

ADVANCED Features Information for A.R. Docents rev. 6.1.23

This document includes photographs and information about many things (“features”) that one encounters while walking the trails in Armstrong Redwoods and Pomo Canyon.

The Features Cards are divided into two groups. Docents should become familiar with the **BASIC** Features first. They are the most conspicuous features that visitors will notice. These are the **ADVANCED** Features Cards. They provide information about many other features in Armstrong Redwoods and Pomo Canyon.

The **BASIC** Features Cards for Armstrong Redwoods and the Pomo Canyon area are another document.

Some features, such as the Parson Jones Tree and Date Round/History Log are found only in Armstrong Redwoods, but Pomo Canyon has many similar features, such as nurse logs, trees sprouting from root crowns, and family circles.

A caution: It is good for a docent to have lots of knowledge. We must, however, not yield to the temptation to be just a lecturer...a “sage on the stage.” Our purpose is not just to inform. More importantly, our purpose is to help people come to love and understand the habitat and to care for it so that they want to become stewards... caretakers. Your job is not to be a font of knowledge. It is to be someone who helps people develop an appreciation and understanding...a “guide on the side”.

And...rather than just telling facts and names, we should be encouraging people to think and wonder. One way to do that is to ask them questions and encourage them to try to figure out answers. Look for ways to help people make a **connection** with the features.

The images and information are laid out in such a way that you can print a page and then cut it into two 5” x 7” sections, glue them back-to-back, and then laminate them so that you can easily carry them with you as you learn about the features.

This is a “living document.” It will be updated and revised periodically.

Credits:

This document was prepared by Mike Roa, Stewards docent, with help from:

- Leslie Carrow, Rachel Hallaway, and Scott Lawyer, Stewards staff
- Hollis Bewley, Greg Corby, Karen Gebbia, Beth Lamb, and Nina Lowrey, Stewards docents
- Sources of images are indicated on the “cards.”

Armstrong Redwoods Features Information for Docents

These pages show many of the features found along the trails at Armstrong Redwoods. They are intended for docent education. There are many more features illustrated than one would share with any one visitor group, but it is useful for docents to have the information in their mental tool box so that they can share it as appropriate, depending on the ages and interests of visitors.

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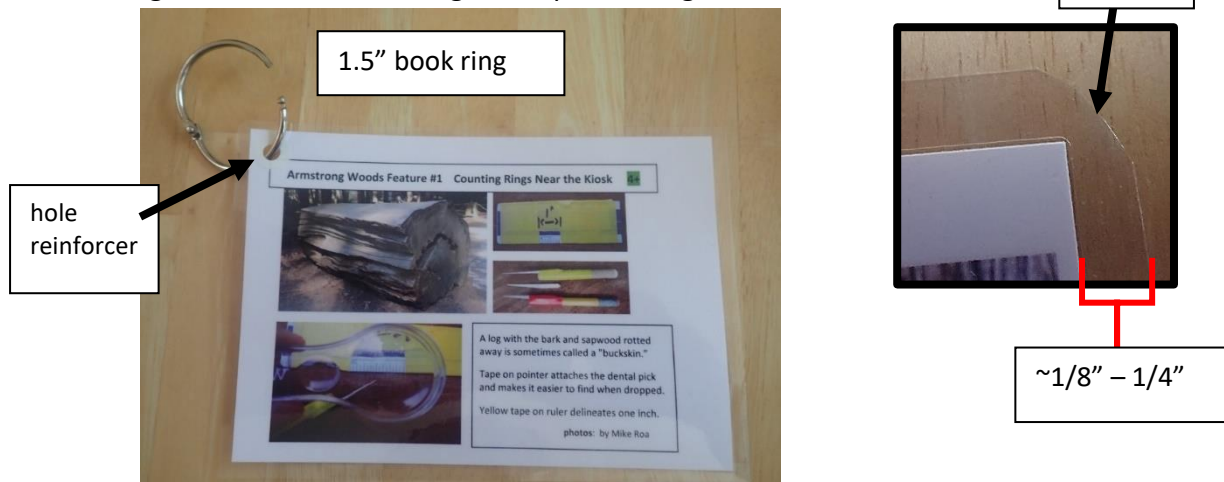
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Laminating and Binding Cards:

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ADVANCED Features Cards

Advanced Features Cards: After becoming familiar with the BASIC Features Cards, docents should become familiar with these features as they continue to develop their docenting skills and knowledge.

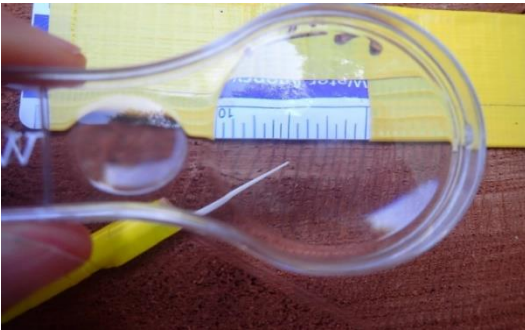
Key: The AR at the start of the number indicates that it is a feature in Armstrong Redwoods. PC indicates that it is a feature in the Pomo Canyon area. AF indicates that it is an “Advanced” feature.

Advanced Features Cards for Armstrong Redwoods

- | | |
|---|--|
| AR AF-1. Counting Rings Near the Kiosk | AR AF-10. Acorn Woodpecker
and Granary Log |
| AR AF-2. Nurse Log | AR AF-11. Burl Growing Between Trees |
| AR 4AF-3a. Log Across Fife Creek | AR AF-12a. Fallen Giant |
| AR AF-3b. Stump along Pioneer Trail
between Burbank Circle and
the Armstrong Nature Trail | AR AF-12b. Fallen Giant – Beetle Galleries |
| AR AF-3c. Tall stump along the Discovery
Trail near the Armstrong Tree | AR AF-13. Base of Tree by Fife Creek |
| AR AF-4. Leaner | AR AF-14. Partially Healed Stump |
| AR AF-5. Another Family Circle
(see also Basic Card #BF-11.) | AR AF-15. Acorn Woodpecker Granary |
| AR AF-6. Root Masses | AR AF-16. Large Goosepen |
| AR AF-7. Redwood Seedling in Stump | AR AF-17. Memorial and Mosquitoes |
| AR AF-8. Cut Log on Trail (Rings and Rot) | AR AF-18a. Log with Beetle
Engravings and Holes |
| AR AF-9. Erosion Control/Hiker Safety | AR AF-18b. Insects that Feed on Redwood |
| | AR AF-19. Stream Bank Erosion
Control Efforts |

Advanced Features Cards for the Pomo Canyon area

In case you re in the Pomo Canyon/Willow Creek area and want to show features to visitors, here are the “advanced” features for that area. They are in this document after the Armstrong Redwoods Features Cards.



A log with the bark rotted away is sometimes called a "buckskin." Even though it has little tannin, the sapwood may remain because it dries out too much to support fungus that would rot it.

colored tape on the pointer attaches the dental pick and makes it easier to find when dropped.

