Calaveras Big Trees State Park

Distance and Home Learning Activity Packet

This packet is a tool for teachers and parents conducting distance and home learning programs. The grade level activities and concepts addressed in the packet are based on the Next Generation Science Standards. This packet is meant to be done in conjunction with a visit to Calaveras Big Trees State Park.

Packet Contents

First Grade

The first grade section focuses on the following standards from the Next Generation Science Standards**:**

Disciplinary Core Idea (S1.A: Structure and Function)

> *All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1) Parts to help them survive, grow, and meet their needs.*

Calaveras Big Trees State Park is a great place to show children a variety of organisms and how organisms have different external parts that help them survive. For example, children can identify parts of a giant sequoia and how the bark, roots, and branches help the tree grow and live a long time.

Home/Classroom Activity #1: Create a Giant Sequoia Tree

Materials

Playdough or clay

Activity Goal

Help children learn and discuss the external parts of a giant sequoia:

- Thick protective bark – The bark protects the tree.
- Needles (leaves) on the huge branches– helps make the food for the tree
- Shallow, spreading roots – which bring water and nutrients (vitamins) to the tree
- Trunk- Gives the tree strength
- Egg-shaped cone with 200-300 tiny seeds in them

Activity Steps

1. Mold all the different parts of the tree: trunk, leaves, cones, roots.
2. Start by helping children make the trunk of the tree.
3. Add roots. Roots can spread from the wide trunk at the base.
4. Add bark to the trunk. Adding a fire scar in the tree can help show the thick bark of the tree.
5. Add branches, needles, and cones.
6. Children can also create magnified parts of each section: an egg sized cone, scale like leaves, a section of bark, or shallow roots.

Home/Classroom Activity #2: How Big is a Tree?

Materials Needed

300 feet of string

Activity Goal

Children will be able to visualize and appreciate the size of a giant sequoia.

Activity Steps

1. Use the string to measure out the diameter of a giant sequoia tree (up to 30 feet).
2. Go to a large open area and lay out the string. Have children walk along the string to appreciate the size.
3. Measure using the string the height of a giant sequoia (up to 300 feet) and repeat step two.
4. Measure roots (up to 100 ft.) and repeat step two.

Home/Classroom Activity #3: Are Other Plants like a Tree?

Materials

Sheet of white paper

Unwanted plant

Magnifying glass (optional)

Activity Goal

Discuss how the plants are different or similar by looking at plant external parts.

Activity Steps

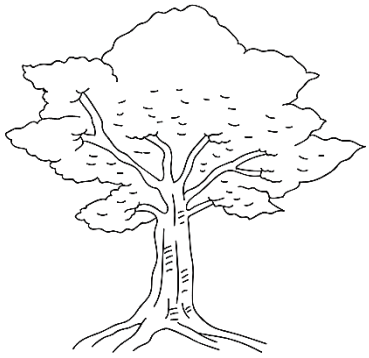
1. Have your child find an unwanted plant or weed, pull it up including the roots, and put it on a white piece of paper.
2. Have them observe the plant very carefully. Try using a magnifying glass if you have one.
3. Have your child describe the parts of a plant they see on their weed. Let them discover the differences and similarities to a giant sequoia tree.

Park Activity #1: A Walk among Giants

Activity Goal

Encourage children to find and identify internal and external structures of trees. After you have completed the home/classroom components, this is a good opportunity to have children begin to identity various structures of the tree (i.e. roots, bark, branches, and leaves) on their own. If you have not completed the components in advance, this gives you an opportunity to cover the structures in a natural setting.

Activity Steps



1. Start the 1.7 mile North Grove Trail. See **General Information for more on the North Grove Trail.**
2. At stop #2, you can point out branches and leaves which, make food for the trees from sun, water, nutrients, and carbon dioxide). The bark protects the tree and serves as a highway to take the food from the leaves to the rest of the tree. The trunk provides support and serves as a highway to get the water and nutrients from the roots to the leaves so they can join with the sun to make food for the trees. Then ask what would happen to the tree if it had no bark, no roots, no leaves or no branches.
3. At stop #4, you can point out the roots. The roots take water and nutrients up to the leaves and they help hold the tree up.
4. As you walk the trail, look for giant sequoia cones and seeds. **See drawings of giant sequoia cones and seeds under General Information.**
5. At stop #26, ask children to touch giant sequoia bark and use describing words to talk about the texture (how the tree feels).

Park Activity #2: The Great Giant Sequoia Hunt

Activity Goal

Help children discover external parts on their own in a natural setting.

Activity Steps

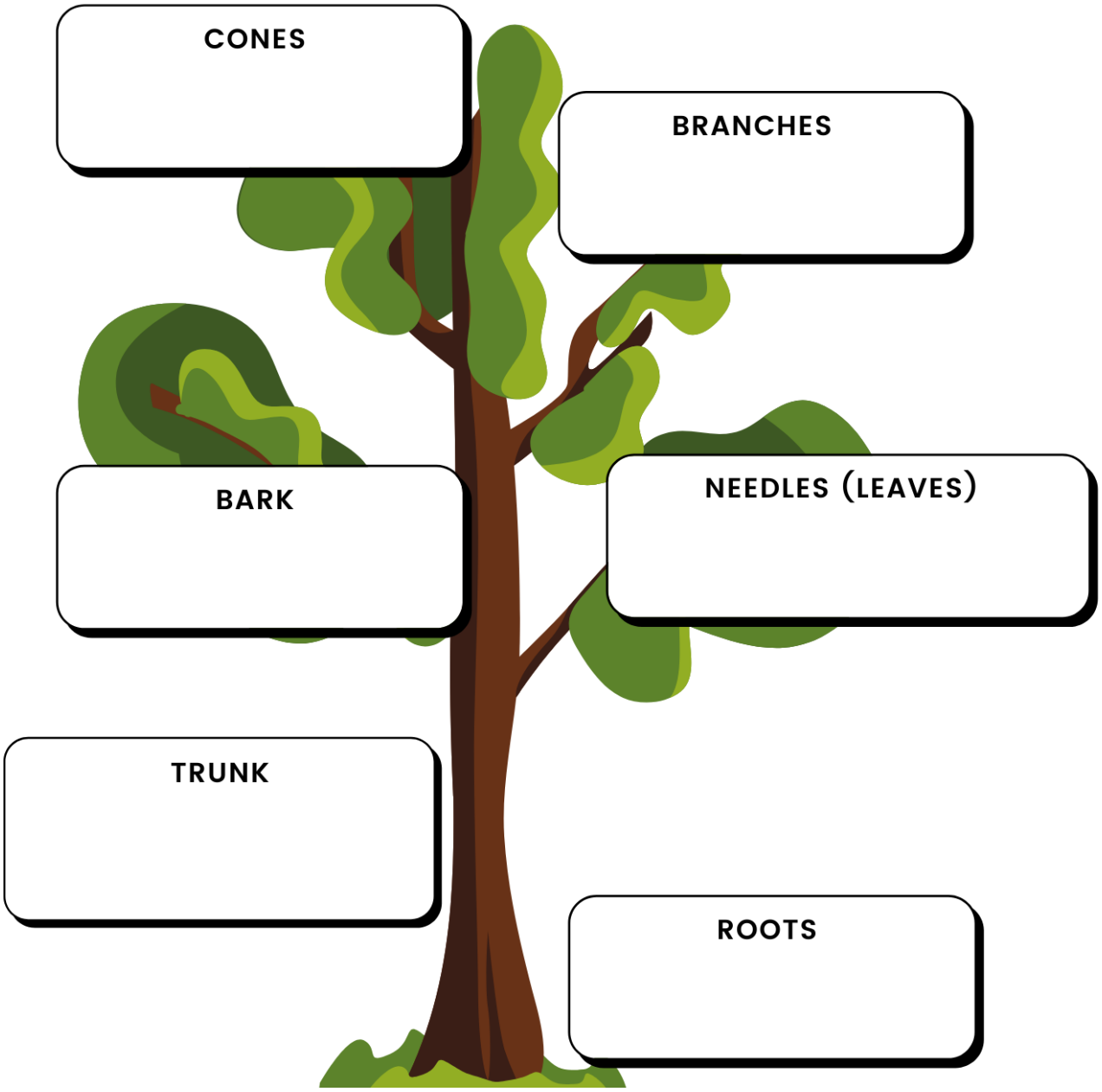
1. Complete the Great Giant Sequoia Hunt worksheet (next page).
2. Discuss plant parts and purpose as children discover them.

