

## From Canada to Tasmania to Kansas, warmer climate means more wildfires By

Associated Press, adapted by Newsela staff

### Warmer weather, more wildfires

Warmer weather translates into an increase in rain-free days along with the number of fires and escalating costs in damage.



SOURCE: Nature Communications, 2015

AP

WASHINGTON, D.C. — As the Earth grows warmer, huge fires like the one still burning in northern Canada are becoming more common. Earlier this year, large wildfires broke out on opposite ends of the world — Tasmania and Oklahoma-Kansas. Last year, Alaska and California pushed the U.S. to a record 10 million acres burned. Massive fires hit Siberia, Mongolia and China last year. Brazil's fire season has increased by a month over the past 30 years. It got so bad that in 2009, Australia added a bright red "catastrophic" to its fire warning index. The index measures the danger of fire in Australian forests. It combines a record of dryness, based on rainfall and evaporation, with wind speed, temperature and humidity. "The warmer it is, the more fires we get," says Mike Flannigan, a professor of wildland fire at the University of Alberta, in Canada. Last week, temperatures pushed past 90 degrees Fahrenheit (mid-30s Celsius) in Alberta. That is unusual for May in northern Canada.

### How Warming Wreaks Havoc

Many factors contribute to the increase in big fires, Flannigan and several experts say. They include climate change, the way people use land, and firefighting methods that leave more fuel — trees and brush — to burn. But the temperature one stands out, Flannigan says. "The Alberta wildfires are an excellent example of what we're seeing more and more of: Warming means snow melts earlier, soils and vegetation dries out earlier, and the fire season starts earlier. It's a train wreck," University of Arizona climate scientist Jonathan Overpeck says.

## **Longer Fire Season, More Big Blazes**

Worldwide, the length of Earth's fire season increased nearly 19 percent from 1979 to 2013. That's according to a study by Mark Cochrane, a professor of fire ecology at South Dakota State University. Fires had steadily been increasing for years. Then, in the late 1990s and early 2000s, "we've suddenly been hit with lots of these large fires we can't control," Cochrane says. In terms of land burned, the worldwide total may be dropping because of better firefighting. But in North America and Siberia, "fires have grown quite a bit due to warming," says Columbia University scientist Park Williams. "My estimate is that global warming has been responsible for about half of this increase." For the entire U.S., the average number of acres burned in wildfires has more than doubled. About 3 million acres burned in the mid-1980s. That compares to 7 million acres now, according to a study of government information by The Associated Press. A study by Flannigan and University of Victoria climate scientist Andrew Weaver found that climate change caused by humans has had "a detectable influence" on a dramatic increase in wildfires in Canada. They did the study 12 years before the recent Alberta blazes. Flannigan said the area burned in Canada has doubled since the 1970s. "And we think that's due to climate change." "Globally, we are seeing more fires, bigger fires, more severe fires," says Kevin Ryan. He is a retired U.S. Forest Service scientist who is now a fire expert. Ryan recently worked in Indonesia, where fires were big last year.