Yellow tape on ruler delineates one inch.

photos: by Mike Roa

This log is near the start of the Pioneer Nature Trail. Kids often want to climb on it. Tell them not to. If several groups are starting their tour at the same time, one group can spend a while at this log to allow for separation between groups.

Materials: tape measure, magnifier, pointer, plastic ruler section. Note pad and pencil for math.

(You can use a dental pick for a pointer or make one by taping a dental pick to a short length of dowel or pencil that does not have a point. (Using a pointed pencil is likely to mark the sanded area.)

This log has a radius of about 35 inches, which gives it a diameter of just under six feet.

It has around 800-900 growth rings.

Kids can work in groups of 2 to count rings in sanded areas at both ends of the log. Have them use a plastic ruler, magnifier, and pointer to count the rings for one inch.

- Have 2 students use a tape measure to estimate radius by measuring it in several places. (~35")
- Have several teams count rings for one inch in various areas... towards the center, middle, and outside. (*Ask why they should measure in several different areas.*)
- They will probably find 24-27 rings per inch. Round to 25 per inch. Ask: **At that rate, how many inches would represent 100 years? (four). So if the log is 32" in radius, how many years would that represent?** $32/4 = 8$, so 800. (Or, have them count how many hundred years as you point out 4" sections of the tape measure from the center and move out towards the circumference/edge.)
- Have them calculate how long it took that tree to grow a foot in radius and in diameter.
- Have them remember the approximate age and discuss when you get to the Parson Jones tree.

AR AF-2

Nurse log

ALL



***How many different types plants can you see on this log?
(Don't worry about their names...
Just point to them and describe them.)***

We call this a “Nurse Log.”

Why do you think that we call it a nurse log?

Watch for these plants during our walk today, and for other nurse logs.

(Plants include hazel nut, moss, sword fern, tanoak, redwood sorrel, partly dead bay tree with some new growth at base)

photo: by Mike Roa



1. *Was that log cut, or did the top break off? What makes you do you think so?*

Cut...a break wouldn't have been so straight.

2. *Was it cut before it fell, or after? Why do you think do?*

Probably cut before it fell. If they cut it after it fell, they wouldn't have been able to make the right angle to the left and then continue downward. They probably would have cut straight through the log.

(I (Mike Roa) think that the ground level was a couple of feet below where the fern is growing. The cut is about 9' above that.)

3. *Why would they cut the tree 9' above ground?*

- a. The weight of the tree compresses the wood at the base so that it develops a wavy grain, which does not make for good lumber.
- b. The base of many older redwood trees flares out. To cut through that dense flaring would have required a lot of work that would not have yielded much lumber.
- c. The weight of the wood compresses the wood at the base making it very dense. It might be so dense that it would sink if they tried to float it down the river to a sawmill.

4. *How would they cut the tree 9' above ground level?*

They used springboards. See the "Carry Cards."

Notes: See Advanced Features Cards 3b, 3c, and Carry Cards #13-20

Other tall standing stumps can be seen near the Armstrong Tree and along Pool Ridge Road.

Photo: by Mike Roa

AR AF-3b

Tall Stump on Pioneer Nature Trail

7+



The stump at the left is on the east side of the Pioneer Nature Trail between the Burbank Circle and the Armstrong Trail intersection. It is between the Bracken Fern and Douglas-fir interpretive signs.

The stump below is on the west side of the trail near the stump shown at the left.

Compare to Advanced Features Cards 3a and 3c



Photos by Mike Roa

AR AF-3b

Tall Stump on Pioneer Nature Trail

7+



The natural height at which one would saw a tree by hand would be between waist and chest height. The lower stump pictured on the other side was probably around waist height if the loggers stood on the downhill side.

There are several reasons why a logger might cut a tree high above the ground.

- The wood might be so compressed that the grain became wavy (“ribbon wood”), which makes for poor lumber.
- The compressed wood might be so dense that it would sink in the river when floated to a mill.
- The usual reason is that the trunk flared out at the base. The flared wood would provide very little lumber for a lot more sawing.

In this case, it was cut about 8’ above ground level. There may have been flare, or maybe the burl on the left side of the trunk would have made it hard to saw by hand.

Other tall stumps can be seen near the Armstrong Tree (across the trail from the Hazelnut interpretive sign), along Pool Ridge Road, and elsewhere Armstrong Redwoods. Photo by Mike Roa

AR AF-3c Tall Stump along Discovery Trail near Armstrong Tree 7+



AR AF-3c Tall Stump near Armstrong Tree 7+

Look for this stump as you approach the Armstrong Tree along the Discovery Trail. It is on the west (left) side.

The stump was cut about 8' above ground level, possibly to get above the burls, which would have been hard to cut through.

West of the stump is the large tree that fell in January of 2023. The base of that tree is visible to the left of the stump in the photo. The caution tape was in place for a while after the tree fell.

See also Advanced Features Cards 3a and 3b.

Photo by Mike Roa



What is happening with those trees?

Wood and bark cells are produced by the cambium layer, which is just under the bark. When the bark rubs off of trees, the cambium layer is exposed.

In this case, the cambium of the trees have started to produce new wood or scar tissue.

(This is essentially like grafting that some gardeners and fruit tree growers do.)

Right photo: What is happening to the scar tissue?

Do you think that the split will heal, or continue to grow?

What do you think will be there in 100 years?

Let's meet back here then and see!

AR AF-5

Another Family Circle

docents



This family circle is about 100 paces north of Regeneration sign, across from the dinosaur. (The opening is to the east of the trail, so you won't be able to take the group there, but the photo taken from inside the circle shows the circular arrangement of the sprouted trees.)

An estimate of the size of the stump in the center of this family circle indicates that the tree was probably even larger than the Colonel. Armstrong and Parson Jones trees!

photo: top by Mike Roa bottom by Greg Corby

AR AF-6

Root Masses

ALL



Left photo: ask: ***Do you see a dinosaur over there?***

What is it really? (roots)

What is it covered with? (moss)

Does it look like any other kind of animal?

right photo: ask: ***What does this root system look like to you?***

Tyrannosaurus rex skull? Triceratops? Wild boar skull?

What part of the tree is it?

photos:: by Mike Roa

AR AF-7

Redwood seedling in stump

4+



In order to sprout, a plant seed needs soil and moisture, and in order to grow it also needs sunlight.

This redwood tree probably grew from a seed that fell into the rotting center part of the stump. The rotting wood acts as a sponge, absorbing and holding water and decomposing leaves that nourish the seedlings.

Fungus needs moisture, and the outer part of the trunk tends to dry out too much for fungus to thrive. This is called “case hardening.”

What else is growing on the stump?

Could it be called a nurse stump?

Watch for other nurse stumps along the trail.

photos: left by Greg Corby

right by Mike Roa



Chemicals called tannins give redwood its beautiful color.

