

EXPLORATION: **RESOURCES USED IN FIGHTING FIRES**

Grades 9-12



NGSS STANDARDS:

HS-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems
HS-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, inc
HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity
HS-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems

Part 1 (50 minutes)

RESEARCH QUESTIONS

You will conduct research to answer the following major questions:

1. How much does it cost to fight fires?
2. What were the costs for Alaska in 2015?
3. How many people were fighting fires in Alaska in 2015?
4. What types of resources are used in fighting fires? Which are the most expensive?
5. What is fire retardant?
6. What are the problems associated with fire retardant?

Use the following tables and figures to answer questions #1-4 and #6. Research from the links provided below the figures and tables will provide more detail as well as address questions #5 and #6.

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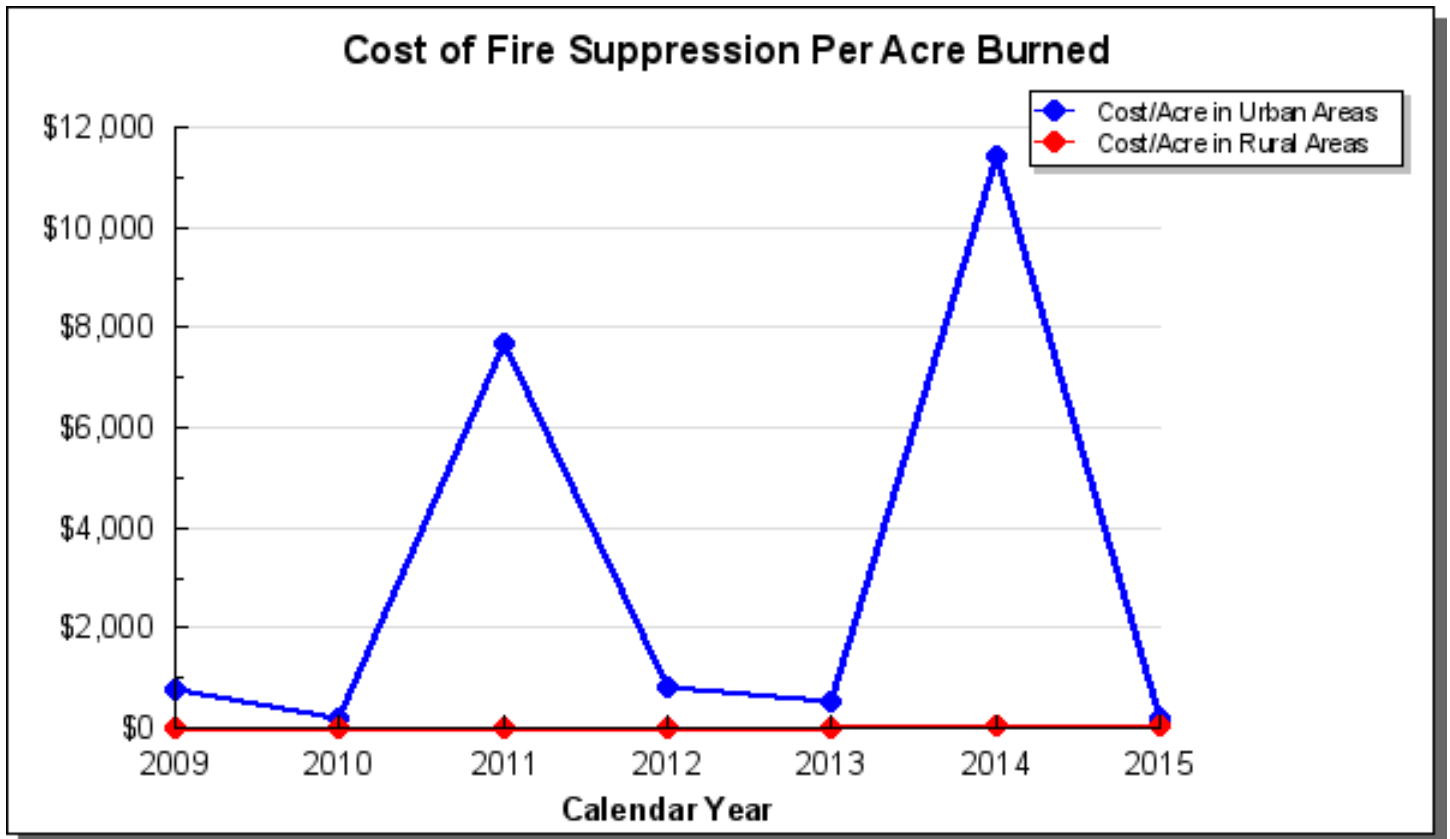


Figure 1. Cost of Fire Suppression Per Acre Burned in 2015. From Alaska State Office of Management and Budget, 2015.

