Name_____

When Nature Strikes: Wildfires - Why are they a challenge to stop?

Background
Wildfires exist wherever combustible material is available to ignite from natural (lightening) or human (deliberate, lit cigarettes, campfires, etc) causes. Although the plants and animals in many ecosystems have adapted to wildfires, the effects can be devastating to these ecosystems as well as to the nearby areas inhabited by humans. Additionally, wildfires pose challenges to the firefighters brought in as fires create their own weather. In this activity you will explore the weather and climate factors that lead to the threat of wildfires and interpret data to learn how a fire can change the local weather, thus posing challenges to those fighting the fires.

Question
How does a fire create its own weather and what does that mean for those fighting a fire?

Hypothesis
(Use the space below to discuss what you know about how and why weather changes from time to time and place to place, and how a fire can create weather.)

Materials
Internet access
Google Earth

Procedure
Part 1:
1. Use references or the Internet to identify the biomes found in the United States that are prone to fires:

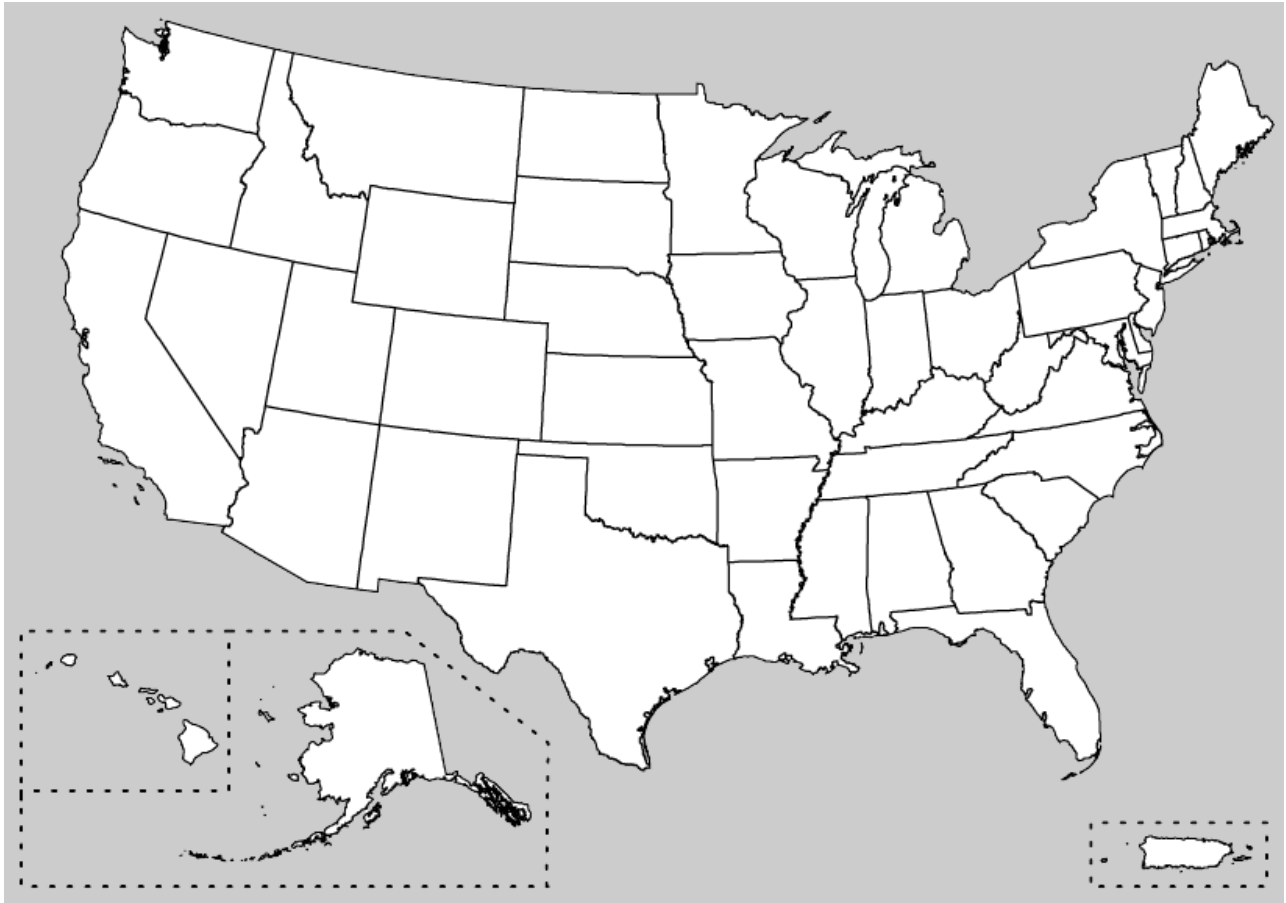2. Highlight and label those regions on the map below in Figure 1.

