**How fires affect forests – an introduction to ecology through math and a fun experiment**

**(By Anu Kramer version of 11-13-2015 SAFE revamp typed by Stacey)**

Our experiment is kind of like a game and all of you will be trees in the forest. And at the same time, you will be scientists, running an experiment to test your hypothesis.

Today there are 3 kinds of trees – and look at **\_\_\_ and \_\_** as examples

 *Optional: or have 3 volunteers demonstrate these*

big trees – you’ll be standing

medium trees – you’ll be kneeling

small trees – you’ll be sitting criss-cross.

can trees move their roots? Can little trees move their roots?

NO!

Can trees sway in the wind?

Yes, but in our game no trees can fall over.

 Everyone will get a turn to be a tree.

 How are we going to tell if a tree is on fire? *DEMO*

 *(wave your hands and arms so everyone can see! Up high, down low, all over)*

 This rope is the border of the Berkeley forest. Can trees move out of the forest? Nope.

First we will make some observations, then we will collect some data – just like a real experiment. We are going to make a big forest – to start, can you all stand outside the forest *(rope)* and make a line?

Let’s start with three trees – can I have 3 volunteers? – *(Big/Med/Small)*

In our experiment, some trees will catch fire!

When you’re on fire, you can reach out and try to catch other trees on fire – to do this, you must **tap** another student on the shoulder **without moving your feet. If you move your feet, you’re out!**

Let’s try (set one student on fire)

 What did you notice? Who spreads fire more easily?

New trees will come from the front of the line (or have the teacher choose good students). When you catch on fire, please leave the forest and stand at the end of the line.

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The first part of our experiment will be what happened in California a few hundred years ago --- **MORE-HIGH frequent fire.** Let’s get some trees in the forest

First forest is 3/3/3 Be sure teacher and one instructor are trees.

What does High Frequency mean? – this means that there are lots of fires, so let’s have one!

There is a lightning storm and a little tree catches fire!

But then the rain puts the fire out. What happens after the fire is out?

 1. Everybody who was on fire, please come to the end of the line.

 2. The remaining trees get bigger (med>big, small>med)

 3. Little trees start growing – add 2-3 more little trees.

Other fire starters MORE-HIGH frequent: *Use lightning strike every time to start the fires.*

*[2-3 times, then collect data on one fire for More Frequent BEFORE and AFTER*]

Now let’s have one more fire and we’ll record what happens during the experiment.

*(If numbers get wacky, re-start a fresh forest with fewer trees)*

*Small-Med-Large counts in 4-8 range*

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The second part of our experiment is **LESS/LOW frequency fire**. To make fires less and less often, we have to let the trees grow for a long time between fires. That means that more and more trees will fill up the forest.

*LESS-LOW frequent: firefighters put them out, lawnmower near someone’s home*

*Campers forget to put out campfire Electric transmission line falls during wind storm*

*Cigarette out of car window*

But then fire department puts it out because it came near a house. What happens after the fire is out?

 1. Everybody who was on fire, please come to the end of the line.

 2. The remaining trees get bigger (med>big, small>med)

 3. Little trees start growing – add 3-5 more little trees.

 4. REPEAT - Let the forest keep growing with no trees removed

*[2-3 times, then collect data on one fire for More Frequent BEFORE and AFTER]*

Now let’s have one more fire and we’ll record what happens during the experiment.

*Really emphasize that this last fire is important because it will help us test the hypothesis.*

*(If numbers get wacky, re-start a fresh forest with fewer trees)*

*Small-Med-Large counts in 10-20 range*

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Let’s calculate the change in how many trees were alive before and after the fire

What is this called? *(severity)*

The difference between trees before and trees after is the wildland fire severity

BEFORE-AFTER= SEVERITY

*Write the data on the board. Have them fill in their tables and do the math. Check answers as a class.*

Now let’s compare the results from MORE frequent and LESS frequent fires in the experiment. Did the forest change a with different fire frequency?

**Does *low* fire frequency result in *more severe* fires? YES/NO**

**Hypothesis: If fire frequency is low, fire severity will be higher.**

Do you think fire severity is influenced by the frequency of fires?

Yes!

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Closing - mixed conifer forests, like yosemite national park, have frequent fires. other places have less frequent fires, like yellowstone national park. today, things are changing in California

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