<https://www.omb.alaska.gov/html/performance/details.html?p=102>

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Table 1 Cost of Fire Suppression Per Acre Burned. From Alaska State Office of Management and Budget, 2015.

Year	Cost/Acre in Urban Areas	Cost/Acre in Rural Areas
2015	\$200	\$25
2014	\$11,418	\$44
2013	\$522	\$12
2012	\$836	\$5
2011	\$7,677	\$7
2010	\$203	\$3
2009	\$783	\$17

Table 2 Number of people fighting fires in 2015 (Source: AICC, 2016. For other fire years visit AICC Predictive Services – Intelligence/Reports at <http://fire.ak.blm.gov/predsvcs/intel.php>)

Date	# of Personnel on fire crews
June 17	999
June 23	2,000
June 29	3,174
July 13	Less than 2,000
July 28	Less than 1,000
Aug 2	Less than 500

Table 3 Type of fire fighting resources used during Alaska’s 2015 wildand fire season. (Source: AICC, 2016. For other fire years visit AICC Predictive Services – Intelligence/Reports at <http://fire.ak.blm.gov/predsvcs/intel.php>)

Type of Resource	How Many	From Alaska	From Lower ‘48
Aircraft	637	92%	8%
Firefighting crews	448	48%	52%
Engines	182	100%	0%
Overhead personnel	2,634	46%	54%

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Table 4: Fire retardant used during Alaska's 2015 wildland fire season. (Source: AK DOF Facebook page 2015).

Location	# of Gallons of Fire Retardant Used	# of Loads
Fort Wainwright	592,290	228
Fort Greely	66,581	24
Kenai	125,507	51
McGrath	103,144	45
Palmer	173,612	85
Tanacross	116,726	48
Total	1,177,820	481

(The total amount of fire retardant translates roughly to one gallon of retardant for every 4.4 acres burned. Each load costs about \$6000)

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Table 5. Alaska State Budget for Fire Suppression. Note: "FY" means Fiscal Year, which starts July 1. So FY 2016 actually began on July 1, 2015. The left square of the table shows the actual amounts spent between July 1 2014, and June 30 2015; and the middle and right squares show the amount of money the governor has designated for fire suppression starting July 1 2015. Note – dollars are shown in thousands of dollars, so 38,840 means 38.8 million dollars.

Results Delivery Unit — Statewide Fire Suppression Program

Statewide Fire Suppression Program RDU Financial Summary by Component												
<i>All dollars shown in thousands</i>												
	FY2014 Actuals				FY2015 Management Plan				FY2016 Governor Amended			
	UGF+DGF Funds	Other Funds	Federal Funds	Total Funds	UGF+DGF Funds	Other Funds	Federal Funds	Total Funds	UGF+DGF Funds	Other Funds	Federal Funds	Total Funds
Formula Expenditures												
None.												
Non-Formula Expenditures												
Fire Suppression Preparedness	16,892.9	1,464.2	1,276.5	19,633.6	16,987.5	1,236.7	1,467.7	19,691.9	15,984.5	1,249.7	1,486.6	18,720.8
Fire Suppression Activity	49,085.2	106.5	24,735.4	73,927.1	6,659.1	1,500.0	11,960.4	20,119.5	6,659.1	1,500.0	11,960.4	20,119.5
Totals	65,978.1	1,570.7	26,011.9	93,560.7	23,646.6	2,736.7	13,428.1	39,811.4	22,643.6	2,749.7	13,447.0	38,840.3

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READINGS/LINKS:

WHO AND WHAT IS INVOLVED IN FIGHTING WILDLAND FIRES?

National Park Service. Fire Management Personnel and Fire Engines. Available [online] at <https://www.nps.gov/fire/wildland-fire/learning-center/fire-in-depth/personnel-involved.cfm>. (Accessed April 2016).

Alaska Division of Forestry. Aircraft Fleet. Available [online] at <http://forestry.alaska.gov/aviation/fleet>. (Accessed April 2016).

Alaska Division of Forestry. Firefighting Resources. Available [online] at <http://forestry.alaska.gov/fire/ffresources>. (Accessed, April 2016).

