

NATIVE AMERICANS

The first human inhabitants of this area were Nisenan Maidu Indians who lived here for thousands of years before the arrival of “settlers” in the 1800s. The foothills provided a moderate climate and abundant food and supported several distinct tribes. The Nisenan ate deer and other game, waterfowl, and a wide variety of plants. The holes you see in these rocks were used for grinding seeds -- especially acorns -- into flour.



These “grinding rocks” are almost always found near rivers or streams because it was necessary to pour water over the acorn meal to leach out the bitter-tasting tannic acid. Each tribal member would collect up to 1000 pounds of acorns annually so acorns were a very important part of their diet. From the acorn flour the Indians made mush, soup, and bread. Native Americans also knew a great deal about almost all of the local plants and utilized many for food, medicines, and tools.



CHINESE ROCK WALLS

Throughout the foothills of the Sierra Nevada it is common to see stone walls several feet tall. These were built after the discovery of Gold in 1848. Most were constructed by Chinese immigrants who had come to California to seek gold. When they weren't prospecting for gold they would often be hired as builders since many Chinese were experienced stone masons (remember the Great Wall of China!).



The Chinese used whatever types of rocks were available onsite and meticulously fit them together so that the walls were rigid and sturdy. Sometimes these walls served as corrals; other times they were built around an entire property to keep livestock from wandering off and getting lost. Unlike rock walls that are built today, no mortar or cement was used to hold the stones together. Despite this, many are still standing 150 years later so they must have been built well!



POISON OAK

Growing among the rocks below is a plant with shiny green and red leaves, though in the winter it loses its leaves and is bare. This is poison oak. It is not related to oak trees but carries “oak” in its name because the leaves look similar to oak leaves. There is a small oak nearby and you can see the similarity in the leaves. But unlike true oaks, the leaves on poison oak grow in groups of three.



Ever hear the expression “Leaves of three, let it be”? This expression is meant to warn you that you should never touch poison oak leaves, or even its stems or roots. This is because poison oak has a chemical in it that causes most people to develop a very itchy rash after touching it. They can even get sick by breathing the smoke when poison oak is being burned. Some people get so sick from poison oak that they have to be hospitalized. So when you see leaves of three, please, let it be!

OAK WOODLANDS

The type and density of vegetation has changed dramatically as you climbed up from the creek to this drier hillside. Here the main plants are blue oak, interior live oak, foothill pine and annual grasses and forbs. It's easy to tell the two oak species apart because blue oak is deciduous and loses its leaves in winter, while interior live oak is evergreen and is green year-round. The larger oaks are over 200 years old so were present when Native Americans were the only people around.



These hillsides are extremely dry in summer, but the upland species present, unlike the riparian plants below, have adapted to these harsh conditions and have no trouble surviving, even during prolonged droughts. In the spring these hillsides are often covered by an assortment of wildflowers including lupines, clovers, fiddlenecks, brodias and mule ears.

GIANT ROCK WITH LICHEN

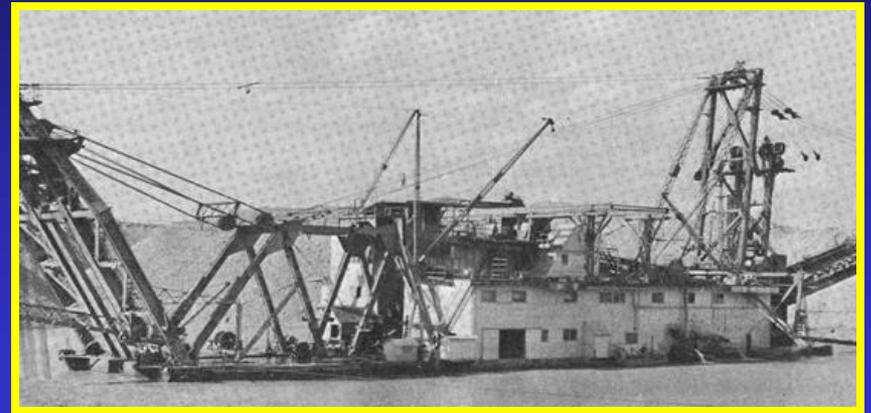
This giant rock probably weighs more than all of the people in your class combined, the bus you came in, and even your teacher! How do you think it got here? The study of rocks is called geology and can tell us a lot about how things developed over time. Many of the rocks in this area came from the late Jurassic Period about 150 million years ago and came into being when molten lava poured out of volcanoes, hardened, and formed rocks.



