STAY HYDRATED and bring water
PREPARE for hot and sunny conditions
BREATHE in the fresh air
BRING A SNACK to refuel
BE CURIOUS AND CONNECT WITH NATURE

**REFUEL**

Turn at trail junction 16 onto Alambique Trail. You will soon find a bench where you can take a break and refuel. You have been hiking for quite a while, sweating and burning up calories. It’s time to refuel with a little water and a snack. The plants around you also use energy while creating new leaves, growing roots, and producing fruits. How do they refuel?

Look at the madrone tree growing behind the bench. It will twist and turn in its quest for sunlight. Trees use their leaves to trap light energy from the sun for photosynthesis, a process which allows them to make sugar. The sugar is transported to the roots and other parts of the tree. That is how a tree refuels.

The sapsucker woodpecker is a bird that knows how to refuel by snacking on tree sap. It drills horizontal rows of holes in a tree causing phloem sap to accumulate. The inside of a tree has tubes that transfer water (xylem) and tubes that transfer sugars (phloem). Phloem sap provides nutrients for the tree and is also made available by the woodpecker for other animals as a food source.

Also growing behind the bench is the black oak tree. Its leaves can grow up to 10 inches long and have 5-7 lobes with bristle tips on the ends. During winter it is bare but the rest of the year, it is full of leaves and acorns. The acorns are low in tannins making them a favorite food of deer, squirrels and jays. Similarly, Native Americans preferred these to other acorns.

**BREATHE**

Breathe deeply. When you exercise, your muscles need more oxygen and your brain responds by stimulating you to breath deeper and more rapidly. Your breathing may increase from about 15 times up to 40–60 times a minute; you may feel out of breath but you are conditioning your lungs and keeping them healthy. Now find a tree you can touch. Think about this, what the tree breathes out, you breathe in. Plants and trees breathe out oxygen and breathe in carbon dioxide.

Some aquatic animals, like the rainbow trout, can breathe underwater. They take in water through their mouth and then push it through their gills. The feathery gills enable them to take oxygen out of the water.

Salamanders like the California Newt breathe through their lungs while living on the land. They also spend time in water where they may stay submerged up to twenty minutes by breathing through their skin.

Plants breathe through tiny pores under their leaves called stomas. They are so tiny you can only see them through a microscope. The stomas open and close as the plants expel oxygen and take in carbon dioxide. Plants that lose their leaves in the fall breathe through their trunks and roots.

How can a tree breathe through its roots? On their roots are tiny hairs that breathe in carbon dioxide from the spaces between the soil particles. They release oxygen the same way.
You will begin your workout by ascending the Bear Gulch Trail. You will need water to regulate your temperature and to prevent dehydration. Like all living things, we need water to survive. When you reach Redwood Flat you will know you are in the redwoods. The trees will be tall and straight and the air is cool and damp. You will feel the softness of redwood needles under your feet (redwood duff). Redwoods can live as long as 2000 years and are the tallest trees on our planet. A tree that tall needs a lot of water to survive.

Most plants take in water through their roots, the redwood tree can also capture water directly from the fog and absorb it through its leaves (needles). Some of the moisture caught in the branches falls to the ground in the form of fog drip. In the dry summer months, half of the redwood tree’s water intake comes from fog.

Banana slugs often make the redwood forest their home. Why don’t banana slugs dry out? How do they stay hydrated? Slime! All parts of the slug’s body produces slime. This slime helps the slug retain moisture.

Moss is a small flowerless plant that doesn’t have roots. With no roots, it must soak up water like a sponge. A moss patch is made up of tiny plants that are tightly packed together to retain water as long as possible.

At trail junction 18 you have reached The Meadows. Congratulations! Enjoy the view of the Bear Gulch Watershed in the distance. It was a steep, steady, uphill climb and you are now at 1,430 feet elevation. This is a grassland habitat, sunny with little shade. To adapt to these conditions, we drink more water, apply sunscreen, wear a hat, and put on sunglasses. Animals that choose this neighborhood have the adaptations needed to help them survive in these challenging conditions. An outer skin that won’t dry out easily would be good. How about scales? That would work.