NAME: _____ DATE: _____

THE GREAT GIANT SEQUOIA HUNT

Can you find all my parts?

As you discover each part of a giant sequoia at Calaveras Big Trees State Park, use four senses to observe the part. How does it feel? How does it smell? How does it look? And does it make a noise?



After Your Park Visit

The children can use a variety of materials to make a picture of a giant sequoia tree or make themselves into a giant sequoia tree. Don't forget to include all the parts of the tree- the trunk, the branches, the roots, the leaves, the crown (the top). They can use materials to make themselves into trees - fabric, construction paper, gift wrap tubes, yarn, cardboard etc. We love to see children's creations! You can tag us on social media or email us a picture or video (#CalaverasBigTrees). Our email address is CalaverasBigTreesSP@parks.ca.gov and find us on Facebook.

Second Grade

The second grade section focuses on the following standards from the Next Generation Science Standards**:**

Disciplinary Core Idea (LS2.A: Interdependent Relationships in Ecosystems)

- *Plants depend on water and light to grow.*
- *Plants depend on animals for pollination or to move their seeds around.*

Calaveras Big Trees State Park is home to a variety of plant species. The giant sequoias located in the park can help children learn about plants and their needs. Two animals here at Calaveras Big Trees State Park help the giant sequoias disperse seeds. One is the long horned beetle, which lays its eggs in the green giant sequoia cones. When the larvae hatches, it eats the flesh of the cone scales causing the cones to dry up and the scales to open releasing the seeds.

The Douglas squirrel or chickaree eats the scales of the green sequoia cones which dislodges the seeds and they drift to the ground. The squirrel doesn't eat the seeds because there is little nutritional value in the seeds. The squirrels also hide cones during the fall for use during the winter and as the cones dry out, seeds are dispersed.

Home/Classroom Activity #1: The Need for Seeds

Materials

Old fuzzy sock or piece of material

Activity goal

Children will be able to observe a variety of seeds and discuss ways the seed might be dispersed.

Activity Steps

1. This activity is best done in late summer or autumn.
2. Children collect seeds by either walking through a field or yard with an old fuzzy sock over their shoe or dragging an old fuzzy piece of material.
3. Observe the seeds closely to see if you can tell how the seeds were dispersed.
    - Some "hitchhike" on animals and people.
    - Some have wings and fly.
    - Some are eaten by animals and deposited in other places through their scat (poop).

- Some float on water.
- Some are shaped like parachutes and float in the wind.
- Some are even ejected by the plant itself.

4. Discuss with children why seeds need to disperse (in order to avoid competition from the parent plant). Discuss the ways in which giant sequoia seeds are released from the cone and dispersed (fire, Douglas squirrels, long-horned beetle).
5. Children can make a seed collage with the seeds they gathered. We love to see the children's creations! You can tag us on social media or email us a picture or video. Our email address is CalaverasBigTreesSP@parks.ca.gov .

Home/Classroom Activity #2: What Do Plants Need?

Plants depend on water and light to grow. They use the energy from light to change carbon dioxide and water into food substances (sugar). This is called *photosynthesis.* Water is essential to all life. Plants use water to carry moisture and nutrients from the roots to the leaves.

Materials

- 3 small milk cartons (or similar) with the tops cut off
- Soil
- Bean or corn seeds
- Daily Seed Growth Journal

Activity Goal

Children will complete this experiment to see how important water and soil are to a plant growth.

Activity Steps

1. Fill the cartons with soil.
2. Plant the seeds and moisten with water.
3. After the seeds sprout, divide the cartons into three groups to test the growing conditions. Label the cartons.
    a. Soil, water, no light. Place this carton under a box or in a closet where it gets no light, but don't forget to dampen the soil daily.
    b. Soil, light, no water. Place this carton on a window sill, but do not water it daily.
    c. Soil, light, water. Place this carton on the window sill and water it daily
4. Record what you think will happen in your Seed Growth Journal. (Hypothesis)

5. Watch the cartons to see how they grow. Record daily in the Seed Growth Journal your observations of what each plant looks like.

Discussion

Which plant grew best? Did you observe anything you thought was unusual? What do plants need to grow? You can send us a picture of your plants or your journal entries. We love to see children's work. You can tag us on social media or email us a picture or video. Our email address is CalaverasBigTreesSP@parks.ca.gov .

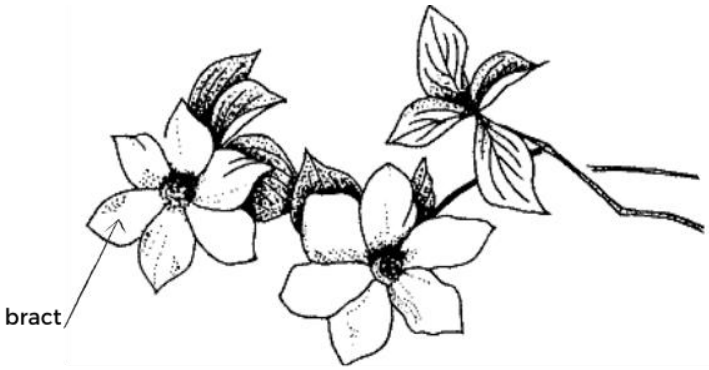
Park Activity #1: Walk among the Giants

Activity Goal

Encourage children to see how plants depend on animals for pollination and moving seeds. They can also see how important sunlight and water are to plants. If you have completed, the home/classroom components, this is a good opportunity to have students begin to look for ways seeds are transported and ways plants are pollinated. If you have not completed the components in advance, this gives you an opportunity to cover the information in a natural setting.