On the surface of this rock you can see some multi-colored crusty formations that are various shades of gray, green, yellow and even orange. These are living organisms called *lichens* and are a symbiotic association between a fungus and an algae. Symbiotic means that it is mutually beneficial to each one. There is saying to help you remember what lichens are. It goes like this: "*Freddy Fungus took a lichen to Alice Algae.... but now their marriage is on the rocks.*" Lichens grow very slowly and it can take 20 or more years for lichens to grow half an inch.

GRAVEL PILES ACROSS RIVER

See the enormous piles of gravel across the river? How do you think this gravel got there and where did it all come from? This gravel is a remnant of something called *hydraulic mining* that took place in the Sierra Nevada foothills and mountains around 1870. Hydraulic mining used the force of rushing water to wash away mountains so that the gold deposited in ancient river beds beneath the mountains could be recovered.



As part of this process, gravel, silt, sand and soil were all washed into the Yuba River and some of the gravel settled here. Starting in the early-1900s miners used dredger boats to process the gravel looking for additional gold that had been missed and had settled in the river. Afterwards, the gravel was dumped into the large piles you can see. Hydraulic mining was finally outlawed around 1885 because it caused extensive flooding around Marysville. Dredging today is rare but a single dredger is still operating about 6 miles west of here.



SPRING WILDFLOWERS

If you are here in the spring you will probably see many beautiful wild flowers at this spot, including poppies, lupines, clovers, filaree, and several brodias, which are often called wild onions or Indian potatoes. Some of these plants are *native*, while others are *exotic* and were brought to California from elsewhere. Exotic plants are more likely to become invasive weeds - like starthistle - since they have not evolved in California's environment and often have no natural enemies to keep their populations in check.



The brodias growing here are native and many have showy purple flowers. In addition to being pretty to look at, however, the brodia's bulbs were an important food for Native Americans who harvested them using digging sticks. They also cultivated fields where brodias were growing to make sure they kept producing their below-ground bulbs and corms. The brodia corms are about the size of cocktail onions and are very sweet and tasty.

CALIFORNIA DEERGRASS

The showy, grass-like plant that you can see in the wet areas nearby is called California deergrass. Its name derives from the fact that this plant provides critical cover during fawning for mule deer, as well as important forage. It was also an extremely important plant for the Native Americans that lived here. They used its long seedstalks as the principal material in coiled baskets. Since baskets were so important to their life, and deergrass baskets often required 3000 stalks, deergrass underwent an early form of cultivation by many tribes who regularly burned areas to maintain stands and induce the production of the long straight stalks. It is believed that much of deergrass's current distribution is due to this cultivation.



Today, many basket weavers still regularly collect deergrass stalks to construct their baskets. Groups such as the *California Indian Basketweaver's Association* want to make sure that Indian basket-weaving traditions are preserved, promoted, and perpetuated. The baskets produced are not only functional and beautiful to look at, but are truly works of art.

FOOTHILL FIRES

There are a number of charred logs nearby that indicate a fire passed through here. These are remnants of the *Field Fire* that occurred in 2002. It started when a tree branch fell onto some power lines near the SFREC headquarters and ignited the grass below. By the time it was through it had burned nearly 1000 acres. However, no buildings burned and no one was injured. In the Native American era, fires in this area were more common than they are today. This is because Indians regularly set fires for a variety of reasons, including keeping areas more open for walking around and hunting, stimulating the growth of certain plants used for making baskets, improving habitat for game animals, and making it easier to collect acorns. They also let fires that started naturally by lightning burn themselves out.



We occasionally conduct *prescribed burns* here at the SFREC to control noxious weeds and to reduce fuel loads. These fires are intentionally set. However we have to be very careful to make sure the fires don't escape and become wildfires.