Figure 1: Highlight and label the fire-prone biomes in the United States. (Map is public domain.)

3. You highlighted the biomes of the United States identified as being prone to fires. Use the space below to identify the climate characteristics of each of these areas.

What are the types of plants found in these biomes?

4. Using examples from Steps 1-3, describe the characteristics of a fire-prone region.

Part 2:

1. In this section of the lesson you will use real-time data to locate current fires, and determine the fire potential across the United States. Visit Active Fire Mapping Program at http://activefiremaps.fs.fed.us/index.php

Click on the KMZ link at the bottom of the map to open the data in Google Earth. Zoom into see all of the locations (dots) of fires from the past 24 hours that have been detecting by a satellite. On the blank map in Figure 2, mark the areas that are currently experiencing fires.
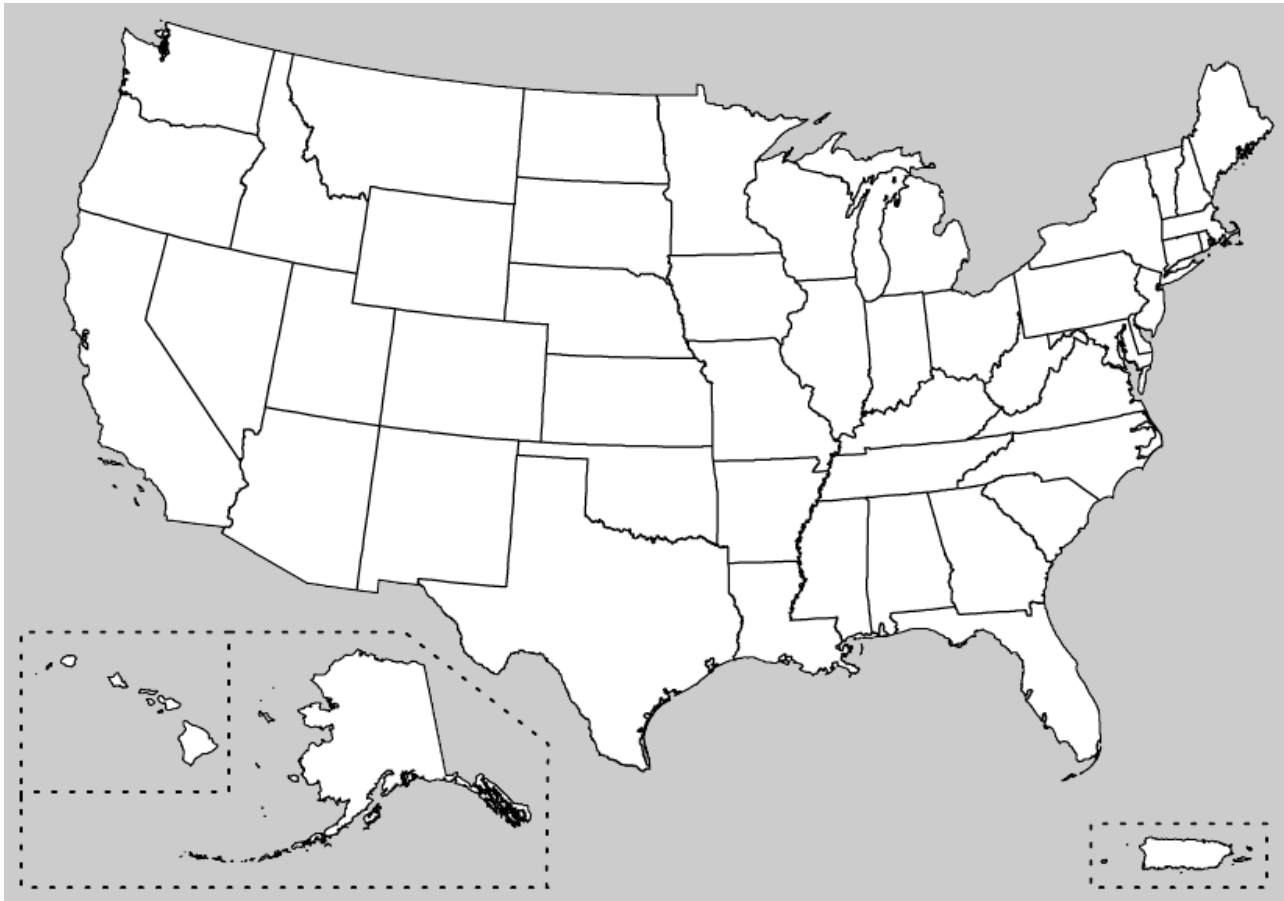
What is today's date: _____