Activity Steps

1. Start the 1.7 mile North Grove Trail. **See General Information for information about the North Grove Trail.**
2. At stop # 11 look at display panel and discuss the how the chickaree and long-horned beetle help with seed dispersal. Pollination of giant sequoias is usually by wind.
3. You can stop by any mountain dogwood and talk about the white bracts on the flowers. The bracts attract pollinating insects like the petals on flowers. This aids in the pollination of dogwoods.



4. Look for giant sequoia cones and seeds as you walk. One way giant sequoia seeds are released from cones is by fire, which causes the seeds to open and release their seeds. **See the General Information for drawings of cones.**

5. As you are walking, look and see if you find any evidence of plants lacking water or sunlight.

Park Activity #2: Seed Dispersal

Activity Goal

Help children discover evidence of seed dispersals and the animals that assist.

Activity Steps

1. Complete the My Evidence of Seed Dispersal worksheet (next page).
2. Discuss the role of squirrels as children discover them.

After Your Park Visit

Draw a picture, or make a model of the different ways that giant sequoia seeds are released. We love to see children's creations. You can tag us on social media or email us a picture or video (#CalaverasBigTrees). Our email address is CalaverasBigTreesSP@parks.ca.gov and find us on Facebook.

Name		Date	

MY EVIDENCE OF SEED DISPERSAL

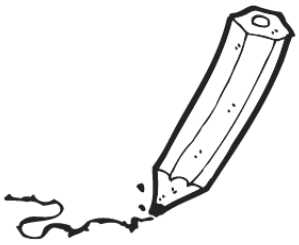
1

Douglas squirrels are great at dispersing giant sequoia seeds. How many Douglas squirrels can you find at Calaveras Big Trees State Park?

Keep track in this box.

2

Draw a Douglas squirrel here. What is your squirrel doing?



Third Grade

The third grade section focuses on the following standards from the Next Generation Science Standards**:**

Disciplinary Core Idea (LS1.B: Growth and Development of Organisms)

- *Reproduction is essential to the continued existence of every kind of organism.*
- *Plants and animals have unique and diverse life cycles.*

The giant sequoias' life cycle is unique because they live so long. These trees may live a long time, but they need just the right conditions to thrive. The percentage of giant sequoia seeds that find the perfect conditions for germination and seedling survival is very low. The seeds require access to mineral soil, plenty of moisture, and ample sunlight in order to survive. Some experts estimate that one in a million giant sequoia seeds ever germinate, and that only a very small fraction of those ever grow to maturity. The trees compensate for this by producing an average of 1,500 new cones per tree every year. An individual tree may bear as many as 40,000 cones at one time. With each cone containing an average of 200 seeds, this theoretically could result in 8 million seeds on each mature tree! However, the seeds are not all released at once as each tree drops an average of 1500 cones a year.

Once a seed has reached moist mineral soil, and has succeeded in germinating, it must continue to receive favorable conditions in order to survive. The first 2 years of life are the most critical. If the seedling does not stay moist and receive the proper amount of sunlight, it will die. Field studies have shown that giant sequoia seedlings have a very high mortality rate. The large amount of seeds produced ensures that at least a few seedlings will survive. When a seedling has become established, it can grow very quickly if it receives enough water and plenty of sunlight. When young, these trees can add up to 4 feet in height a year. Eventually the pyramid-shaped young giant sequoias grow into massive round-topped trees with huge, gnarly branches. The average giant sequoia does not become mature until about age 75, when viable seeds begin to be produced.

<u>Home/Classroom Activity #1</u> Under What Conditions?

Materials

Lima bean seeds

Paper towels

Small milk cartons (or similar) with the tops cut off

Soil

Activity Goal

Students will be able to discuss what conditions seeds need to germinate and grow into plants (soil, water, sunlight and air) and how changes in those things vital for plant germination can change the outcome for the plant.

Activity Steps:

1. Plant some seeds in wet paper towels to observe actual seed germination.
2. Check them every day and draw a picture of what they look like daily. These sprouts will die when they use up the energy stored in the seed.
3. Plant some seeds in soil. After they germinate, try growing the plants under different conditions:
    a. In darkness (under a box or in a closet)
    b. With no water
    c. With no air (In a plastic bag)
4. Chart the growth of the plants, comparing growth under different conditions.

Discussion

Do giant sequoias need the same things as other plants in order to grow? (Yes) Giant sequoias also depend on fire, which clears the layers of forest litter and duff from the soil surface, helping the seedlings to survive.

Home/Classroom Activity #3 Grow a Tree

Materials

Avocado seed

Tooth picks

Water

Activity Goal

An avocado makes a good grow-your-own-tree so children will be able to observe how a tree grows from a seed. By suspending an avocado in water, children can see how a seedling's roots and stem grow

Activity Steps

1. Peel the brown thin covering from the seed.

2. Poke three toothpicks into it at equal distances and let the seed sit in a glass of lukewarm water with the large end submerged.
3. Make sure the water continues to cover the bottom of the seed and replace with lukewarm water once a week.
4. Avocados will sprout in about 3 weeks.
5. When the stem and roots are a few inches long, plant in a pot that is an inch wider than the avocado.

Discussion

As the avocado sprouts, discuss with the students how the seeds develop and the things the seedling needs to grow.

Park Activity # 1 Walk among the Giants

Activity goals

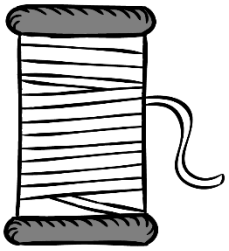
Encourage children to see the different stages of a giant sequoia's life from seed to mature giant sequoia.

Activity Steps

1. Look at the entrance of the Visitor Center for a giant sequoia seedling in a pot.
2. Start 1.7 mile North Grove Trail. **See General Information for information about the North Grove Trail.**
3. Stop at tree # 10. Look back down the trail and up to see the tree standing on the hill. The massive gnarled branches tell us this tree is quite old. A giant sequoia keeps growing bigger around, and as it gets older, it doesn't have energy to support the growth of a top. The top of this tree has died and will eventually be knocked off by wind, lightning or snow, leaving the tree with a rounded crown that looks a little like broccoli. The giant sequoia drops its lower branches as it gets taller because it only needs the branches at the top get sunlight to use in the photosynthesis.
4. At Mother of the Forest take the trail junction to the right. You are in an area that was burned in a 1908 fire, the fire created ideal growing conditions for giant sequoia seedlings and today there is a healthy stand of young sequoias here. Look for their reddish bark and feathery, juniper-like foliage.
5. Have children find giant sequoia cones and look at the seeds in the cones.
6. You can talk about seed reproduction at any giant sequoia. **Please see the General Information for examples of male and female cones.**

7. Reproduction starts in the winter when the male cones emerge. Male cones are smaller than the female cone. They are just a swelling at the tip of the branches. Pollination occurs with the wind in April and May and you see the pollen all around. The pollen must come into contact with the female cones for seeds to develop. Only the cones from the prior year are fertilized. Seed maturation takes two years.

Park Activity #2: Run the Length



Materials Needed

300 feet of string

Activity Goal

Help children understand the life cycle of a giant sequoia.