Alaska Division of Forestry. Fire Assignments. Available [online] at <http://forestry.alaska.gov/fire/assignments>. (Accessed April, 2016).

COSTS OF FIRE SUPPRESSION:

Anchorage Dispatch News June 26, 2015. McGrath firefighting camp prepares for personnel cuts as wildfires rage across Alaska. Available [online] at <http://www.adn.com/article/20150626/mcgrath-firefighting-camp-prepares-personnel-cuts-wildfires-rage-across-alaska>. (Accessed April 2016).

Department of Interior, BLM, 2015. Incident Cost Information for 2015. Available (online) at <http://fire.ak.blm.gov/content/Incident%20Business%20Management/BLM%20Alaska%20Supplemental%20Business%20Practices/Chapter%2080%20Cost/2015%20Incident%20Cost%20Information.pdf>. (Accessed April, 2016).

KTUU Channel 2 News, June 21 2015. Major Alaska wildfires burning through state fire budget. Available [online] at <http://www.ktuu.com/news/news/major-alaska-wildfires-burning-through-state-refighting-budget/33700124>. (Accessed April 2016).

U.S. Forest Service. Federal Firefighting Costs (Suppression Only). [Table]. Available [online] from https://www.nifc.gov/fireInfo/fireInfo_documents/SuppCosts.pdf. (Accessed April, 2016).

FIRE RETARDANT. WHAT IT IS, HOW IT IS USED, AND IMPACTS.

Mapes, L., 2015. Wildfire retardant flights under review; some 'just painting stuff red'. Seattle Times Sept 26, 2015. Available [online] at <http://www.seattletimes.com/seattle-news/forest-service-reviewing-cost-effectiveness-of-aerial-retardants/>. (Accessed April, 2016).

USFS, (no date). Interagency Wildland Fire Chemical Policy and Guidance. Available [online] at <http://www.fs.fed.us/fire/retardant/>. (Accessed April, 2016).

USFS, (no date provided). Seeing Red: A short history of fire retardant and the Forest Service. Available [online] at <http://www.fs.fed.us/fire/retardant/history.html> (accessed April 2016).

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READINGS/LINKS:

Wikipedia, (no date). Aerial Fire Fighting. Available [online] at https://en.wikipedia.org/wiki/Aerial_firefighting. (Accessed April 2016).

VIDEOS:

- Video – air tanker fire – footage of different type of air-supported fire suppression efforts during the Vinesale fire. Available from Lilly but no source unfortunately.
- Video clips from Burning Issues CD (has stuff on fire suppression, and fire careers, and the aircraft used in fighting fires).
- Flames Activity from Burning Issues CD (students try their hand at being an incident commander on a fire).
- Shirley Zylstra Video from Alaska Fire Consortium on fire retardant. 2015. [this video has excellent info, but its also pretty specific and way too long If you use this, recommend only first 27 minutes or so – or maybe you can get pieces of it because it will still be boring and long). Available at <https://vimeo.com/120405686>

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Part 2 (45 minutes)

STUDENT DIRECTIONS

You will now have 45 minutes to review your notes and sources, plan, draft and revise your essay, which will be based on the essay topic below. You may use your notes and refer to your sources, but please work on your own! You may also refer to the answers you wrote to earlier questions, but you cannot change those answers. Now read your assignment and the information about how your essay will be scored, and then begin your work!

ESSAY TOPIC:

Do you think fire retardant should be used to fight fires in Alaska? Be sure to consider all the factors in your answer, including the environmental impacts and costs associated with fire retardant, the costs of putting out fires and the human and material resources involved with and without the use of fire retardant.

Your essay should be at least 7 paragraphs, and could be longer.

Part 3 (15 minutes)

SCORING YOUR ESSAY

Your essay will be evaluated based on:

1. **Organization:** How well you included an introduction, reasons that are supported with details, and a clear conclusion.
2. **Use of examples to support your opinion:** How well you used various examples and scientific information to explain your opinion and new concepts.
3. **Scientific accuracy:** How accurate the facts were that you presented.
4. **Language and vocabulary:** how well you used precise language and vocabulary to explain your opinion.

How well did you think you did? Score yourself by giving yourself 1-5 (5 is highest and 1 is lowest) for each of the above evaluations.

1. Organization	_____
2. Examples	_____
3. Accuracy	_____
4. Language and Vocab.	_____
TOTAL	_____

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