering Practices, and Crosscutting Concepts that the activity supports. You will also find NGSS standards in the overview table along with a key to the language of each referenced standard.

Suggested Complementary Activities

While each activity can stand alone, many focus on information and skills that build off of one another. When applicable, we have identified complementary activities on the intro page for some activities.

Activity	5 E	Focus	Next Generation Science Standards (NGSS)			Suggested Complementary Activities	Best Before or After Field Trip?
			<i>Disciplinary Core Idea</i>	<i>Science & Engineering Practices</i>	<i>Cross-Cutting Concepts</i>		
<i>Engage! Activate prior knowledge and experience, get focused for future learning</i>							
Bill Nye Rock Cycle	Engage	Geology and earth processes	ESS2.E Biogeology, ESS2.A Plate Tectonics and Large-Scale System Interactions		Stability and Change	Tree Cookie Detectives	
Pogonip Pandemonium	Engage	Plants and animals and their adaptations	LS1.A - Structure & Function, LS1.D - Information Processing	Engaging in argument from evidence	Structure & Function	The Change Game, Stuck in the Web of Life	
<i>Explore! Use senses to make observations, discoveries, and connections that stimulate thinking</i>							
Peek Inside the Bean Seed	Explore	Plant Development	LS1.A - Structure & Function	Planning & carrying out investigations	Systems & system models		
Pogonip Timeline	Explore	History of Pogonip	ESS3.A Natural Resources	Use evidence to construct	Stability and Change		

				or support an explanation			
Stuck in the Web of Life	Explore	Food web	LS1.A - Structure & Function	Engaging in Argument from Evidence	Cause and Effect	The Change Game	
Follow the Signs	Explore	Tracking and evidence	ESS2.E - Living things affect the physical characteristics of their region.	Analyzing and interpreting data, using evidence to support or construct an explanation	Patterns, stability and change		
<i>Explain! Construct explanations and hypotheses based on observations</i>							
Tree Cookie Detectives	Explain	Tree growth, weather	ESS2.A Earth Materials and Systems, LS1.A Structure & Function	Analyzing and interpreting data, constructing explanations	Patterns can be used to support an explanation.	Bill Nye Rock Cycle	
I Will Survive	Explain	Landscape change, survival	LS2.C Ecosystem Dynamics, ESS3.B Natural Hazards	Analyzing and interpreting data, constructing explanations	Stability and Change	Pogonip Pandemonium, Stuck in the Web of Life	
<i>Elaborate! Take explanations a step further, constructing arguments and coming up with new questions</i>							

Nature Rangers at Your School (emailed as followup activity after the field trip)	Elaborate	Plant communities, data collection	ESS2.E Biogeology	Analyzing and interpreting data, constructing explanations	Patterns, Cause and Effect		
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Key to Next Generation Science Standards

This is a key to the language of each NGSS standard referenced in this kit's activities.

Disciplinary Core Ideas

- **LS2.C Ecosystem Dynamics, Functioning, and Resilience:** When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.
- **LS1.A Structure & Function:** Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.
- **ESS2.A Earth Materials & Systems:** Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.
- **ESS2.B Plate Tectonics & Large-Scale Systems:** The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features of earth.
- **ESS2.E Biogeology:** Living things affect the physical characteristics of their regions.
- **ESS3.C Human Impacts on Earth Systems:** Things people do can affect the environment but they can make choices to reduce their impacts. Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Societal activities can also help protect earth's resources and environments.
- **ESS3.A Natural Resources:** Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. Energy and fuels humans use are derived from natural sources, and their use affects the environment. Some resources are renewable over time, others are not.

Science and Engineering Practices

- ***Developing and Using Models*** - Develop a model using an analogy, example, or abstract representation to describe a scientific principle.
- ***Analyzing and Interpreting Data*** - Analyzing data in 3-5 builds on K-2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.
- ***Engaging in Argument from Evidence*** - Critique a scientific explanation or solution proposed by

peers by citing relevant evidence about the natural and designed worlds. Construct an argument with evidence, data, and/or a model.

- ***Obtaining, Evaluating, and Communicating Information*** - Evaluate the merit and accuracy of ideas and methods. Obtain and combine information from books and other reliable media to explain phenomena.
- ***Planning and Carrying Out Investigations*** - Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. This builds upon previous experiences to include investigations that control variables and provide evidence to support explanations or design solutions.
- ***Asking Questions and Defining Problems*** - Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.

Cross-Cutting Concepts

- ***Patterns***
- ***Cause and effect***
- ***Systems and System Models***
- ***Influence of Science, Engineering, and Technology on Society and the Natural World***
- ***Stability and Change***

Nature Ranger Kit Checklist of Materials:

◆ Teacher's Guide Binder

- 8 Activity Lesson Plans
- Vocabulary List
- Crossword and word search activity pages

• ◆ Books:

- Mammal Tracks and Scat Life Size Tracking Guide
- Whose Tracks are These? By Jim Nail

• ◆ DVDs:

- Bill Nye the Science Guy: Rocks and Soil

◆ Other Pieces:

- Activity 1: Pogonip Timeline Folder
- Activity 2: Bill Nye DVD Question Cards (34)
- Activity 3: Laminated question cards (33) and question cards (33)
- 4 plant posters
- Activity 4 : Follow The Signs
 - Track panel
 - Animal Tracks (bobcat, striped skunk, deer, gopher, raccoon, cougar, gray squirrel, cottontail rabbit, coyote, red fox)
 - 2 samples faux fur (bobcat, red fox)
 - Stack of laminated cards showing other signs of wildlife
 - Data Sheet and Activity Sheet for each student / student group
- Activity 5 : Tree Cookie Detectives:
 - Tree round ("cookie")
 - Worksheet to photocopy
 - 4 Magnifying glasses

- Activity 6 : I Will Survive
 - Laminated species cards (32)
 - Laminated disturbance card rings (15 cards per ring)
 - Laminated habitat example cards (3 per group, 18 total)
 - Yellow, red, and green beads (6 separate bags)
 - Laminated worksheets for group work (12 total, 2 per group)