Activity Steps

1. Prior to your visit, use the string to measure out the height of a more mature giant sequoia tree (around 300 feet). Mark the string at 1 foot and 150 feet.
2. Use the fire road next to the warming hut.
3. Lay out your string starting with 1 foot length. This represents the very young giant sequoia at the Visitor Center.
4. Have the children walk or skip the distance.
5. Now lay out 150 feet of string to represent a young giant sequoia (150 ft.) and repeat step four.
6. Finally, lay out 300 feet of string to represent a more mature giant sequoia and repeat step four.

After Your Park Visit

Draw a picture of giant sequoia trees at different stages. We love to see children's creations. You can tag us on social media or email us a picture or video (#CalaverasBigTrees). Our email address is CalaverasBigTreesSP@parks.ca.gov and find us on Facebook.

Fourth Grade

The fourth grade section focuses on the following standards from the Next Generation Science Standards**:**

Disciplinary Core Idea (LS1.A: Structure and Function)

Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)

Calaveras Big Trees State Part is known for giant sequoias and giant sequoia trees are a great example of how plant structures serve various functions for plant growth and survival. These external and internal structures help giant sequoias live long lives. This packet discusses how the various parts of the tree are crucial to its survival and long life:

- Heartwood - provides stability, but is dead. It is filled with resin-like materials and no longer transports water and minerals.
- Sapwood – (xylem) the most recently formed layer of wood. It is made of thick-walled cells that transport water and minerals from the roots to branches and leaves by transpiration – water molecules stick together (cohesion) and form a kind of string of molecules that go from the roots to the leaves. The molecules move up until they evaporate through the stomata or small holes in the leaves.
- Inner Bark - also called phloem, is a pipeline of cells that transports sugar and nutrients to all parts of the tree.
- Cambium – The cambium is a very thin layer of growing tissue that produces new cells that become either xylem, phloem or more cambium. Every growing season, a tree's cambium adds a new layer of xylem to its trunk, producing a visible growth ring in most trees).
- Outer bark – protects the tree from insects, fire, and disease.
- Roots – absorb water and nutrition from soil and anchor tree.
- Leaves (needles) – produce food for the tree (with sunlight).
- Branches – connect the trunk to leaves and transport water and minerals to the leaves.
- Seeds – small parts produced by plants from which new plants grow.
- Cones – carry the seeds.

Home or Classroom Activity #1: Build a Tree Cookie

Materials

1 Paper plate

1 Pencil

Colored pencils or crayons

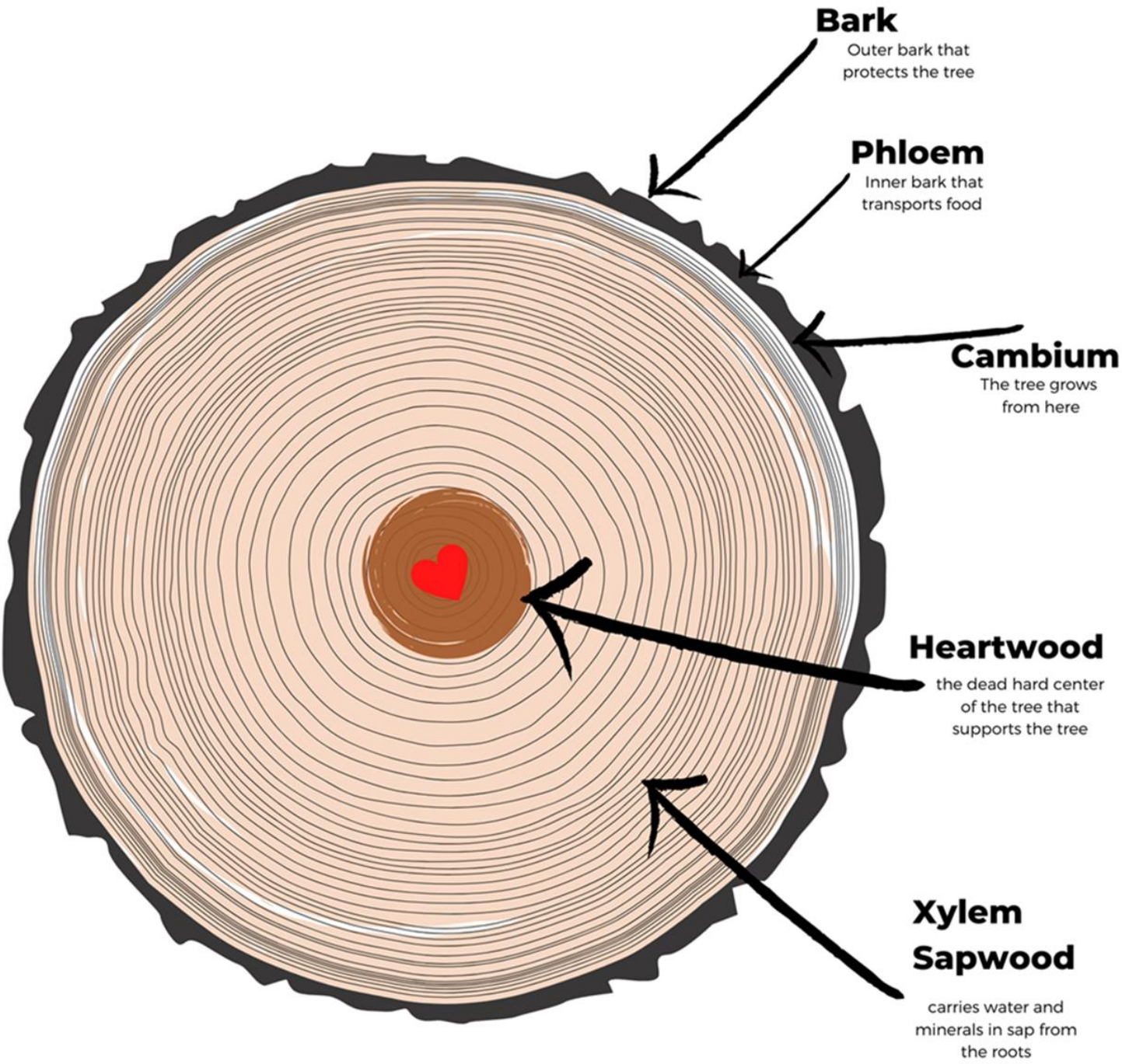
Activity Goal

Children draw and color the internal structure of a giant sequoia by creating a tree trunk on a paper plate. In the process, they are able to learn how these structures aid the tree in survival.

Activity Steps

1. Discuss each internal structures of a giant sequoia and have the student color and label them on their paper plate as they go. Have children choose a different color for each structure of the tree. **Heartwood** in the center, encircled by the layer of **sapwood**, then a thin layer of **cambium**, then the **inner bark,** and finally the **outer bark.**

    a. **Heartwood -** provides stability, but is dead. It is filled with resin-like materials and no longer transports water and minerals.
    b. **Sapwood –** the more recently formed layer of wood. It is made of thick-walled cells that transport water and minerals from the roots throughout the tree. This part of the tree is also known as the xylem.
    c. **Cambium –** a thin layer of actively dividing cells between the phloem (inner bark) and xylem. DRAW a dark line to represent the cambium.
    d. **Inner Bark -** also called phloem, is a pipeline of cells that transports sugar and nutrients from the places where the food is produced to the places where it is needed or stored.
    e. **Outer bark –** protects the tree from insects, fire, and disease.
2. Children can create symbols for the various functions of the internal structures (i.e. heart for heartwood).