Insects and fungi don't like tannins, so redwood is **resistant** to rot and insects.

The longer a redwood tree grows, the more tannins collect in the heartwood.

But the resistance is not perfect...Redwood will eventually rot, and insects will attack redwood.

Sapwood tends to dry out sooner than the heartwood, and fungi need moisture to thrive. So sapwood in a log may remain fungus-resistant even though it doesn't have much tannin.

What might live in the holes in this log?

What would the forest look like if redwood trees never rotted?

(The insert shows rot development in sapwood but not heartwood.)



Photos: by Mike Roa

(between the Armstrong Tree and the section of trail with railing, on uphill side.)

What do you think those pegs are for? Why were they put there?

This is a place where some people walked off the trail.

Branches were put behind the pegs to keep people from doing that.

Why do you think we don't want people going off the trail and around trees on the hillside?

When people walk off of the trail, they knock the leaves out of the way, exposing bare soil to rain and wind, which causes erosion. The leaves provide ground cover, preventing erosion on hillsides. (The hiking trail is fairly level, so the water doesn't run off very fast. Therefore, the soil doesn't erode soil very fast.)

Also...***Do you see any plants growing on the trail?*** When people walk off the trail they trample whatever plants might grow there. When they stay on the trail, such trampling is contained to the trail area.

And... People who go off the trail are more likely to trip or fall and get hurt.



What made the holes in this log? (The log is on the north side of the trail.)

Were the holes made from the inside or outside of the branch?

There are several kinds of woodpeckers that live in Armstrong Woods.

One of them, the **acorn woodpecker**, made these holes in this branch when it was on the tree, and stored acorns in them.

As they dry, the acorns shrink. The woodpeckers will move an acorn from a hole that is too big to a smaller one so that it doesn't fall out.

The woodpeckers eat the acorns and insects that feed on them.



The larger tree is growing a large burl. The burl has grown into the smaller tree and may either eventually push it over or it may rub the bark off and the two trees may grow together (forming a graft) like the tripod tree seen early in our walk.

photo: by Mike Roa

AR AF-12a

Fallen Giant

ALL



Feb 12, 2020



May 6, 2021

This tree is sometimes called the **Fallen Giant**.

What do you think killed it? It was probably killed or at least weakened by the fire in 1923, but didn't fall until 1984.

What evidence do you have for your answer?

photos: by Mike Roa



Notice how thick the bark on the tree is. That thick bark and the sap and tannins in the tree help protect it from insects. However, when the tree dies, a variety of beetles sometimes lay their eggs in the tree. Those eggs hatch into larvae that feed on the wood (xylem) and the cambium and phloem layers under the bark. The marks on the wood (the "gallery") show the path that the beetle larvae made as they fed.

The 2020 Walbridge Fire obliterated most of the galleries, but some are still (barely) visible. A page that shows some insects that attack redwood follows later in this document.

The galleries were likely made by the Spiny Wood Borer or some other long-horned wood boring beetle. The holes are where the larvae bored out of the wood and fed on the phloem and cambium.

Other beetles, called Bark Beetles, form galleries as they feed on the cambium and phloem.

Bark beetles are also called "engraver beetles."
Why is that?

Notice the bark that has fallen from the tree. Native Americans used slabs of bark and wood from fallen/shattered trees like the one near the start of our walk to build various structures. A tree like this would be their lumberyard!



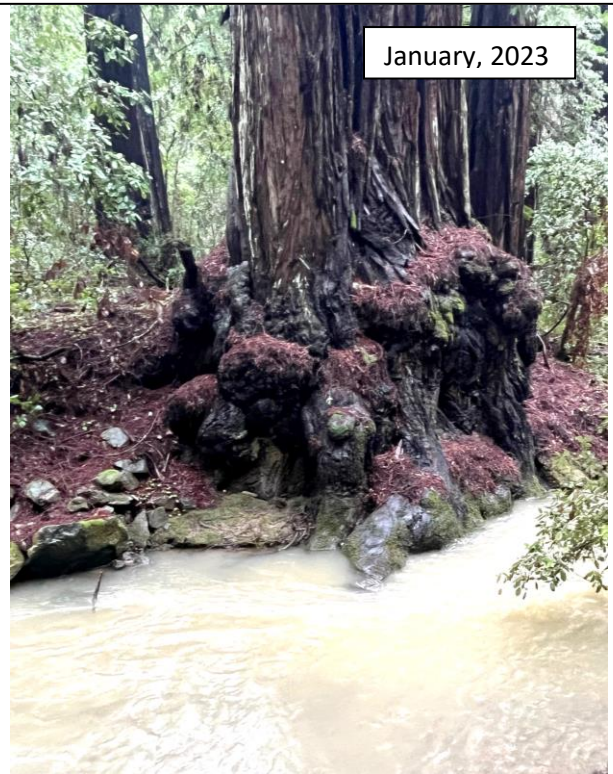
photos: by Mike Roa

A shattered tree in Humboldt Redwoods St. Pk.

AR-AF-13

Base of Tree Along Fife Creek

4+



What has happened to the soil at the base of this tree?

Every few years, heavy rains cause Fife Creek to become a raging torrent. (The Russian River flooded 38 times between 1940 and 2019! That's about every other year for 60 years!)

That running water erodes the soil from the bank. Eventually this tree may be undercut and fall.

Even though redwood roots generally don't go very deep, these have grown downward along the creek bank. **Roots seek water.** For most redwoods, that means **spreading out near the surface** to catch rain and fog drip, which may not sink very deep into the soil.

This tree is next to Fife Creek, which dries up in the summer, but **still has water several feet down in most summers.**



This tree is sometimes called the Troll Tree. Can you see why?

photos: by Mike Roa

AR AF-14

Partially Healed Stump

7+



When approached from the west (from the Armstrong Tree direction), this “healing stump” is about 60-70 paces west of the intersection of the Discovery Trail and the Pioneer Trail.

Approaching from the west, it appears to be a pretty complete stump. (left photo)

From the other side, though, it can be seen that most of the stump has rotted away. The outer part of the stump hasn’t all rotted, possibly because fungus needs moisture to thrive and the outer part tends to dry out. This is called “case hardening.”

The roots survived long enough, though, for considerable healing on one side.

I (Mike Roa) would be surprised if the resources stored in the roots alone were enough to sustain the healing/scarring process long enough to form that much wood. It seems like it would have taken several years. So I suspect that there were root crown sprouts at one time.

So I wonder if maybe the tree was cut and some stump sprouts supported it for a while but have since died. (True stump sprouts don’t tend to live as long as trees that sprout from the root crown/root collar.)

photos: by Mike Roa

This piece of wood is near or in a root pull just east of the "healing stump.



Stand the wood up so that visitors can see the holes. Show both sides.

Ask visitors what might have made the holes.

Ask whether the holes are on the inside or outside of the tree, and how they know. (Inside, as shown by the curve of the wood.)