PILES OF WOOD

Below us is a large pile of sticks and logs. How do you think this debris got here? These materials were transported here by the river itself during a flood when the river had much more water in it than it does today. Can you imagine the river being so full that it would be 20 feet higher? And much wider also! It doesn't happen often but during severe storms there can be so much rain that water pours over the top of Engelbright Dam, as shown below, and the river becomes a rushing torrent. Anything floating in the river then can be deposited at the river's highest point.



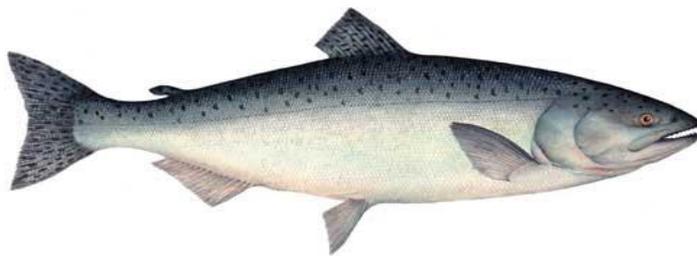
Sometimes such high flows can cause serious flooding around Marysville and Yuba City. Another effect of the rushing water is that it causes the rocks to become smooth and rounded like those all around us. The constant tumbling and turning by the water causes all of the rough edges on the rocks to be worn down. You wouldn't want to be here during a flood when the river is as high as we are would you?

FISH IN THE RIVER

The Yuba River is very important for several species of fish, including Chinook salmon and steelhead trout. These types of fish are called *anadromous* -- meaning they are born in the freshwater of the river, swim out to the ocean where they live and grow for several years, and then return to the same river to spawn and start the process all over again. Isn't it amazing that a fish could live part of its life in freshwater and part of it in salt water? Unfortunately the number of adult fish returning annually from the ocean to the Yuba River has been plummeting recently.



There are multiple reasons for reduced fish populations but an important one is that adult fish need lots of cold water during spawning. About two miles above here is Engelbright Dam that restricts the amount of cold water entering the river. They are changing how water is discharged and we hope fish populations will recover. If you are here during one of the spawning "runs" you may be able to see adult fish swimming upstream looking for a place to lay or fertilize their eggs.



Chinook Salmon
Oncorhynchus tshawytscha

WILDLIFE USE

At a previous stop we mentioned that oaks provide important wildlife habitat. This means that they provide food, shelter, and cover for a variety of animals. Oaks are especially important since so many animals eat acorns, the seeds of oak trees. Can you think of some animals that eat acorns?

There are even animals such as squirrels and acorn woodpeckers that collect and store acorns so they will have food to eat during the winter.



There are also many species of animals that use the Yuba River itself. Ever hear of river otters? They are like sea otters but live in fresh-water rivers. We sometimes see them swimming – and fishing – in the river below. Often there is also a variety of water birds such as mallard ducks and hooded mergansers that hang out here. Up on the river's bank you can sometimes see evidence of mammals such as deer, coyote, fox, bear and even cougar. Clearly the Yuba River is very important for wildlife!



CATTLE GRAZING

In addition to being a place where important research on plants, wildlife, and water takes place, the Sierra Foothill Research and Extension Center also has a large cattle herd that grazes most of its 5700 acres. This herd is used for research on a variety of subjects including animal health, genetics, supplementation, and nutrition. This Nature Trail is in an area that is grazed each year, usually in the spring and fall.



Cattle put on most of their weight in the spring when the annual forage plants are actively growing and are extremely nutritious. While most of the ground vegetation is eaten, cattle do have their preferences and dislikes. Some of their favorites are clovers and filaree, which are both relatively high in nitrogen. At the opposite end are starthistle and medusahead, which are considered unpalatable noxious weeds. However, cattle will even consume these when they are young and tender. Several foothill plants such as fiddleneck and lupine are actually poisonous to cattle, but the animals seem to know not to eat them.



FOOTHILL PINE WITH MISTLETOE

This small tree is a *foothill pine*, also called gray, bull, or woodland pine. It used to be called digger pine, but some consider this name to be disrespectful to Native Americans so it is no longer used. Notice all of the small yellow to yellow-brown growths on it. Do you know what these are? They are called *dwarf mistletoe* and are actually parasites that extract moisture and nutrients from the tree they are growing on. They do this by sending roots down into the wood. Dwarf mistletoe has a fascinating way of reproducing. It has male and female flowers on separate plants. Female flowers are pollinated by insects and wind, producing seeds enclosed within a fruit.