Bark
Outer bark that protects the tree
Phloem
Inner bark that transports food
Cambium
The tree grows from here
Heartwood
the dead hard center of the tree that supports the tree
Xylem
Sapwood
carries water and minerals in sap from the roots

3. Have your children share their work. They can explain their creation to you or in a short video for social media. We always love to see children's creations here at the park. You can tag us on social media or email us a picture or video. Our email address is CalaverasBigTreesSP@parks.ca.gov.

Home or Classroom Activity #2: A Trip through a Sequoia

Activity Goal

This activity or guided imagery will take the students on a "visit "to the inner working parts of a tree. Children are able to use their imagination to learn more about the structures of the tree.

Activity Steps

1. Before reading the guided imagery, have children put down all objects and sit in a comfortable position with their eyes closed.
2. Read the following activity slowly and steadily, allowing students enough time to create their own visual images.
3. Once finished, ask the students to review all of the images they saw in their minds. After at least one minute, ask them to open their eyes.
4. Have them discuss their thoughts and impressions. Where did they go and what was happening.
5. Bring closure to the imagery by having the students draw a picture of any of their mental images.

Guided Imagery

What if, instead of going on a trip to Calaveras Big Trees State Park, you could go on a trip inside the cells of a giant sequoia tree? What do you think you would find there? The first thing you need to do is find a giant sequoia tree. You are going outside the room now…away from the home (or school)…. Away from our town…. You travel until you find a huge giant sequoia tree. You are now standing next to a very tall and very, very wide tree with soft, reddish-brown bark. Look up. Can you see the top? As you look up, you notice that everything around you seems to be getting bigger, and you seem to be getting smaller. Now you can't see the top of the tree at all. In fact, a nearby flower is taller than you. The ground seems to shake a little and you notice a huge ant walking toward you. You can see its big hairy legs and vicious looking mouth as it steps over you without even noticing you. You look up again and see a raindrop, which looks like a huge ball of water falling from the sky. The raindrop lands next to you. It makes a huge splash, and you find yourself sinking into the wet ground. You quickly grab onto a nearby water molecule, a shimmery, round, object.

Sssshhhllluuupppppp. Both of you are being sucked down into the ground and into a tiny dark tunnel along with thousands of other water molecules. They are like a sea of shiny, bouncy, spheres moving along together. You are pulled through the tunnel, which joins another tunnel, and then another. As this connecting system of passageways becomes more and more complicated, you wonder if you'll ever be able to find your way back. There are other kinds of molecules around you too…some are very large, and they are all different shapes and colors.

You now find yourself in a narrow tube that is taking you straight up. As you move slowly skyward, you look next to you and see another tube. It looks like the one that you're in, but it is full of a syrupy liquid, and is moving down, not up. On the other side of the tube is a dark, solid looking wall. Pretty soon, things start to move very slowly, and then stop completely. Nothing moves for a long time. It's getting cold. You begin to wonder if you'll be stuck inside this tree forever. After what seems like hours, you start slowly moving up the tube again, and the syrupy liquid next to you starts moving down again. As you go higher and higher, you begin to hear loud knocking and chewing noises. You feel safe from whatever is knocking and chewing in the dark wall next to you.

All of a sudden, you begin moving sideways. Soon everything around you is a beautiful color of green, and you feel very warm. The green walls around you are made of cells that look like boxes stacked on top of each other. As you look closer, you notice some of the syrupy liquid coming out of the green cells. It is like a busy factory inside each cell. There are molecules inside the cells that grab other molecules and bring them into the cells. Those molecules are broken apart and combined with other molecules, which makes the syrupy liquid. You also notice that there are tiny holes in the floor, and every once in a while, an oxygen or water molecule falls through a hole. You wander around, watching the molecules moving about. Without realizing it, you have stepped into one of the tiny holes. You begin to fall. You are outside the tree now, floating down, past branches and leaves and a woodpecker and a beetle, and dark red bark… down all the way to the ground.

How does it feel to be back on solid ground again? You look around and see that the flower, the ant, the tree, and you are all back to your normal sizes. You wave goodbye to the tree as you travel back to your town… back to your school… back to your classroom…

When you are ready you may open your eyes.

Tree Parts in the story (in order of appearance)

Ask the children what they think the parts in the story might have been

- Tunnels and passageways----------root system
- Tubes going up----------Sapwood or xylem tissues transporting water and minerals
- Tubes with syrupy liquid----------inner bark or phloem tissues transporting sugars
- Dark wall----------outer tree bark
- When you stop moving----------night time
- Knocking and chewing noises---------- ----------woodpecker and beetle
- Green warm area----------leaf in the sunshine
- Factory----------Photosynthesis, which produces the sugars
- Holes in the floor---------- ----------stomata in the leaf

<u>Park Activity #1</u>: A Walk among Giants.

Activity Goal

Encourage children to find and identify internal and external structures of trees. If you have completed the home/classroom components, this is a good opportunity to have children begin to identify various structures of the tree (i.e. roots, bark, branches, and leaves). If you have not completed the components in advance, this gives you an opportunity to cover the structures in a natural setting. In addition to talking about roots, bark, branches you can also discuss the workings of the tree (i.e. heartwood, sapwood or xylem, cambium layer, bark, phloem).

Activity Steps

1. Start the 1.7 mile North Grove Trail**. See General Information for information about the North Grove Trail.** Make sure you pick up a trail brochure made available by Calaveras Big Trees Association (suggested donation 50 cents per guide). This guide will give you and your student's information about the numbered stops on the trail.
2. As you are walking, you can look at the rings on tree stumps or fallen trees to identify parts and explain what they do. You can have children locate the various parts, including xylem which is in the sapwood and carries the water and minerals up to the leaves so photosynthesis can happen. This makes the sugars that will flow down through the inner bark and phloem to feed the tree.
3. Stop # 12 (Hercules) is a place to look at the heartwood, sapwood, cambium, bark. They can look at the tree rings also (1 ring =1 year)

Park Activity #2: Tree ring rubbing

Materials

Crayon without a wrapper

Paper

Activity Goal - Have students try to find and label the parts of a tree from the rubbings they make of a tree stump.

Activity Steps

1. Go to the picnic area behind the ranger station and find a tree stump.
2. Clear the stump of dust and debris.
3. Place the paper on the stump and use the side of the crayon to make a rubbing of the tree rings on the stump.
4. Using the rubbing, label the heartwood, sapwood, cambium layer, and bark as best you can.
5. Count the rings to see how old the stump is.
6. Do this as many times as you like. Observe how the rubbings are alike and different.