Ask how the woodpeckers made the holes on the inside.

(The wood is from a snag... the rest of the tree had rotted away or was burned.)

Ask where the snag is and how the specimen got here. The nearest snag is a bit farther east on the trail. The specimen was probably put here by people or may have been moved when Fife Creek flooded.

The specimens at the right are from the top of a living redwood that fell across the creek in the Walbridge fire in 2020. The top of the tree was dead and rotting. Watch for these specimens on the creek side of the trail.





Visitors may want to exit through the "back" side of the goosepen. Tell them not to do that...Coming out that side puts them on the "wrong" side of the fence.

This large **goose pen** can hold a lot of people.

What kinds of animals might live in a goose pen? (bats, various invertebrates, and others)

NOTE: The opening has been fenced off, presumably to protect bat habitat and because the roots at the entrance become dangerously slippery when wet.

Do not allow people to go into the fire cave.

(From a little to the east (towards the road), looking south (towards the entrance) you can see a tall tree that broke off in a wind storm and is growing a couple of new trunks from the top.)

photos: by Mike Roa

AR AF-17

Memorial and Mosquitoes

4+



This memorial was made to honor Marcus Flohr, who was sheriff of Sonoma County in the early 1930s. This resting spot and watering hole was created in 1934 in his memory by the Sonoma County Sportsman's Club.

When there is water in it, mosquitoes lay their eggs here.
Look for larvae and pupae in the water.

What does the word mosquito mean in Spanish?

(mosca is "fly"; -ito means little, so mosquito means "little fly.")

Photo credits:

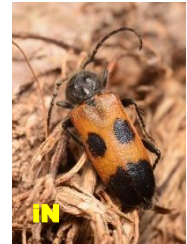
Mosquito larvae (left): from Flickr, by Jenn Forman Orth
Mosquito pupae (middle): from Flickr, by IAEA Imagebank
Mosquito adult (right): from Flickr, by Volkmar Becher
Memorial: by Mike Roa



Spined wood borer adult and larva



Long-horned wood boring beetles.
Many adults feed on flowers.



(This log is beside the trail almost to picnic area)

What made the grooves and holes in this log? (beetles)

The grooves are called “galleries”. They show the path that the larvae took as they fed on the cambium and phloem. The holes are where the beetles emerged from feeding on the wood (xylem).

Are all of the holes the same shape, or are some round and some oval?

Different shapes may indicate different types of beetle, or maybe just different angles of exiting the wood. Different types of beetles also make different patterns in their galleries.

Long-horned wood boring beetles are also called round-headed wood boring beetles. They lay their eggs on the surface of the bark and the larvae bore into the wood (xylem). Later the larvae bore out from the wood and feed on the cambium and phloem under the bark, making a sort of meandering path in the wood as they feed. Their larvae make round or oval-shaped holes.

(In contrast, bark beetle females bore through the bark and feed on the cambium and phloem while laying eggs in an “oviposition gallery”. The eggs then hatch and feed laterally, making a sort of centipede-like branched pattern as they feed on cambium and phloem. See card 18b)

Photo credits:

Spined wood boring beetle (*Trichocnemis*) adult: from iNaturalist, by W. Mason

Spined wood boring beetle larva from iNaturalist, by “true72”

Top right (on sword fern): long-horned wood boring beetle (*Dorcasina*) : from iNaturalist, by Tony Iwane

Lower right: Large Cedar Borer (a long-horned wood boring beetle) (*Semanotus*) from iNaturalist, by “Buddy”)

Log by Mike Roa

4 mm (< 1/4)

Redwood Bark Beetle *Phloeosinus*

The grooves in the log were made by **Bark Beetles**, also called Engraver Beetles. Bark beetles feed on the cambium and phloem layers under the bark. Look for these “galleries” on branches along the trails.

Note that the Redwood Bark Beetle pictured is actually only about 4 mm long... < 1/4” Different bark beetles make different patterns in their engravings or galleries. The Redwood Bark Beetle's gallery looks a little like a centipede.



Termites will attack redwoods, accessing the wood where branches break off or the bark is compromised in some way. Note that the termites have fed on the sapwood in the lumber but hardly touched the heartwood, which has more tannins.

Termites and termite damage to redwood lumber



FCC



Long-horned (Round-headed) Wood Boring Beetles make round or oval holes. Holes in the sapwood in the right photo were likely made by the Spined Wood Borer (below)

The undigested waste, basically sawdust, fills the tunnel as the larva moves through the log. It is called “frass”.



The California Prionus (root borer) beetle (above) is a long-horned wood borer whose larva feeds on the roots of many types of trees.

Other insects that will attack the wood include flat-headed wood borers, powder post beetles and carpenter bees. There are also several insects that feed on the leaves/needles.



Photo credits: Bark beetle: From Forestry Images.com by Javier Mercado
Bark beetle galleries by Mike Roa
Termite-damaged wood from Reddit by u/sverdrupian
Termites: from Flickr, by Don Loarie
Spined wood borer from iNaturalist, by W. Mason
CA. Prionus adult: from iNaturalist, by Cynthia Bardouka-Large
CA. Prionus larva: from iNaturalist, by Richard Wasson
round with hole and rulers, by Mike Roa



Fife Creek flows through the valley in Armstrong Woods. Over the years, the creek erodes its banks and changes its course.

In the winter of 1964-65 there were HUGE floods in northern California. People became concerned about the possibility of Fife Creek eroding its banks and undercutting trees and the road. So they installed concrete slabs, bags of concrete, and logs to try to prevent erosion. (This is called “revetment.”)

Unfortunately, revetment like that has a negative impact on fish habitat. Also, when the water hits the concrete and logs, it tends to reflect back and erode the opposite bank. In many places, such creek bank alterations are being removed and replaced with placement of “large woody debris” (logs) carefully placed in the creek bed.

What might happen if the creek erodes its banks and changes course?

(Things like roads and trails may be damaged and trees may be undercut and fall.)