When these fruits ripen in the fall, the seeds are shot out of the fruit, traveling up to 30-40 feet! Mistletoe on foothill pines causes increased tree mortality, reduced growth, and loss of vigor. On the other hand, mistletoe flowers, shoots and fruits are important food for some insects, birds and mammals. And we all know about that Christmas kissing business, though that is usually done under a different type mistletoe (*leafy mistletoe*) that grows primarily on oaks.



CALIFORNIA BLACK BEARS

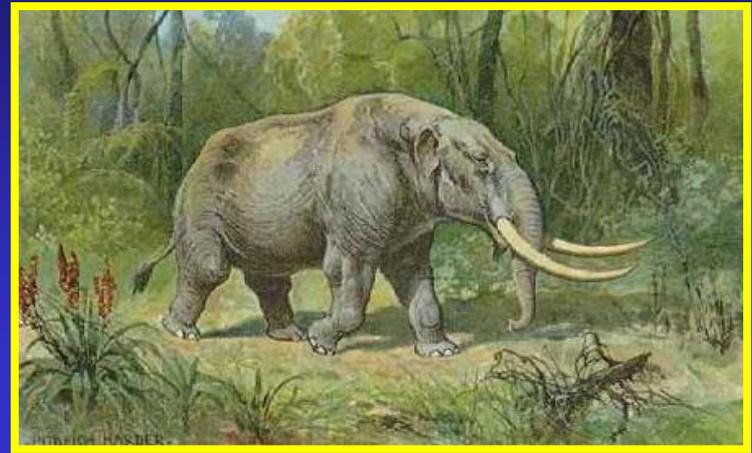
It is not common, but occasionally black bears roam around this area. Across the road is an old olive orchard where bears will sometimes camp out and eat the olives. You can tell they have been there by the large piles of scat (poop) containing olive pits. Bears are *omnivores*, meaning they eat a wide variety of plants and animals, including berries, nuts, honey, roots, bees, larvae and fish. It is estimated that there are between 16,000 and 24,000 bears in the state, mainly in forests and wooded mountains.



Black bears are generally shy and avoid people, unless they smell food nearby. That is why it is so critical to never feed bears, or allow them to get to food you have with you. There is an old expression: “A fed bear is a dead bear”. This is because once a bear develops a taste for human food, they keep trying to get more, leading to interactions with people which are never good. While trapping and transporting problem bears to remote areas is preferred, this doesn't always work (the bears come back) so occasionally problem bears have to be euthanized (killed).

END OF THE LAST ICE AGE

The last ice age in California began to end about 20,000 years ago. At that time, the foothill woodlands were substantially wetter and colder than today and the vegetation was more like what you would find at higher elevations in the mixed conifer forest – fewer oaks, but more pines and firs. The animal population was also much different than today and included saber-toothed tigers, woolly mammoths and mastodons. However, as the climate began to warm up, there were mass extinctions, and all three of these species disappeared from the planet.



During this period when the glaciers began receding, there were no human beings on the American continents. We don't know the precise date when the first ones arrived, but physical evidence such as artifacts, ruins and skeletons suggest that the earliest people came to California about 12-14,000 years ago. We also believe we know where they came from. By sampling early human bones and comparing their genetic makeup to those of other people around the world, we now believe that the first Californians arrived from Siberia and were literally able to walk across the Bering land bridge west of Alaska when water was still locked up in the polar ice caps.

