

Bay Area Scientists in Schools Presentation Plan

Lesson Name California Marine and Terrestrial Community Ecology (Food Webs)

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Grade Level 4 Standards Connection(s) Ecosystems, energy, food webs

Teaser:

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

Students will learn about the plants and animals where they live and how they all interact – including themselves!

CA Science Content Standards: 4th grade

Life Sciences:

All organisms need energy and matter to live and grow.

Living organisms depend on one another and on their environment for survival.

Next Generation Science Standards: 3rd and 5th grades

Content:

3-LS1. From molecules to organisms: structures and processes

3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death

5-LS2-1. Ecosystems: Interactions, energy, and dynamics

5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. (3-LS1-1) (5-LS2-1)</p> <p>Connections to Nature of Science Scientific Knowledge is Based on Empirical Evidence (3-LS1-1)</p> <p>Engaging in Argument from Evidence Engaging in argument from evidence in 3–</p>	<p>LS1-B. Growth and Development of Organisms Scientific Knowledge is Based on Empirical Evidence: Science findings are based on recognizing patterns. (3-LS1-1)</p> <p>LS2.D: Social Interactions and Group Behavior Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary</p>	<p>Patterns Patterns of change can be used to make predictions. (3-LS1-1)</p> <p>Cause and Effect Cause and effect relationships are routinely identified and used to explain change. (3-LS2-1)</p> <p>Systems and System Models A system can be described in terms of its components and their interactions. (5-LS2-1)</p>



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<p>5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). (3-LS1-1)</p> <p>Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena Science explanations describe the mechanisms for natural events. (5-LS2-1)</p>	<p>dramatically in size (Note: Moved from K–2). (3-LS2-1)</p> <p>LS2.A: Interdependent Relationships in Ecosystems The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)</p>	
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CA Common Core Standards: 4th grade

ELA:

- W.4.2.** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- W.4.4.** Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
- SL.4.1.** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners
- SL.4.3.** Identify the reasons and evidence a speaker provides to support particular points.
- L.4.3.** Use knowledge of language and its conventions when writing, speaking, reading, or listening.
- L.4.4.** Determine or clarify the meaning of unknown and multiple-meaning words and phrases

Mathematics

- 4-7.** Look for and make use of structure

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

- Students will learn one native plant and animal from both marine and terrestrial ecosystems.
- Students will learn to read a basic food web.
- Students will be introduced to the effects of climate change on CA ecosystems.

Vocabulary/Definitions:



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3 – 6 important (new) words

Ecosystem, estuary, native, climate, producer, consumer

Materials:

What will you bring with you?

We will provide all worksheets and handouts and crayons.

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

Students need a pencil and (if they want) colored pencils/markers.

Classroom Set-up:

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

Students can remain in their normal seating arrangements; small groups will be created in the middle of the lesson and then they will return to their seats. No accommodations for power/water/clean up needed.

Classroom Visit

Personal Introduction:

_____5_____ Minutes

Who are you? What do you want to share with students and why? How will you connect this with students' interests and experiences?

Richelle and Madison go to UC Berkeley where they study biology and ecology, which they'll be teaching you about today.

Richelle studies how changes in our environment affect tiny squishy animals that live on underwater grass in San Francisco Bay. She looks at how they eat, breathe, and swim to see if they will be happy or not so happy when the bay gets warmer or colder. She gets to work at a place where everyone studies something in the ocean and they get to play with lots of cool animals.

Madison studies how different plants affect the bugs found on the ground of grasslands. She gets to collect insects in traps and look at them up close!

Topic Introduction:

_____7_____ Minutes

What questions will you ask to learn from students? Big Idea(s), vocabulary, assessing prior knowledge...

Overview Presentation of Food Webs:

Today we are going to share with you a little bit about what we study in the ecosystems of Northern California. Does anyone know what an ecosystem is? It's a set of relationships between the living things and the non-living things in an area. It includes, plants, animals, soil, weather, and people. In every ecosystem, the organisms that live there depend on other organisms and things like sun, water, and soil to live. We can talk about how "healthy" ecosystems are like we do when we talk about people. If you catch a cold, you are not able to do what you are normally able to—like go to school or play with your friends. In the same way, if an ecosystem is not healthy, it may not be able to do what it could before—support plants and animals living there. There are many different things that can make an ecosystem sick. One of the most common is an invasive species. Invasive species can be plants, animals, bugs, or other living things that move to a new place, where they did not live previously. This is what Madison studies in the grasslands around here.

Here in the San Francisco Bay area, we have many types of organisms and environments where they can live. There are marine organisms—those that live in the water, like what Richelle studies. There are terrestrial organisms—those that live on land, like what I study. And then we also have estuarine organisms—those that live in the places where land and water meet. Together, these environments can form one large ecosystem. Changes in one environment can affect the others.