photo: by Mike Roa



Pomo Canyon Features Information for Docents

rev. 6.30.21

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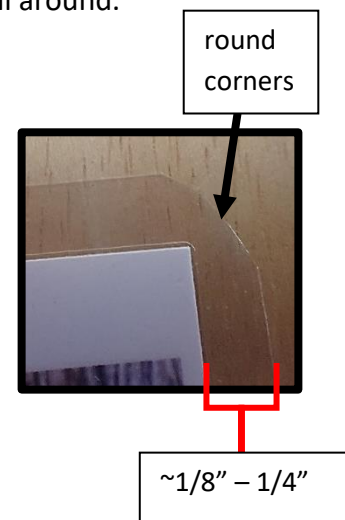
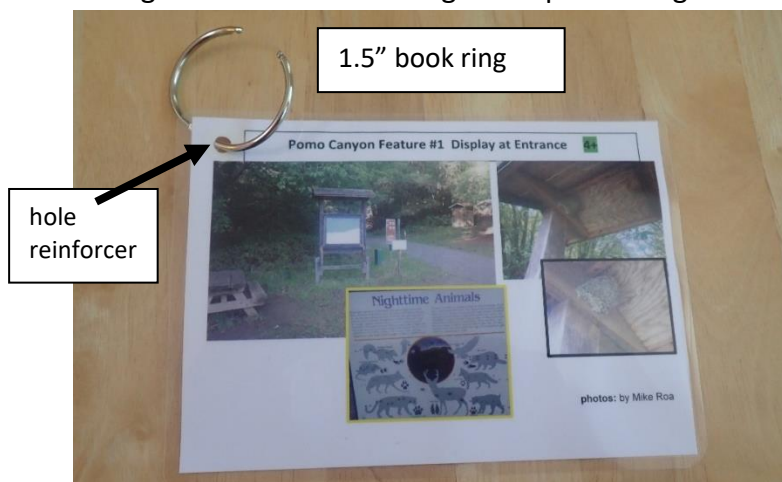
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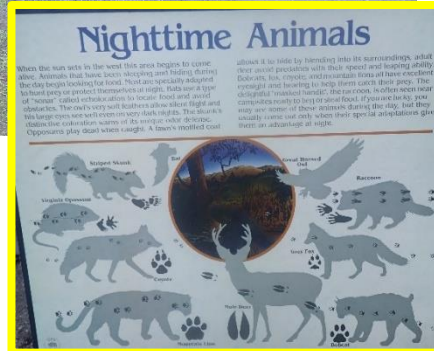
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ADVANCED Pomo Canyon Features Information:

POMO CANYON ADVANCED FEATURES CARDS:

- PC AF-1.** Display at Entrance
- PC AF-2.** Bands of Vegetation
- PC AF-3.** Alder
- PC AF-4.** Misshapen Redwoods
- PC AF-5.** Split Douglas-firs
- PC AF-6.** Springboard Notches
- PC AF-7.** Beetle Holes
- PC AF-8.** Bracket Fungus
- PC AF-9a and PC AF9-b.** Stump Enigma (9a) and Regrowing Stump (9b)
- PC AF-10.** Large Flared Stump
- PC AF-11.** Goose Pen?
- PC AF-12.** Stream Bed and Rocks
- PC AF-13.** Small Stump with Notches
- PC AF-14.** Fallen Douglas-fir
- PC AF-15.** Redwood Log with Beetle Signs
- PC AF-16.** Large Stump Across Stream
- PC AF-17.** Roadside Plants
- PC AF-18.** Roadside Plants for Docents



photos: by Mike Roa

Check the display for any new or pertinent information.

On the back of the display is a graphic showing "Nighttime Animals", including tracks.

As this is written, there is a bird nest under the display roof. Cliff swallow?

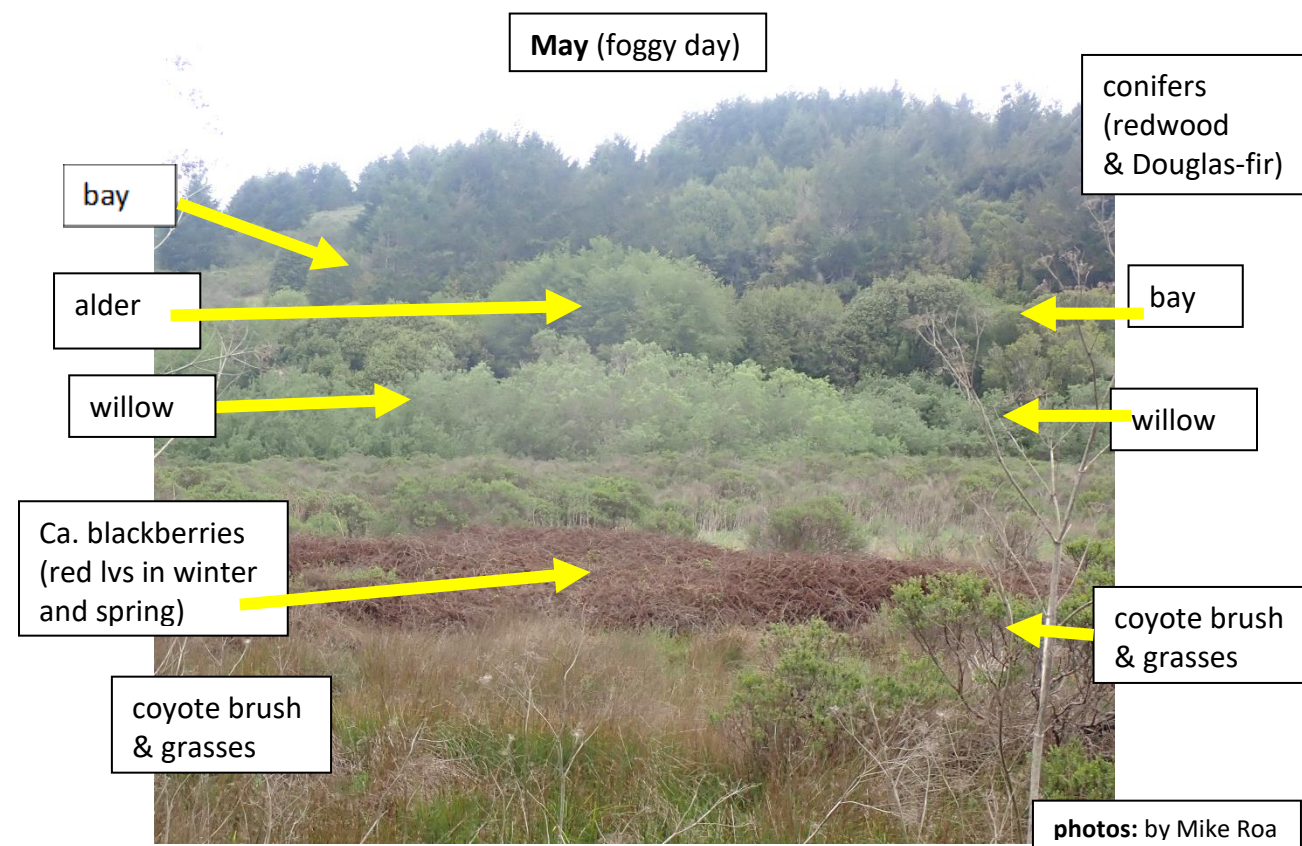
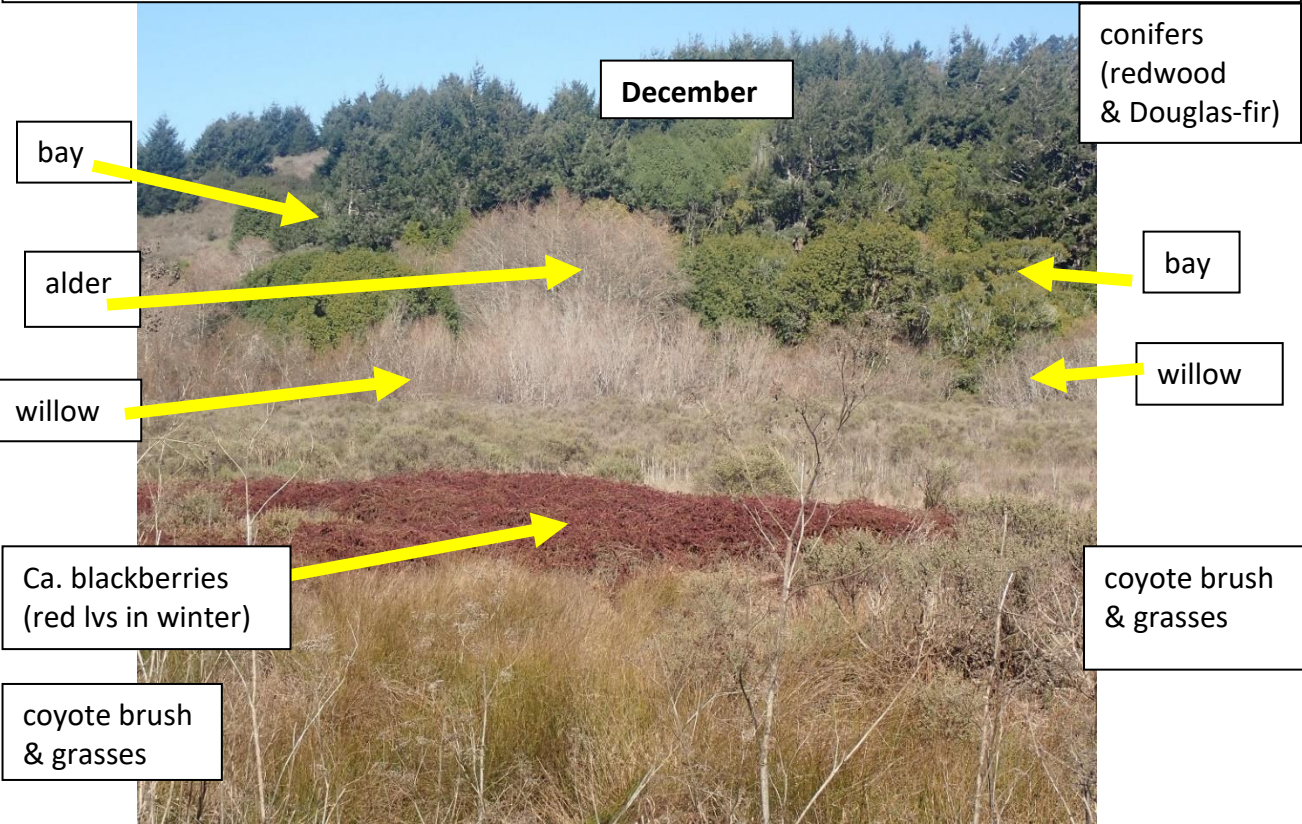
Ask students what it is.

