Bay Area Scientists in Schools Presentation Plan

Lesson Name Wildland Fire
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Grade Level 4 **Standards Connection(s)** Ecosystems and differential survival

Next Generation Science Standards:

2-ESS1-1. Use information from several sources to provide evidence that Earth events can occur quickly or slowly.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. • Develop a model to represent patterns in the natural world. (2-ESS2-2)	ESS1.C: The History of Planet Earth • Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1)	Patterns • Patterns in the natural world can be observed. (2-ESS2-2),(2-ESS2-3) Stability and Change • Things may change slowly or rapidly. (2-ESS1-1),(2-ESS2-1)

Common Core Standards:

ELA/Literacy:

W.2.8 Recall information from experiences or gather information from provided sources to answer a question.
SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.

Mathematics:

MP.2 Reason abstractly and quantitatively.
MP.4 Model with mathematics.
2.MD.B.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.

FOSS Connections:

Grade 4 Module: Solid Earth
Investigation 5: Landforms

Teaser:
Your opportunity to tell teachers and kids what's going to be fun and interesting about your visit!

We will learn about wildland fires and how fire frequency shapes a forest. We will do this through a brief discussion, followed by our "experiment" where students get to be trees in a forest (and burn!), as finally via a live demo with matches (and appropriate safety attire)!

Objective: *As a result of your lesson, what will students learn? What will they be able to do?*

Students will learn about wildland fires: fire in California, how fire spreads, the pros and cons of wildland fire, controlled burning, and how fire frequency changes a forest.

Vocabulary/Definitions:
3 – 6 important (new) words

Wildland fire,
frequency
severity
Wildland fire severity

Materials:

What will you bring with you?

cones for the activity
A worksheet handout
Our matchstick demo (a board with holes drilled in it that holds matches at different densities)

What should students have ready (pencils, paper, scissors)?
Pencils

Classroom Set-up:

Student grouping, Power/Water, A/V, Light/Dark, set-up/clean-up time needed

- Space on the board to write up key words and definitions, a table of pros and cons for wildland fire, and the data and results of our experiment

- An area for our activity (at least 20 x 20 feet) where students can sit or stand

Classroom Visit

- Introductions
  - Who knows what a wildfire is?
    - (A fire that burns mostly plants (trees, bushes, grasses))
  - Are wildfires good or bad?

    - (start a table of good and bad on the board and fill in student answers)

- Can anybody tell me what frequency means?
    - (How often something happens)
- In CA, wildfires have been burning at a high frequency for thousands of years
- They clean the forest (like vacuuming or sweeping up the dirt in your house) – they get rid of twigs and bushes and some small trees
- What would your house look like if nobody cleaned it for a year? How about 5? – pretty bad!
- So do you want to add anything to our table?
    - (fill in answers, hopefully the good section will flesh out)
- Does anybody know what severity means?
    - (how bad something is)
- How about wildfire severity?
    - (how bad a fire is) – how many trees are killed
- Can anybody tell me what a hypothesis is?
    - (a prediction of what is going to happen) – and then you test it
- Who makes hypotheses?
    - Scientists, but anybody can make a hypothesis, even you!
- So let's be scientists and make a hypothesis: Is fire severity influenced by the frequency of fires? (write the question up on the board)
    - Write down your hypothesis on your paper

- Now we'll do an experiment where we test our hypothesis.
    - "A way to test a hypothesis" on the board
    - Bring papers outside?
- Please form a semi-circle
    - In this activity,
        - some of you will be big trees – you'll be standing
        - some of you will be medium trees – you'll be kneeling
        - some of you will be small trees – you'll be sitting
        - and the rest of you will observe what happens
    - Sometimes, there will be a fire! Can I have 3 volunteers? (one big, one med, one small)
        - When you're on fire, you can reach out and try to catch other trees on fire – to do this, you must tap another student on the shoulder
        - Let's try (set one student on fire)
        - Great! Does anybody have any questions?

- First, we'll make a forest –
    - these cones will show the outline of our forest
    - our semi-circle will be the a line, and new trees will come from the front of the line, but when you catch on fire, you'll come out of the forest and stand at the end of the line
    - Would the first 10 students please become big trees in the forest (standing)
- Trees make seeds, right?…then what happens?
    - (little trees start growing)
- Would the first 10 students please become small trees in the forest (sitting)
- We'll start our experiment with a frequent fire scenario – this means that there are lots of fires, so let's have one!
    - You have been struck by lightning and start to burn!
- Everybody who was on fire, please come to the end of the line
- Trees grow, right, so small trees become medium tree, medium trees become large trees, and large trees stay as large trees (so sit -> kneel, kneel ->standing, standing remain standing)
- Now let's have one more fire and we'll record what happens
    - 10 more little trees
    - Let's count how many trees there are of each size and fill in the table
    - Fire
    - Those on fire back in line
    - Now let's count again and fill in the table
- Did the forest change a lot over time?

- Now we'll see what happens when fires are infrequent – so there aren't very many
- Repeat until all students are in
    - 10 more little trees
    - no fire
    - grow
- I think a fire might be coming! Let's count the trees
    - Small –
    - Med –
    - Large –
    - A volcano erupted and some very hot rocks landed on you and now you're on fire!
    - Those on fire back in line
    - Do you think there will be many seeds now?
- Let's count again and fill out our table
- Did the forest change a lot over time?