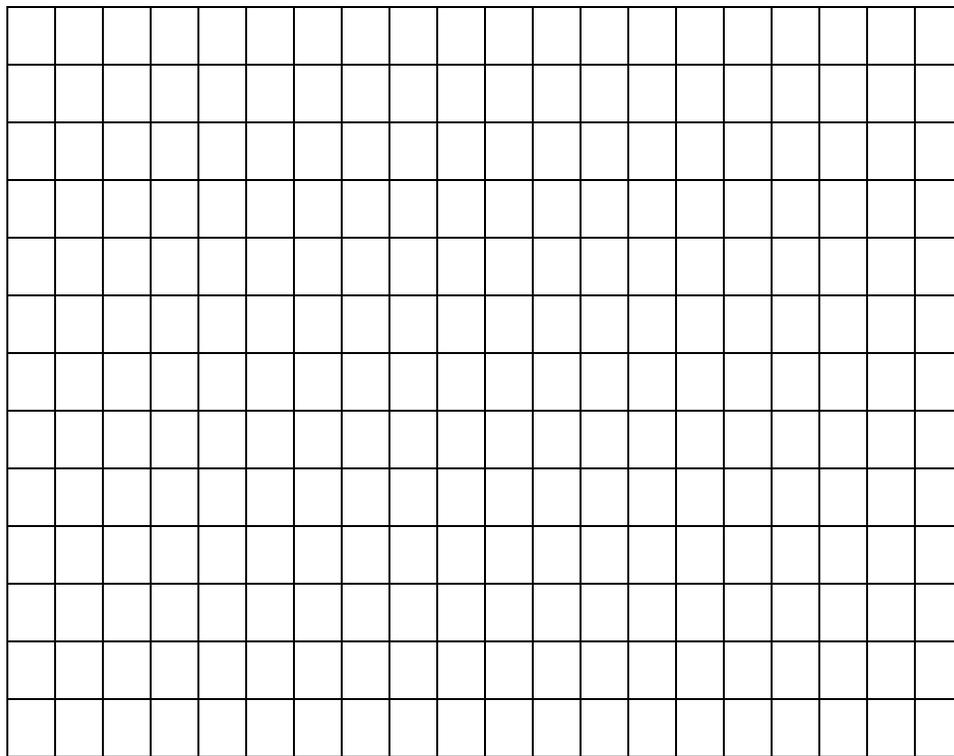
## **Link Between Lightning And Fires**

Fires in some places, such as Indonesia and Canada, are bad when there's an El Nino. That occurs when a warming of parts of the Pacific changes weather worldwide because it triggers drought in those regions, Ryan says. In Indonesia, changes in land use are a bigger factor than climate, he says. But elsewhere, it's temperature and moisture, too much of one and not enough of the other, scientists said. As the air warms, it gets "more efficient at sucking the moisture out of the fuels," which makes them more likely to burn, Flannigan says. Lightning is another factor. A study found that lightning increases 12 percent with every degree Celsius and that can trigger more fires. Flannigan said there's evidence of fire-triggered clouds in Alberta causing at least two more fires because of lightning. The U.S. National Academy of Sciences determined that "climate warming has resulted in longer fire seasons." But other factors, such as the way fires are fought and land use, make it difficult to scientifically say individual fires and regional fires were caused by climate change, the report and other scientists said. More devastating wildfires are sure to come, says Weaver, the Canadian climate scientist.

**Trait 1: Organize and Present Data (\_\_\_\_\_/4)**

Using the data in the table below, construct a line graph that represents the effect of temperature on the number of wildfires

	Temperature (F)	Wildfires
WEEK 1	65F	10
WEEK 2	75F	20
WEEK 3	85F	30
WEEK 4	95F	40
WEEK 5	105F	50



**Trait 2: Analyze Trends in Data (\_\_\_\_\_/4)**

Use evidence from the data table and line graph to explain the trends ( patterns) in your graph

According to the graph, as \_\_\_\_\_ (independent variable) \_\_\_\_\_ (increases/decreases) the \_\_\_\_\_ (dependent variable) \_\_\_\_\_ (increases/decreases).

For example, when the \_\_\_\_\_ (independent variable) \_\_\_\_\_ (increased, decreased)

from \_\_\_\_\_ (data 1) to \_\_\_\_\_ (data 2), the \_\_\_\_\_ (dependent variables) \_\_\_\_\_ (increased, decreased) from \_\_\_\_\_ (data 1) to \_\_\_\_\_ (data 2).

**Trait 3: Construct Explanations (\_\_\_\_\_/4)**

What can you conclude about the effect of climate on the number of wildfires in this investigation? Use evidence to support your answer.

According to the graph, as \_\_\_\_\_ (independent variable) \_\_\_\_\_ (increases/decreases),

the \_\_\_\_\_ (dependent variable) \_\_\_\_\_ (increases/decreases).

For example, when the \_\_\_\_\_ (independent variable) \_\_\_\_\_ (increased, decreased)

from \_\_\_\_\_ (data 1) to \_\_\_\_\_ (data 2), the \_\_\_\_\_ (dependent variables) \_\_\_\_\_ (increased, decreased) from \_\_\_\_\_ (data 1) to \_\_\_\_\_ (data 2).

According to the background information, this happened because:

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**Trait 4: Critique a Hypothesis (\_\_\_\_\_/4)**

Identify the strengths and limitations of the hypothesis. Be sure to cite information and evidence from the experiment and the background information.

*“If the temperature is very hot then the number of wildfires will increase because extreme heat is one of the factors that contribute to widespread wildfires.”*

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**Trait 5: Write a Hypothesis (\_\_\_\_\_/4)**

Write a hypothesis of your own about temperature increase and wildfires based on the background information you can also refer to the data table and line graph.