(The focus of kindergarten social studies and science is "homes.")

See Pomo Feature Cards 2 and 3:

Looking eastward from the parking area one can see bands of different types of plants. The bands form because different plants need (or tolerate) different amounts of light and water.

PC AF-2 **Bands of Vegetation** **4+**



PC AF-3

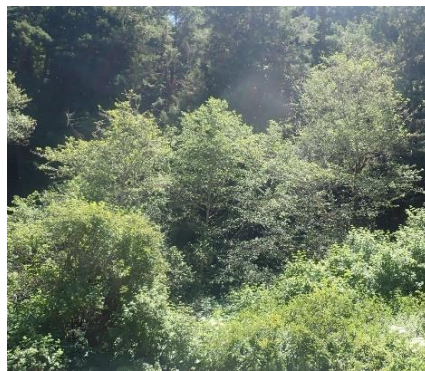
Alders

7+



Red Alder trees along Willow Creek Road (left) and from Pomo Campground parking lot (above center and right) in **December**

photos: by Mike Roa



Red Alder trees along Willow Creek Road (left) and from Pomo Campground parking lot (above center and right) in **June**



Most stands of redwood trees have an occasional tree that is misshapen, but for some reason there are many such trees at Pomo Canyon.

Some were probably broken during wind or (rare) snow storms, and the new branches grew outward as they grew toward sunlight.

(Several examples are visible at Campsite 1. Have visitors watch for other examples as they walk through the campground.)

photos: by Mike Roa

PC AF-5

Split Douglas-firs

7+



From the trail near campsites 1-3 one can see several Douglas-fir trees that have double trunks beginning part way up. Another (below) fell across the trail southwest of campsite 6.

This may have been caused by an animal such as a squirrel or porcupine feeding on the growing tip of the young tree.



Fallen Douglas-fir
between campsites
8 and 9.

photos: by Mike Roa



Stumps with Springboard notches at Campsite 16 and near Campsite 21.

Most of the stumps in the Pomo Canyon Campground are tall. (We did a quick survey of the stumps between the creek and the base of the hill to the southwest of the trail, from Campsite 11 to Campsite 21. Of the 74 stumps measured, the average height where it was cut was 5.5 above ground! And that included 23 cut at 3' or lower. The other 51 averaged over 7'!) A little beyond Campsite 21 and across the creek there's a stump that was cut 17' above ground (on the downhill side)! (See Pomo Canyon Features cards AF-11, AF-13, and AF-16.)

WHY were the trees cut so far above ground?

- 1) The trees were so massive that they compressed the wood at the base so much that it became so dense that it would sink when they tried to float it to Duncan's Mill.
- 2) The massive trees also compressed the wood at the base so that it became wavy, which makes for pretty wood, but it isn't good for lumber.
- 3) Often, the bases of the trees were flared. Cutting through the wide, dense wood of the "butt flare" would be a lot of work for little usable lumber, so they cut above the flare.

HOW were they cut so far above ground?

The loggers would cut a series of notches in the thick bark and insert "spring-boards" on which they would stand. Many of the stumps in the valley floor don't show notches, possibly because the bark was so thick that the wood itself wasn't notched. Most of the stumps uphill (between Campsites 1 and 10) do show notches, maybe because the trees were smaller and had thinner bark. (See Carry Cards)

PC AF-7
Beetle Holes
7+



This stump is found on the downhill side of the trail from campsites 1-10, just before the trail joins the trail at the bottom of the canyon*.

Several holes made by emerging wood boring beetles can be seen.

Some people think that redwood is immune to attack by fungus and insects.

Rather, the tannins that give redwood its red color, in conjunction with its thick bark, make it resistant to insects and fungus, but not immune.

Ask: *What would the forest look like if redwood were truly immune to attack by insects and fungus?* (The forest floor would be a pile of down wood that hadn't decomposed!)

Another stump with beetle holes is just beyond the bridge that leads to campsites 17-19, between the trail and the creek. (See photo at right.)



photos: by Mike Roa

PC AF-8

Bracket Fungus

ALL

below: in creek bed near campsite 11.



