

### Part 3. Tree Density: Trees Need Space, Too

An acre is about the size of a football field. An acre should contain about 40 trees. We are going to do an exercise that will help students visualize the needs of a forest.

#### Materials

- A loaf of bread
- Peanut butter
- Jelly
- A plastic knife
- A bag of oranges
- Eight ounce drinking cups and smaller cups
- A source of drinking water

#### INSTRUCTIONS:

Make three peanut butter and jelly sandwiches. If there is anyone with allergies have him or her be the recorder. If not, the teacher will be the recorder.

1. Have four students stand in the front of the class. They are each going to represent 10 trees. Give the rest of the students the smaller drinking cups.
2. Hand the four students a peanut butter and jelly sandwich, one orange and a glass of water. Tell the class: the sandwich represents the nutrients a tree needs to grow, the orange the sunshine, and of course the glass of water is water.
3. Have each student invite a friend up to the front. This will now represent 80 trees per acre. Have the students split their peanut butter and jelly sandwich, the orange and the glass of water. Have them share these with the friends they invited up.
4. There are a few more mouths to feed. Have the class decide on two talking points they would like to record. Write them on the board.
5. Have each student invite a friend up to the front. There should be 16 students, which represent 160 trees per acre. Have the students split the peanut butter and jelly sandwiches, oranges and glasses of water. Have them share these with their friends.
6. There are more mouths to feed. Have the students decide on two talking points they would like to record. Write them on the board.
7. If you have enough students, have the 16 invite a friend up to the front. This would represent 320 trees per acre. They do not need to try and split the sandwich. They need to visualize and talk about it. How hard is it going to be to split the peanut butter and jelly sandwich, the orange and the glass of water? Ask the trees how healthy they would be if this happened year after year, for 100 years.

Ask the students to return to their seats.

## Wrap up: What it all means

Most Front Range ponderosa/Douglas fir forests exceed 400 trees per acre. Remind students about the parts of the trees. When a tree has fewer resources, it creates a small growth ring and cannot make or maintain a thick, fire resistant bark.

The sandwich represents nutrients, which are restored by one of three processes:

- First is decay. Decay requires high humidity, which Colorado lacks most of the time. Ask if any of the students have ever lived near (or visited) a coastal region; ask them to share what high humidity feels like.
- Another is to fertilize, like is done in a city park or yard. This method is very impractical and costly to do in a forest.
- The last process is fire. A low to the ground grass fire, like mentioned in the story, feeds a ponderosa/Douglas fir forest for 10 to 15 years. During this time many small and unhealthy trees are burned to create nutrients for the other trees. Fire has been suppressed in Colorado since it became a state in 1876. The federal government adopted a policy to suppress all fires in 1910. How long has it been since our forest had a good meal?

The teacher's background guide has information about the urban forest. If you are in an urban school, I highly recommend you lead a discussion about the difference between an urban forest and a wildland forest.

Finally, if you feel comfortable enough, touch on the costs and benefits of thinning trees to make a forest healthy. Removing small trees when thinning removes a valuable carbon sink. Waiting for a wildfire to thin out an overly dense forest can result in the entire forest being destroyed, which also removes the valuable carbon sink. Having experienced many catastrophic fires in Colorado, we know we have tree species that need stand replacing fires (lodgepole). We have chosen to become firewise and protect those forest types that would be destroyed by a stand-replacing fire (ponderosa).