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**Part 2: Design an Investigation**

**Trait 6: Design an Investigation ( \_\_\_\_/4)**

**Question: How does the amount of sunlight affect the plant growth?**

- \* Be sure to
- 1. Conduct multiple trials to get the most accurate data
- 2. Mention use of the same materials the only changing the amount of sunlight the plants gets.

Design an experiment that will measure the amount of sunlight and the growth of plants in centimeters (cm)

**Identify all variables for you experiment:**

- Independent Variables:** variable changed on purpose for testing
- Dependent Variables:** data you collect from and experiment this variable responses as a results of the independent variable.
- Constant Variables:** All the factors you keep the same in an experiment: remember the only factor you change is the independent variable.

- Independent Variable:** Amount of Sunlight
- Dependent Variable:** Plant Growth ( cm)
- Constant Variables:** same location for testing, same amount of water, same type of plant,

Write out your procedure steps

- 1. -----
- 2. -----
- 3. -----
- 4. -----
- 5. -----
- 6. -----

7. -----

8. -----

9. -----

10. -----

Show how you will organize your data on a table


How will you interpret and analyze your data?

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**Trait 7: Apply What You Learned**

Explain how the investigation you design will help support your hypothesis

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Explain why your experiment will provide reliable data.

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### 6TH GRADE SUMMER PACKET RUBRIC

TRAIT	LEVEL 4	LEVEL 3	LEVEL 2	LEVEL 1
<b>Trait 1:</b> Organize and Present Data (Graph)	Contains all of the following:	Missing 1-2 of the following:	Missing 2-3 of the following:	Missing all of the following:
	Title_____ Axis_____ Intervals_____ Labels_____ Scale_____ Plot_____			
<b>Trait 2:</b> Analyze Trends in Data (Data Analysis Q1)	<input type="checkbox"/> Discusses overall trends in data. <input type="checkbox"/> Cites specific examples of data. <input type="checkbox"/> Accurately analyzes data trends.	<input type="checkbox"/> Discusses overall trends in data. <input type="checkbox"/> Cites general examples of data. <input type="checkbox"/> Accurately analyzes data trends.	<input type="checkbox"/> Discusses overall trends in data. <input type="checkbox"/> Inaccurately analyzes data trends.	<input type="checkbox"/> No summary is provided.
<b>Trait 3:</b> Construct Explanations (Data Analysis Q2)	<input type="checkbox"/> Explains why results happened. <input type="checkbox"/> Cites specific information from background information.	<input type="checkbox"/> Explains why results happened. <input type="checkbox"/> Cites general information from background information.	<input type="checkbox"/> Explains why results happened. <input type="checkbox"/> Does not cite information from background information.	<input type="checkbox"/> No explanation is given.
<b>Trait 4:</b> Critique a Hypothesis	<input type="checkbox"/> Describe a strength <b>AND</b> a limitation in the hypothesis.	<input type="checkbox"/> Describes a strength <b>AND</b> a limitation in the hypothesis.	<input type="checkbox"/> Only describes a strength <b>OR</b> a limitation but not both.	<input type="checkbox"/> No critique is written.

	<input type="checkbox"/> Cites specific evidence from the background text or experiment.		<input type="checkbox"/> Strength or limitation is <b><u>incorrect.</u></b>	
<b>Trait 5:</b> WRITE a HYPOTHESIS	<input type="checkbox"/> Appropriate hypothesis with specific rationale from text and/or data	<input type="checkbox"/> Appropriate hypothesis with general rationale from text and/or data	<input type="checkbox"/> Partially appropriate hypothesis with incomplete rationale from text and/or data	<input type="checkbox"/> Inappropriate hypothesis
<b>Trait 6:</b> DESIGN an INVESTIGATION (ELEMENTS/PROCEDURE)	Contains all of the following:	Missing 1-2 of the following:	Missing 2-3 of the following:	Missing all of the following:
	Materials List ___ Step by Step Procedure___ Data being collected___ Data table that contains IV/DV___ Explain how data is ANALYZED___			
<b>Trait 7:</b> APPLY WHAT YOU LEARNED	Contains all of the following:	Missing 1 of the following:	Missing 2 of the following:	Missing all of the following:
	<input type="checkbox"/> Supports limitations of the conclusion by using evidence from the data collected. <input type="checkbox"/> Supports limitations of the conclusion by using evidence from the research design. <input type="checkbox"/> Explains why the procedure is more likely to yield reliable data. <input type="checkbox"/> Explain how and why the variables are isolated and controlled.			