Can you hear the cottonwood trees' leaves rustle in the breeze?

(Spring and Summer | Grades 2-8) • **Map Stop 4** • Opposite the creek, surrounded by the trail

How loud can a tree be?

Stop at one of the cottonwood trees around the creek area during the spring and summer. Cottonwood leaves are almost heart-shaped, and the trees have white and fluffy catkins in spring and early summer (as seen in the pictures below).

*If you're visiting Twelve Hills at a time on a day without wind or leaves, scan the **QR code** or go to **youtu.be/HAV23m4mgeM** to see a video of our cottonwood trees' leaves in action!*

Background Information:

Listen: do you hear a rustling sound? How do you think the leaves are making this distinct noise?

They are channeling the **wind** in some way. Why don't all the trees around you make this sound? What is special about the cottonwood tree leaf shape or geometry that allows this tree to be this loud? Come up with a **hypothesis** of your own, and then read ahead for an answer!

Have an idea of an **ANSWER** yet? Look carefully around - you may find leaves that have fallen to the ground. Notice the long **stalk** that joins the flat leaf area to the stem - this is called the **petiole**. The cottonwood's long petiole is **flattened near the base of the leaf**. The wide flat edge of the petiole acts with the leaf to capture wind, like a little **sail**, so that even the slightest breeze can cause the leaves to move in a major way, causing that unique sound!

Why might it be helpful to be shaped like this? Look around you some more - do you see any fluffy white cottonwood **seeds** around? All that fluff helps cottonwood seeds spread out by sailing on the wind. Having petioles shaped to capture even *more* of the wind likely allows their seeds to be scattered further.

Leaf shape is one of the ways plants can **adapt** and change over time to fit the environment they live in. It probably wouldn't be useful for cottonwoods to have such big petioles and fluffy seeds if they grew somewhere without any wind, for example. Since the plants able to grow and spread best are the ones that are able to then keep growing, over time plants end up extremely well-suited to the place that they live!

Activity:

Now that we know what a windy leaf might look like, design a leaf that can survive **cold, snowy weather**. Keep in mind the sorts of problems it might face - if snow piles up on this leaf, it might break; if it can't stay warm, the water inside might turn to sharp ice and hurt the plant. Make a few notes about how your design features allow the leaf to survive. If you want to go farther, you can also add adaptations to **other parts** of the plant to help it survive in a cold climate.

After you have your icy plant, try to design a leaf that can survive in the **dry, hot climate of a desert**. This leaf needs to be able to keep as much water in as possible, and protect the rest of the plant from getting sunburnt. Once again, you can add adaptations to other parts too to help the plant survive in a desert. Make a few notes about how your design features allow the leaf to survive. For one possible design that really exists in nature (and here at Twelve Hills), check out the **Yucca** stop!

If you're curious, try looking up real-life plants that grow in those areas. Do they have leaves that look like yours? How do you think their adaptations work?