Right and below: bay tree by trail between campsites 12 and 14. The fungus was broken off in 2021, but it may regrow



These are a kind of fungus called Bracket Fungus, Shelf Fungus, or Artist's Conk.

These pictures were taken in the winter. Notice the brown spores coating the bay tree below the fungi.

Why would they be called shelf fungus?

Why would they be called Artist's Conk?

The underside of the fungus is soft and white. If it is scratched, it turns brown. Sometimes people break them from the tree or log and draw on them.

Would it be okay to break these off?

Why not? (Someone broke them off in April of 2021. Let's hope they regrow.)



Image at right from Flickr, by Joyce
other images by Mike Roa

PC AF-9a

A Stump Enigma

7+

You probably won't share this with visitors.

The pictured stump is between the trail and the creek, in the fenced off Fragile Area, not far beyond campsite 12 as you enter the valley.

If you look closely, you can see that the loggers started to fell it about 3 feet off the ground. The horizontal saw cut is only part way through, and you can see that they used axes to complete the undercut.

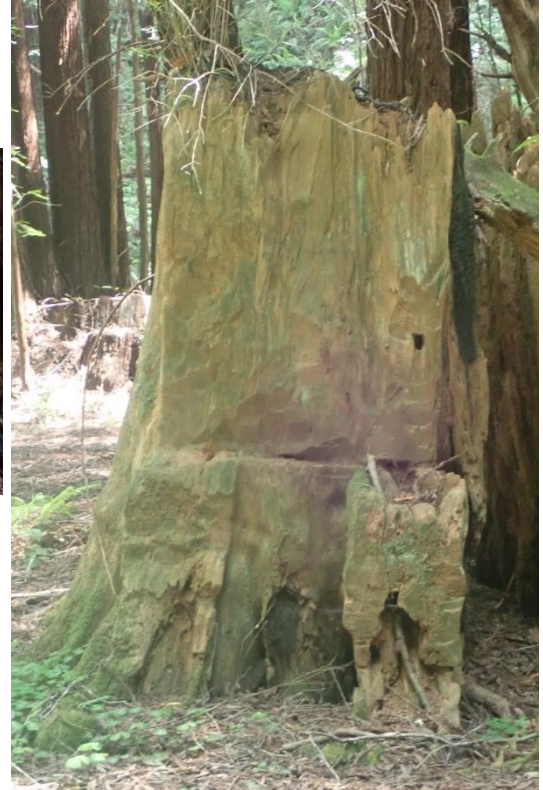


For some reason, they then cut it about 7 feet above ground.

There's another similar stump nearby, with the partial undercut at about 2.5' above ground and the final cut at about 13'

Why did they start a low cut and then cut higher?

Photos: by Mike Roa



PC AF-9b

A Regrown Stump

DOCENTS

You probably won't share this with visitors.

The pictured stump is between the trail and the creek, in the fenced off Fragile Area. It isn't far from where the trail comes down from campsites 1-10.

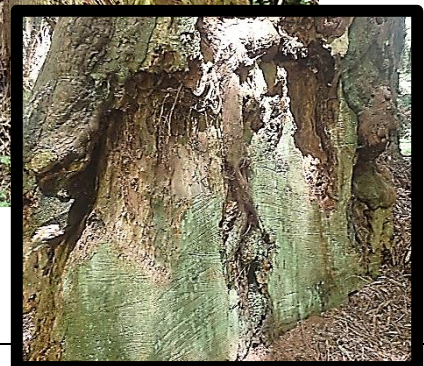
From the trail, one can see a cut stump with a tree growing to the left, and the tree has some burls formed around the base.



On the other (creek) side, there is a large vertical cut.

I (Mike Roa) think that someone cut off a very large slab of burl wood there.

Photos: by Mike Roa



PC AF-10

Large Flared Stump

7+



same stump from uphill side

This large stump is near the end of the fence on the west side of the canyon floor trail, just before the trail from campsites 1-10 joins the canyon floor trail.

It was cut about 15' above ground level. It was probably cut that high to get above the wavy wood at the base, which makes poor lumber, and because it flared out at the base. (Cutting through the flared base would be a lot more work for not much lumber.)

I estimate that the tree probably had a diameter of around 15' at the base and around 12-13' where it was cut. (A circle with a 15' diameter would have an area of ~177 square feet, while a 13' diameter circle would have an area of only ~133 square feet. So cutting at a 13' diameter would reduce the sawing by about 25% as compared to cutting at a 15' diameter.)



photos: by Mike Roa



photo: by Mike Roa

All of the large trees in Pomo Canyon were cut and removed prior to the last fire, so no goosepens were formed in living trees by that fire.

But some of the stumps are hollowed out, especially on the uphill side. Some of these may have been goosepens that formed before the tree was cut.

The stump pictured is across the trail from campsite 14. No charring is evident on the top of the stump, which may indicate that it formed before the fire, but when the tree was cut above it the newly cut wood was uncharred. Or maybe the charred wood from the top has just worn away in the last 100 years.

They may also have formed in stumps when the fire came through.

Note that the most severe burning was usually on the uphill side, where fuel accumulated.



Most of the rocks in the stream bed are a sedimentary rock called greywacke. But chert, blueschist, and serpentinite may also be found.

Note the roots hanging out above the creek.

Do you think that they grew out into the air that way?

What happened to the soil that used to cover them?

Look at the rocks in the stream bed.

Are their edges completely rounded, somewhat rounded, or not rounded at all?

What causes rock edges to become rounded?

Do you see a greenish tint on the rocks? What might that be?

Look at the rocks embedded in the stream bank.

Are there rocks embedded in it?

Do those rocks look like the ones in the stream?

How do you think they got into the stream bank?

photo: by Mike Roa



Use a stick to act out cutting a tree with a whipsaw. At what level does one naturally cut the tree? (Probably around waist or chest high.)

Point out to students that many trees in Pomo Canyon were cut well above ground level. Some were cut over 10' above ground! ASK:

- (1) **WHY** were they cut so high? and
- (2) **HOW** were they cut so high?

This tree, which can be seen across the creek from campsite 21, was cut around 5' above ground. It has a diameter of only about 31 inches where it was cut.

I'm not sure why it was cut so high. (Maybe the wood was wavy even though the tree wasn't all that massive?)

Point out the roots, which have been exposed by the creek. **What will happen to the stump as the creek continues to erode the soil?**



photos: by Mike Roa

A bit past campsite 21 a Douglas-fir fell across the trail and has been cut. Growth rings can be seen in the sections that were removed and in the trunk itself.

Discuss what growth rings represent.

Students can count the growth rings to determine the age of the tree at that point.

Ask: Is the age at the point of the cut the age of the tree?

Where would we have to count the rings to get the actual age of the tree when it fell?

Have students feel and describe the bark of the Douglas-fir and compare it to redwood bark.