- Now, let's go back inside
- Let's calculate the change in how many trees were alive before and after the fire
    - What is this called? (severity)
- Do you think fire severity is influenced by the frequency of fires?

    - Yes!
- Do you think fires are bad?

Extra time:

- In the last 200 years, do you think fires have gotten more or less frequent in CA?
- Now pick an animal; would you rather have frequent or infrequent fires?
    - Mouse – burrow
    - Bird – fly away, but maybe more insects?
    - Deer – run/stand in the river

Differentiated Instruction:

English Learners: Repeat directions, if necessary, and physically model how to perform fire tag activity. Write vocabulary words on the board and read words aloud. Vocabulary words can also be visually demonstrated using an illustration or action and redefined in very simplistic terms.

Advanced Learners: Have students think of other natural forces that can be helpful or harmful to the environment.

Follow-up Possibilities

ELA Activity:

Students answer the following prompt:

"Write a letter to a friend explaining what you learned about wildfires."

Reading Connections:

Fire: A Force of Nature: The Story Behind the Scenery by Jack De Golia. Fire has been mankind's companion and foe since the dawn of time. It's a fundamental element of the planet, like air, shaping the patterns of life. Our opinion of fire has changed often, but fire itself is the same. The real challenge from fire is to understand it and the earth we live on. Fire presents opportunities for new life that doesn't exist until a burn. Each place responds in its own way and its own time. While the forests and grasslands of today are products of earlier fires, they are also setting the stage for fires to come.

The Charcoal Forest: How Fire Helps Animals & Plants by Beth A. Peluso. After a fire, you might think a burned area is as barren and lifeless as the moon. But take a closer look and you'll find that even before the last wisps of smoke have cleared, the newly burned forest is already teeming with life. Unlike most books, which concentrate on the fire itself, The Charcoal Forest explores the new habitat created by the fire. Focusing on the Northern Rocky Mountains of the United States and Canada, the book describes twenty species of animals and plants that contribute to the reclamation and renewal of the charcoal forest.

Fire in the Forest: A Cycle of Growth and Renewal by Laurence Pringle, Illustrated by Bob Marstall. Using full-color, double-page spreads of the cycles and stages of life, death, and rebirth of the forest, Pringle presents a positive view of fire as a way for nature to renew itself. The landscape paintings are interposed with whole pages of text. Small paintings of wildlife decorate the textual pages. Pringle's writing is convincing; facts are presented clearly in an informative manner. Unfortunately, the text is at a fairly sophisticated reading level for what is, essentially, a picture-book format. While the illustrations are beautiful, middle grade readers may be reluctant to pick it up. Introduce this one to whole-language teachers, who will be able to put the illustrations to good use in a unit on nature.

The Forest and the Fire by Alison Carlisi and Teralene S. Fox. A story told through the eyes of a child, Alison Carlisi, of three generations watching the forest changing after a fire. Alison accompanied her mother, Teraline Foxx, fire ecologist and artist, in the field studying the aftermath of fire. The book can be used in the classroom from second to sixth grade.

The Fire That Saved the Forest by Mike Donahoe. When Bernie the bear and his other animal cohorts make a practice of extinguishing every fire that starts in the forest, they realize that the trees are choking out open meadows and not allowing berry bushes and other foods they depend on to grow. One day, an uncontrollable fire devastates the forest, and they animals mistakenly believe their world has ended. Soon, however, new growth provides them with a bounty of food, and they realize how important fire is to the health of the forest.

Mathematics Activity:

Students do research to find out the number of wildfires per month in the U.S. They can graph the data and calculate the mean, median, and mode.

Other:

Fire Story from the National Park Service -- In this online interactive, learners investigate fires, particularly the causes and behavior of forest fires, as well as how the National Park Service deals with fires. Learners modify conditions (density of forest or "fuel", weather, and terrain slope) to see how fast a simulated fire spreads. http://www.webrangers.us/activities/fire/

Read about the importance of fire in forest ecology at Sequoia & Kings Canyon National Park: (from http://www.nps.gov/seki/naturescience/ficwhyfire.htm)

Why Does the Park Service Use Fire?

Fire has been a natural part of the Sierran ecosystem for centuries. Natural fires swept through these plant communities at intervals that provided conditions for many plant species to regenerate. Fire thins competing species, recycles nutrients into the soil, releases and scarifies seeds, and opens holes in the forest canopy for sunlight to enter. All of these are critical to forest health and natural cycles of growth and decomposition.

Plants are not the only living things that have evolved with and adapted to fire. Animal species are just as much a part of the "fire environment." With the increased forage that results after a fire, many animals low on the food chain experience increases in their populations; therefore species above them on the food chain also benefit.

Despite the evidence that fire is a necessary element in the Sierra Nevada, over most of the past century people have feared and suppressed it whenever possible. Especially in the western United States, the accumulation of dead forest litter and duff during that time now presents extreme hazards to the health of the trees, soil, and wildlife, to humans living in these areas, and to the taxpayer who has to fund the fighting of catastrophic wildfires.

Prescribed fire is used in Sequoia and Kings Canyon National Parks to restore this natural process to the forests. These fires are strategically used to reduce the risks that unnaturally heavy fuels pose to humans and ecosystems.

Meet the fire specialist team: http://www.nps.gov/seki/naturescience/fire.htm