SOILS AT THE SFREC

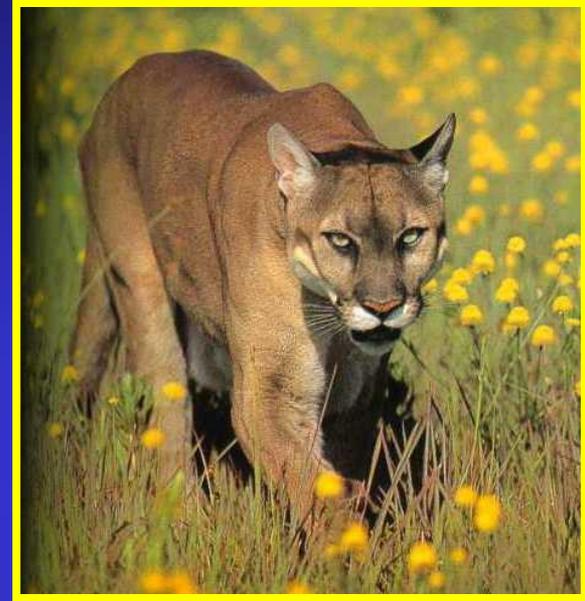
Soils are a combination of organic and inorganic matter. *Organic* means that it comes from living things that have that have carbon in them. Inorganic material comes from rocks on the earth's crust. However most rocks that have formed soils came to the site from elsewhere and have been deposited there by water, ice, wind, gravity, or as a result of transport from volcanoes. These rocks break down into smaller pieces through a process called *weathering*, which is strongly influenced by rainfall and temperatures. This is a very slow process that can take thousands of years.



Organic material in soil can include earthworms, plants, insects, microorganisms, and burrowing animals, among others. There are many different types of soils which are identified by digging soil pits as shown above. Maps of different soil types are often critical for determining what will grow where. Compared to most agricultural areas, there are relatively few soil types at the SFREC. The ones that are here are relatively deep, are often red as a result of a high iron content, and can vary greatly even over short distances (i.e. 10 feet).

MOUNTAIN LIONS

Mountain lions occasionally visit the SFREC but they are so rare, secretive, and elusive that people rarely see them. In fact there are employees that have worked here for decades – spending most of their time outside – that have never even glimpsed one. You have probably heard that mountain lions occasionally attack people, but this is 1000 times less likely than being struck by lightning. In fact, between 1909 and 1986 there were NO reported mountain lion attacks on people in California, and since 1995 there has only been one fatal encounter. But as the population of California grows and humans move more into mountain lion habitat, human/lion interactions are clearly increasing.



Mountain lions – also called *cougars* or *puma* -- are the biggest cats in North America and males can grow to nearly 200 pounds. They can be found almost wherever deer reside since deer are their main food source. It is hard to know exactly, but inventories suggest there likely are 4000-6000 individual lions in the state. If you happen to ever see one, don't run, but try to make yourself look as big as possible by raising your arms. Most likely the cat will want to have nothing to do with you.

TICKS AND LYME DISEASE

There are several kinds of ticks in this area including the kind that that causes Lyme Disease. Ticks are small, insect-like creatures that are most often found in naturally vegetated areas, especially in tall grass. They feed by attaching to animals and humans, sticking their mouthparts into the skin, and sucking blood for up to several days. Sometimes these ticks carry germs like bacteria or viruses that can be transmitted to a person while the tick is attached and feeding.



Lyme disease in California is caused by a spirochete bacteria in a small tick called the *western black-legged tick*. However not all ticks of this species carry the bacteria (estimates range from 1%-15%), and even if you are bitten, the ticks have to be on you for 24 hours or more for you to become infected with lyme disease. Typical disease symptoms include fever, headache, fatigue, and a characteristic skin rash. If not treated, it can cause severe neurological problems. To prevent tick bites, wear clothes that cover your skin, and avoid contact with overgrown grass, brush, and leaf litter. Also, always check your clothes and skin when you leave an area and remove any ticks that may have climbed on you.



SOIL EROSION

Soil erosion occurs when soil is “moved” from one place to another. *Background erosion* has been occurring for 450 million years, since the first soils were formed on earth. Such erosion removes soil at roughly the rate as it is formed. *Accelerated soil erosion*, on the other hand – or loss of soil at a much faster rate than it is formed -- is a far more recent problem and is the result of unwise actions by people such as overgrazing, faulty road construction, and poor cultivation practices. These leave the land unprotected and vulnerable and during periods of heavy rainfall or high wind, soil can be moved.



Some soils are more likely to become eroded than others. For instance, here in the Sierra foothills, soils are generally more stable and less erosive than those in the coastal mountains. Accelerated erosion can affect both natural and agricultural areas and is one of the most serious and widespread of today’s environmental problems. Industrial agriculture, deforestation and urban sprawl are just some of the activities that contribute significantly to this problem.