Several kinds of fungus are growing on the dead tree.

Discuss decomposition.

Ask: What would happen if fallen trees didn't decompose?



PC AF-15
Redwood Log w/ Beetle Signs

7+



photos: by Mike Roa

This redwood log is a bit farther along the trail.

“Engravings” made by beetles can be seen where the bark has come off, as can holes where the adults emerged.

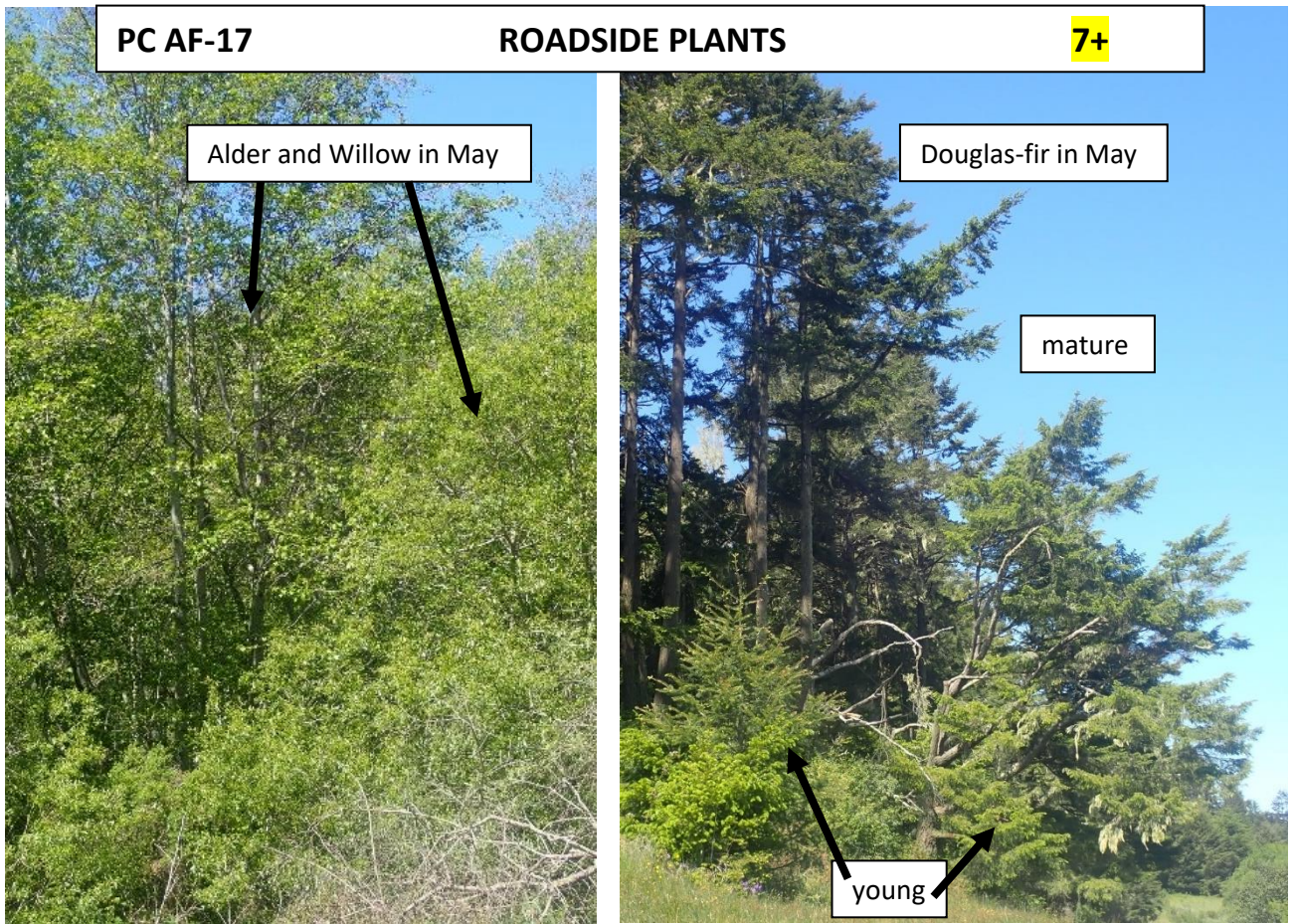


This large stump can be seen across the creek, from a little beyond the redwood log with the beetle engravings.

It has a circumference of about 38' where it meets the ground on the uphill side, but much of the tree is burned away on the uphill side. I (Mike Roa) estimate that it had a circumference at the base of about 44' when it was cut, which would give it a diameter of around 14'.

It was cut about 17' above ground on the downhill side and over 10' above ground level on the uphill side.

photos: by Mike Roa



PC AF-17

Roadside Plants

7+

Challenge students to try to identify the types of trees that they learned about today as they leave the area.

They will see:

- **red alder**
- **willow**
- **coast redwood**
- and **Douglas-fir**, at least.

Redwoods and Bay trees can be seen as they leave Pomo Canyon.

Red alder trees and willow trees/bushes can be seen along the road to Willow Creek Road and along Willow Cr. Rd.

photos: by Mike Roa

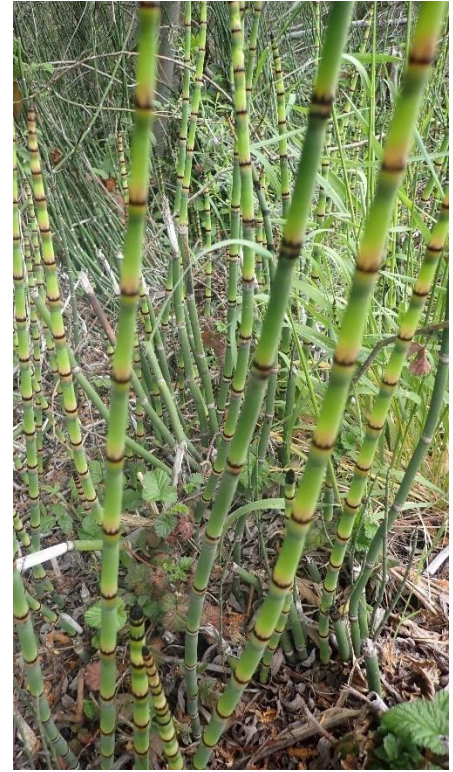
PC AF-18

Roadside Plants for Docents

As you head out from Pomo Canyon on Willow Creek Road, some scouring rush can be seen to the right of the road less than 0.1 miles after the barn.

In the early spring (May) the new plants (right) are more colorful than the older ones (left).

photos: by Mike Roa



PC AF-18

Roadside Plants for Docents

As you leave Pomo Canyon via Willow Creek Road, the dead alder tree pictured is on the left, about 0.1 miles after the first bridge that you cross (the one with the salmon painting).

If you have some time, you might watch for the woodpeckers.

If you can identify the species, please let me know and I'll update this document.

photos: by Mike Roa