After Your Park Visit

Have your child write a letter to a giant sequoia. They can write a letter about what they learned and/or what they love about giant sequoias. You can tag us on social media or email us a picture or video (#CalaverasBigTrees). Our email address is CalaverasBigTreesSP@parks.ca.gov and find us on Facebook.

Fifth Grade

The fifth grade section focuses on the following standards from the Next Generation Science Standards**:**

> *Disciplinary Core Idea (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.*

At Calaveras Big Trees State Park the main forest community present is the Sierra mixed conifer (trees that have cones) forest community. It is an interrelated group of plants and animals that occur in a belt between about 2,000 and 7,000 feet elevation on the west side of the Sierra Nevada Mountains.

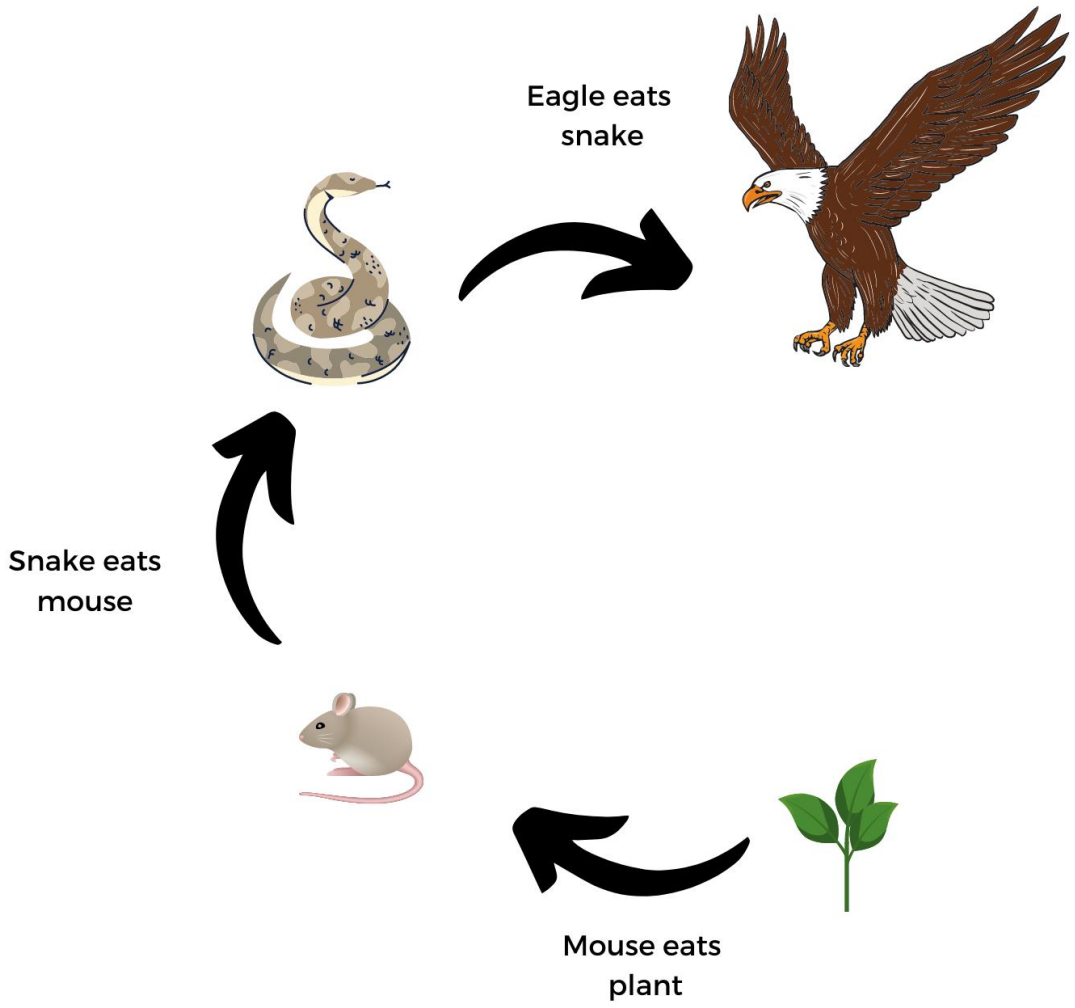
The food of almost any animal (consumer) can be traced back to plants (producer). Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat the plants. Some organisms such as fungi and bacteria break down dead organisms (both plant or plant 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 need in a relatively stable web of life. Newly introduced species can damage the balance of the ecosystem.

The following is a brief description of the parts of a food chain:

- **The sun** provides the energy to power the process of photosynthesis in green plants.
- Green plants are called **producers** because they use solar energy combined with carbon dioxide, nutrients, and water to produce their own food in the form of sugars, proteins and other organic compounds.
- Animals are called **consumers** because they cannot make their own food, but must consume other plants or animals to acquire energy and the building materials for their bodies.
- **Herbivores** are animals that get their energy and nutrients by eating plants.
- **Carnivores** are animals that get their energy and nutrients eating other animals.

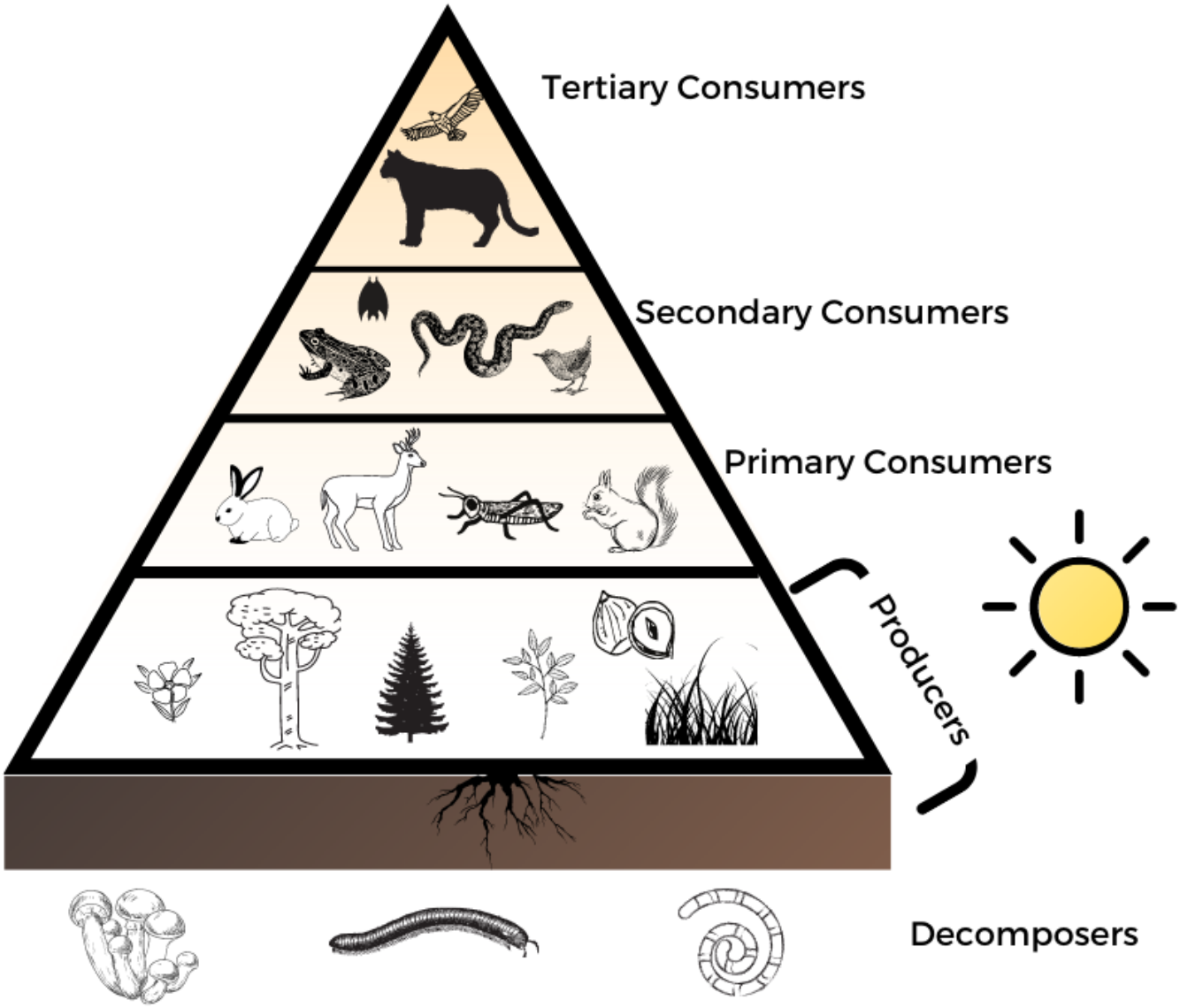
- **Omnivores** are animals that get their energy and nutrients by eating both plants and animals.
- **Scavengers** are animals that feed on dead animals (that they haven't killed).
- **Decomposers** are organisms that break down dead plants and animals into various chemicals, which are then returned to the soil and used as nutrients by plants. They can be insects, bacteria, fungi, or protozoans.