Within an ecosystem, we can make a food web to connect all of the living things living there. Does anyone know what a food web is? It describes the way food (energy) moves between living things in an ecosystem. *Draw this on board*. A simple food web could have grass, a mouse, an owl, a snake, and a worm. Grasses (and most of the plants you see on land and in water) are producers. They can make their own food using sunlight. A mouse can eat the grass, and then an owl or a snake can eat the mouse. These are consumers—they eat other things for food. What are humans in a food web? That's right—we're consumers! And depending on what you eat, you may be more like the mouse or the owl. Worms are decomposers—they feed off dead plants and animals. When we look at entire ecosystems, food webs get more bigger because we have more than four types of plants and animals that live there. Food webs also change if an ecosystem is not healthy because there are new plants and animals in the food web that may eat all the food or take up space and replace the native organisms that lived there first. Today we are going to make a huge food web of organisms that live in healthy terrestrial, estuarine, and marine habitats.

Learning Experience(s):

_____28_____ Minutes

What will you do, what will kids do? Demonstrations, hands-on activities, images, games, discussion, writing, measuring... Describe in order, including instructions to kids.

Interactive Activity:

1. Explain the role of sketching and science notebooks in the scientific process.
2. Hand out a different coloring sheet to each student. If there are 20 students, use the primary packet. If there are more students, select different organisms from the supplementary packet (do not copy the same organism more than once from either packet).

3. Hand out coloring implements and allow them 10 minutes to color their picture. Write these questions on the board and ask them to think about it and put their answers on their own sheet. Everyone will have a different answer!
 - a. Do you have an animal or a plant?
 - b. Does your animal/plant live in the water or on the land?
 - c. Does your animal/plant eat things, is it eaten by other things, or both?
4. Ask students to separate into groups first by animal/plant, then by water/land, and then by what they eat. There should only be a few students in each group.
5. Have each group talk about what they think their organisms do in the food web. Do they make the food? Do they eat other plants or animals? Are they at the top or the bottom or in the middle? Put up the poster board with the food web outline as a hint.
6. Hand out the outlines of food webs to each student.
7. As a class, ask each group where they think their organisms belong on the web and have them come up and put their sheets in those boxes. This may take some shifting around if some students aren't completely right.
8. Have all of the students copy down what is in the food web when it is completed. Invite all students to attach (eg, staple) their coloring pages and food webs into their science notebooks (if they have them).
9. Questions?

Wrap-up: Sharing Experiences

_____10_____ Minutes

Putting the pieces together – how will students share learning, interpret experience, build vocabulary?

See above for constructing food web as a class – this is the culminating project. We will incorporate vocabulary words in this section.

Connections & Close:

_____10_____ Minutes

What else might kids relate this to from their real-life experience? How can they learn more? Thanks and good-bye! Clean-up.

It is very cool how all of these animals and plants work together so that they can all be happy! Where do we fit on this food web? (Take a few suggestions) That's right - at the top! Which means if we do something different, everything else below us has to change. Something that we are changing right now

is the climate. Climate is the weather over a long period of time, more than how old Madison and I are. We drive our cars and eat packaged food and this changes the climate because of the bad things that are released into the air when we do them. Has anyone seen or smelled the smoke that comes out of big buildings and cars? Not very nice, is it? It makes our climate change in unexpected ways more often now. Sometimes it gets really hot and sometimes it gets really cold, sometimes there's no water and sometimes there's a lot! All of these things are caused by climate change, and the plants and animals have to change along with it. Think about if you had on your winter coat and then suddenly it was bathing suit season - you wouldn't feel so great. This is how the plants and animals can sometimes feel. We want to stop doing this to them, and there's a lot you guys can do to help. Can you think of anything? (Walk places, shorter showers, turn off the water when you brush teeth, turn off lights when you leave the room, ask parents to carpool with friends, less computer and TV time, volunteer at park/beach clean-ups...lots of things) Every little thing you do adds up to make one big difference; you have the opportunity to make the ecosystem better with your actions. If you want to know more about this, you can read some of the books we listed on the back of your food web worksheet - Madison and I really like these books and you will too! If you like it so much that you can't stop telling your friends about it, you may end up like us one day studying the effects of climate change on animals and plants around the world.

Total 50 – 60 Minutes

Follow-up – After Presentation

Suggest students write a letter explaining “How we learned about _____?”

List or attach examples of activities, websites, connections for additional learning.

Attach worksheets, hand-outs, visuals used in classroom presentation.

Suggestions for future reading/learning are included on the worksheet handout.