

Name _____

Date _____

Hydrofracking Fluids & the Forest

Look at the photo below. This shows how the drilling company, when they were done drilling for natural gas and were left with a lot of wastewater, began spraying that wastewater onto the forest. The bottom picture shows the results of this spraying after one year.



Figure 5.—Land application of drill pit fluids to fluid application site 1, Femow Experimental Forest, June 2008. Photo by U.S. Forest Service.



Figure 9.—Fluid application site 1, with non-treated forest in background, Femow Experimental Forest. Photo taken May 17, 2009. Photo by U.S. Forest Service.

1. Scientists observed that there were 115 trees that were visibly damaged in the area where the spraying took place in 2008, and 147 in 2009. Here are the different tree species each year:

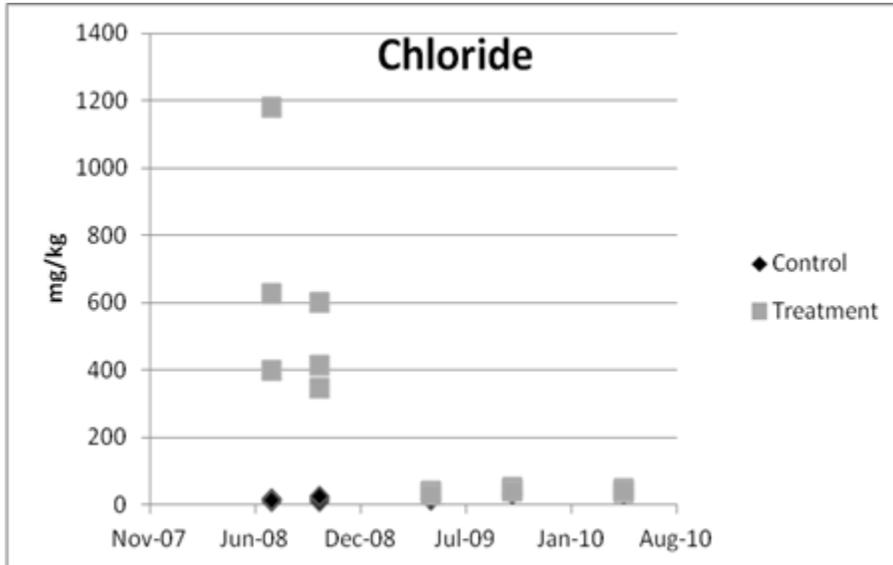
Tree species	Number damaged in 2008	Number damaged in 2009
American beech	57	57
Red maple	29	47
Sassafras	10	10
Northern red oak	6	14
Yellow-poplar	5	6
Sweet birch	4	5
Chestnut oak	1	1
Cucumber tree	1	1
Fraser magnolia	1	1
Downy serviceberry	1	3
Sourwood	0	2
TOTAL	115	147

- a. What trend do you notice between 2008 and 2009?

- b. What do you expect might happen to the number of damaged trees in 2010? Explain your answer.

- c. Do these results of tree damage support the claim you made after testing salt pollution on organisms? Explain.

2. Think back to the graphs that you made and discussed in Lesson 2. Here is the chloride graph you investigated earlier in the unit (and remember that there are other variables which showed a similar trend).



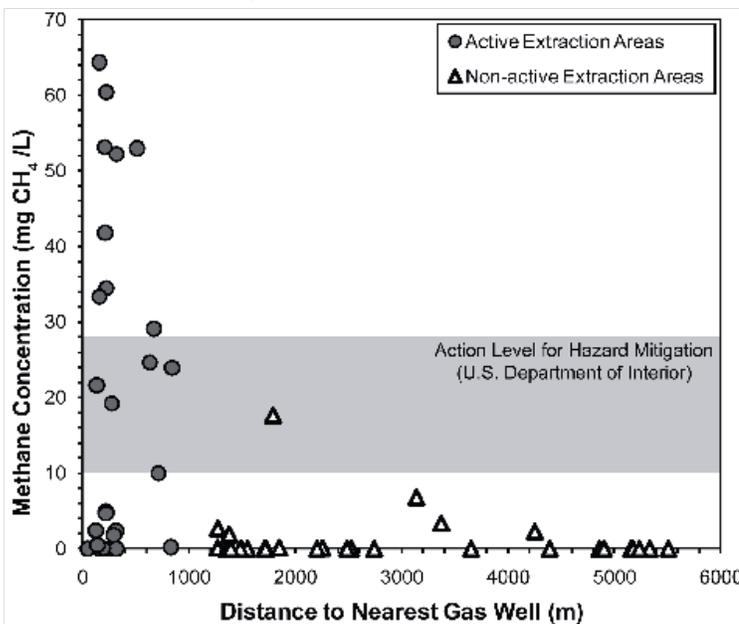
- a. Describe what happened to the chloride concentrations in the soil of the forest after the application of the flowback water in May of 2008 (treatment):

- b. Why do you think there is so much variability between the samples taken in the treatment area of the forest in 2008?

- c. How long did it take for the soil chemistry to return to “normal” levels found in the control plot?

- Why do you think the trees in the treatment forest (from question #2) continued to die in 2009, even when the contaminants in the soil were “back to normal” values?

- Look at the graphs below. Graph A is the same graph you saw in the first lesson, while Graph B shows the same data in a different way: it shows the averaged data and error bars for the active and inactive sampling sites:



a. Explain the trend you notice in methane concentration.

b. Which graph do you think more clearly shows this trend? Explain.

c. Complete this table, thinking about the two graphs:

Benefits of the scatterplot (Graph A):	Benefits of the bar graph w/ error bars (Graph B):
Drawbacks of the scatterplot (Graph A):	Drawbacks of the bar graph w/ error bars (Graph B):

5. Based on the information you have so far, make a scientific argument (claim, evidence, reasoning) about whether hydrofracking causes ecological harm.

<p>Claim: Make a claim about whether fracking causes ecological harm</p>	
<p>Evidence: Provide evidence to support your claim</p>	
<p>Reasoning: Explain how your evidence supports your claim</p>	

6. What else would you like to know about hydrofracking and ecosystems?

7. Design a study that you would like to conduct to gather additional data about the claim you have stated.