Figure 2: Highlight the regions that are currently experiencing fires. (Map is public domain.)

2. How do the fire locations compare to the biome regions you identified in Part 1? Cite examples in your response.

3. What data is needed to determine the fire potential for a region? Why?

4. Next step is to explore the potential for wildfires. Go to USFS-WFAS Wildland Fire Assessment System at http://www.wfas.net/ and in the left column under Weather, click on "Google Earth Map Data", and then on "Click here to download the auto-updating KML file" under the Google Earth image. The file will open in Google Earth, and you will see a number of placemarks around the United States.

Select 10 placemarks from the area currently experiencing fires and complete Table 1 below with the "Observed" data for that location. You will need to zoom-in to identify the city and state.

Location (City, State)	Temperature (°F)	Relative Humidity (%)	Wind Speed (mph)	Precipitation (inches)	Fire Danger Class

Table 1: Current Fire Weather Data.

5. Use the data above to identify the relationship between the current "fire weather data" and locations currently experiencing wildfires.

6. Go back to the USFS-WFAS Wildland Fire Assessment System at http://www.wfas.net/ and in the left column under Fire-Potential/Danger click on Fire Danger Rating, and click on the current map in the middle of the page or in the table to enlarge it. What factors go into creating the fire danger rating?

Click on the map from the previous day. Why do these two maps look different? What data could you use to confirm you're your answer?

Part 3:

1. In this section you will be viewing model simulations created by Dr. Coen's laboratory using data from past wildfires. You will be focusing on how wildfires create local weather. Go to Coupled Weather-Wildland Fire Modeling at
http://www2.mmm.ucar.edu/people/coen/files/newpage_m.html

Select the animation type that works best on your computer. In each of these cases, watch the vectors and describe and sketch how the fire and the temperature of the fire influence the movement of the vectors.

Little Bear Fire:

High Park Fire

Esperanza Fire

Analysis

Use the space below to link together Parts 1-3. Be sure to use examples to support your analysis and explanation.

Conclusion

Use the space below to describe <u>how</u> and <u>why</u> your thoughts about wildfires has changed from the start (see your hypothesis) to the end of the lesson.

Application

Wildfires are a challenge to battle. How can the models that Dr. Coen creates be used to assist firefighters in their efforts? For example, how could fire fighters use her models? How can weather forecasters use her models?

What are a few of the other challenges a firefighting team faces when trying put out a fire?

What message would you pass along to those living in regions prone to wildfires?