Food Chain



Energy Pyramid

Energy is stored in biomass as part of an organism's body. This is what energy is available to the next food chain level. It is generally thought that 10% of energy stored in the biomass of an organism ends up as stored biomass in the next level. So the bottom of the energy pyramid is the largest level (plants/producers) and each level (primary consumers/ herbivores then secondary consumers/ carnivores, omnivores) as you go up the energy pyramid is considerably smaller with the final level of the tertiary consumer being the smallest.



FBI - Fungus, Bacteria, & Invertebrate

Home/ Classroom Activity #1: Discover Food Webs and Energy Pyramids

Activity Goal

Children will have an understanding of the food web and the energy pyramid.

Activity Steps

1. Research the food webs and energy pyramids.
2. Have children complete the food web activity on the next page.

Home/Classroom Activity #2: Make Your Own Who Eats Who?

Activity materials

Paper

Pencil and Crayons

Box if you make a diorama

Activity Goal

Children will understand the way energy is transferred from producers to consumers by drawing an ecosystem.

Activity Steps

1. Start with drawing the **sun** shining down on a green plant, which is making food in its leaves.
2. Add a **producer** (i.e. grass) a **primary consumer** an herbivore (i.e. squirrel), a **secondary consumer** a carnivore or omnivore (i.e. snake) and a t**ertiary consumer** a carnivore at the top of the food chain (i.e. great horned owl).
3. These are parts of a food chain. Draw a line from each thing to what it eats (grass to mouse to snake to great horned owl)
4. When things die they can be eaten by a **scavenger** (i.e. turkey vulture) or they will decompose with the help of decomposers (i.e. fungus, bacteria, invertebrates). As things decompose the nutrients are returned to the soil by **decomposers** which will be used by green plants. Add these parts to your drawing.

FOOD WEB

Animals in an ecosystem form a food web. In the illustration below, use arrows to map out the energy transfer between organisms.

Name two producers in the food web above.

_____

_____

_____

Name two secondary consumers in the food web above.

_____

_____

_____

Park Activity #1: Walk among the Giants

Activity Goal

Encourage children to see the connections between members of this forest community and understand how important the different parts are of the food web.

Activity Steps

1. Start the 1.7 mile walk around the North Grove Trail. **See General Information for information about the North Grove Trail.**
2. You can help children see connections between the members of this forest habitat by discussing the importance of each member to the food chain. When you start the hike, ask students to look around and ask "Do you see any producers? (plants)" "Do you see any consumers? (animals) Why do you think you see so many more producers than consumers? After you get their answers, you can talk about the energy pyramid.
3. Have children look for evidence of energy transfer, either plants (producers) that have been eaten by animals (consumers) or evidence of animals eating plants or animals eating other animals (Like leaves with holes in them, pinecones that have been torn apart, or fur or feathers).
4. It is important that children understand that all parts of the food web are important to the ecosystem and if we lose one part, the whole ecosystem can be effected. You can discuss what might happen if one part of the food chain disappeared.

Park Activity #2: Energy Evidence

Materials

Worksheet

Pencil

Activity Goal

Encourage children to look for evidence of energy transfer from producer to primary consumer to secondary consumer to tertiary consumer. Some examples include:

- Plants that have been eaten
- Cones or nuts that have been eaten
- Spider webs
- Feathers
- Fur

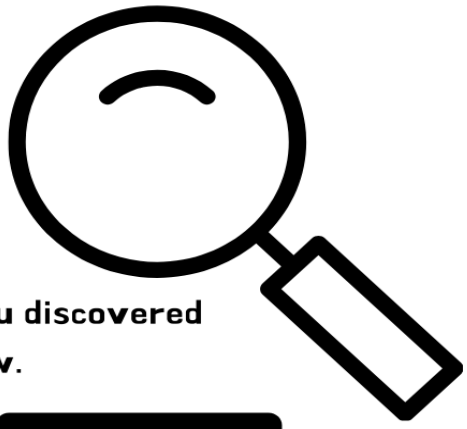
- Woodpecker holes

Activity Steps

1. Have children complete the worksheet on the following page.
2. Discuss with the children the evidence they found.

Name _____ Date _____

MY ENERGY EVIDENCE LOG



Draw two examples of energy transfer evidence you discovered on the North Grove Trail and describe what you saw.

Evidence #1

Evidence #2

Evidence #1 ???

Evidence #2 ???

After Your Park Visit

To reinforce what they have learned students can create a visual representation that shows a food chain or food web that they might have observed in the giant sequoia ecosystem. It could be a picture, a model, a diorama, a computer generated presentation. We love to see the children's creations! You can tag us on social media or email us a picture or video. Our email address is CalaverasBigTreesSP@parks.ca.gov.

After Visit Activity #1: Members of the Giant Sequoia Food Web

Materials Needed

Computer to do research

Activity Goal

Students will be familiar with some of the plants and animals living at Big Trees and will be able to use this knowledge to create a food web.

Activity Steps

1. Each child should research a different plant or animal that lives in the park. Below is a list of some plants and animals that live at Calaveras Big Trees SP.
2. Create a visual representation that shows a food chain or food web that they might have observed in the giant sequoia ecosystem. It could be a picture, a model, a diorama, a computer-generated presentation

Sample Plants and Animals

giant sequoia, red clover, wood strawberry, colonial bent grass, mountain currant, mountain dogwood, trail plant, ponderosa pine, thimbleberry, mule deer, Douglas squirrel, field mouse, butterfly aphid, chipmunk, mosquito, dragonfly, little brown bat, gopher snake, convergent ladybug, black bear, great horned owl, mountain lion, northern goshawk

All Ages Park Activity – Trail Bingo

This activity requires preparation prior to visiting Calaveras Big Trees State Park. Children must construct their own unique bingo card before arriving at the park.

Materials

Scissors

Glue stick

Pencils

Activity Goal

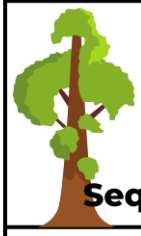
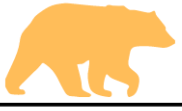
Encourage children (and the whole group) to look around as they walk the trail and identify plants and animals in the giant sequoia ecosystem. This activity requires you to prepare the bingo card at home prior to your visit.

Activity Steps

1. Each children needs to make hit their own bingo card using the animals and plants provided.
2. Cut out and paste an animal or plant into a desired square.
3. Use the bingo cards and pencils to play trail bingo as you walk the North Grove Trail.

Bingo Squares

The bingo squares on the following page are for players to construct their own individual bingo card. Cut out all the individual squares and place them randomly on your bingo card.

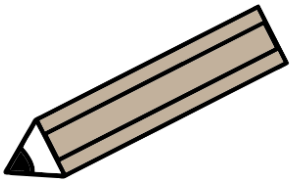
Douglas Squirrel 	 Bird	 Fern	Bobcat 	 Racoon
 Sequoia	 Cone	 Insect	 Snake	 Mushroom
Mule Deer 	 Vulture	 White Fir	 Flower	 Woodpecker
Leaves 	Grey Fox 	Owl 	Black Bear 	 Carpenter Ants
 Moth or Butterfly	Rabbit 	 Pine Needles	Grass 	 Frog

TRAIL BINGO

HOW TO PLAY

Fill in the bingo card with random plants and animals.

As you walk the North Grove Trail, **cross out boxes as you spot the plant or animal.** First person to complete a line and says "bingo" wins!



General Information

Visiting the Park

Calaveras Big Trees State Park preserves two groves of giant sequoias in the North and South Groves. The park is a mixed-conifer forest (a variety of trees living together). In addition to the giant trees you will find the Stanislaus River, Beaver Creek, ancient volcanic formations, and natural meadows. For more information call (209) 795-7980 or go to https://www.parks.ca.gov/ . You may also find information about our non-profit partner, Calaveras Big Trees Association (CBTA) at https://bigtrees.org/. CBTA supports all educational programs at the park.

Remember to Bring

Good walking shoes,

Water

Snacks

Sunscreen

Insect repellent

The North Grove Trail

The trail through the North Grove is a gentle, well-marked loop a little less than 2 miles long and takes about an hour and a half to walk. On this trail you will be walking among the world's largest living trees. Since the beauty of the North Grove is enjoyed by thousands of people every year, your help is needed in protecting the big trees and their environment in these ways:

- **Leave your dog at home.** Dogs are not allowed on the North Grove Trail.
- **Stay on the trail and boardwalks.** This protects the shallow sequoia root systems from erosion and soil compaction.
- **Please do not climb on the trees.** The protective bark is easily damaged.
- **Leave all natural objects where they are found.** Seeds from pine cones are an important food source for squirrels and even a twig is important in returning nutrients to the soils.
- **Pack out all trash.**

Giant Sequoia Information

Just what is so special about giant sequoia trees? What makes them different from other types of trees? These are some of the main reasons that biologists and naturalists consider these trees to be amazing.

- Giant sequoias are the largest single-stemmed tree by wood volume and mass (weight) in the world.
- Giant sequoias have unique characteristics enabling individual trees to live to 3,000 years.
- Giant sequoias grow naturally only in a 250-mile long strip in 75 groves on the western slope of the Sierra Nevada at an elevation of 4500 to 7000 ft. These trees are always found near a constant supply of water where summers aren't too hot and winters aren't too severe.
- Giant sequoias are descended from trees that forested most of the northern hemisphere during the age of dinosaurs.
- Their related human history is fascinating. In this park it includes the Miwok Indians, the discovery of giant sequoias by Euro-Americans, the early use (and abuse) of the trees, and protection today within the State Park System.

What are the characteristics that enable these trees to grow so big and live so long?

- Soft, fibrous, resinless, bark can grow to 2 feet thick and provides protection from fire, insects, and disease.
- The presence of tannin in the wood aids in this protection and slows the process of decay even after a tree has fallen.
- Even if fire manages to burn through the bark, the tree is often able to live for hundreds of years or more. The bark will grow around the burn scar.
- Shallow, spreading roots reach only 4 to 8 feet in depth, but may extend out more than 100 feet, encompassing over one acre of soil. Many small feeder roots are able to take up the water and nutrients required to support the growth of these giants.
- The form of a mature giant sequoia is very stable. The wide supporting base gradually tapers off to a rounded top that can withstand heavy snow and wind. If the environment around one of these trees causes it to lean it will respond by growing more wood on one side to prevent falling.

- Falling is one of the few things that actually kills these trees. They topple most often during heavy winds, especially if their root system has been affected by erosion or fungus, or the trunk weakened by large burn scars.

Sequoia Cones and Seeds

FEMALE CONE

SEEDS

MALE CONES

Calaveras Big Trees State Park Timeline

Pre 1833

Local indigenous people knew of the Big Trees. The Miwok word for giant sequoias was “wawona”.

1833-1852

There was mention of trees of the redwood species and large trees, but no one seemed interested in checking it out especially after gold was discovered.

1852

Augustus Dowd, a hunter for the Union Water Co., stumbled onto the North Grove. This was the first substantiated discovery of the giant sequoia tree.

1853

The Discovery Tree was cut down and the bark and a section of the trunk were shipped to New York to be put on exhibit. The exhibit was a failure and the bark and the trunk were destroyed by fire. What remained of the Discovery Tree was a "Big Stump", which through the years has been used for dances, concerts, weddings, and even a print shop.

1854

In an effort to capitalize on the amazing mammoth trees the " Mother of the Forest" was stripped of her bark and the bark was reassembled in the Crystal Palace in New York and then was moved on to London's Crystal Palace where it was exhibited until 1866 when the Crystal Palace burned down.

1885

A tunnel was cut through the "Pioneer's Cabin Tree"

During the rest of the 19th century and the beginning of the 20th century the grove was owned by a variety of people who used it as a tourist destination.

1931

After years of effort the North Grove became Calaveras Big Trees State Park.

1954

After years of private fund-raising efforts and private negotiations, the South Grove was purchased from the Pickering Lumber Co. for a price of $2.8 million

1967

The South Grove was formally dedicated as a publicly-owned park area.