

## Annotated Designing Solutions for California Wildfires IEA

The following task was designed to test SCALE's [Criteria for 21st Century Science Performance Assessments](#), a set of design criteria that we developed to incorporate advances in research on teaching and learning into our design process. Our design process required that all of SCALE's current [Design Criteria for Science Performance Assessments](#) were met, in addition to at least one element from each category of the new criteria. This task demonstrates that the use of all categories of the 21st Century criteria results in a long, complex task. We might expect a single assessment used in a classroom to attend to only two or three, though in a system of assessments that includes two or three tasks like this over a year, each might attend to a different subset of the 21st Century criteria.

The task is not aligned to one specific high school performance expectation. Instead, it elicits evidence of how students use high school-level practices, core ideas, and crosscutting concepts together as they are necessary to make sense of the phenomenon and design a solution. This table provides a map of the parts of the task that will show evidence of students using each dimension. Teacher-facing and student-facing rubrics accompanying the task would describe the multidimensional performances being assessed at specific points and guidance for using the task to evaluate students' progress.

Products to Be Assessed	Performances Assessed	Alignment to NGSS Dimensions
<u>Group Product</u> 1: Write an Opening Statement For the Committee Meeting that Defines the Problem	Analyze and interpret data to determine why wildfires have been increasing in severity and incidence in the last few years.	<b>SEP - Analyzing and Interpreting Data:</b> Evaluate the impact of new data on a working explanation and/or model of a proposed process or system. <b>DCI - ESS3.B: Natural Hazards:</b> Human activities can contribute to the frequency and intensity of some natural hazards. <b>CCC - Patterns:</b> Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.
<u>Group Product</u> 2: Represent an Expert Group to Present a Wildfire Mitigation Strategy	Gather research and evaluate sources to identify an idea for a strategy that can mitigate the impacts of wildfires in Northern California.	<b>SEP - Obtaining, Evaluating, and Communicating Information:</b> Critically read scientific literature adapted for classroom use to determine the central ideas or conclusions and/or to obtain scientific and/or technical information to summarize complex evidence, concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. <b>DCI - ESS3.C: Human Impacts on Earth Systems:</b> The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. <b>ETS - Developing Possible Solutions:</b> When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.
<u>Individual Product:</u> Represent a Local Stakeholder Advocating For a Strategy That Fits Your Interests	Advocate for a mitigation approach from a particular stakeholder's perspective using credible sources of information.	<b>SEP - Obtaining, Evaluating, and Communicating Information:</b> Evaluate the validity and reliability of and/or synthesize multiple claims, methods, and/or designs that appear in scientific and technical texts or media reports, verifying the data when possible. <b>DCI - ESS3.C: Human Impacts on Earth Systems:</b> The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. <b>ETS - Developing Possible Solutions:</b> When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.

## Designing Solutions for California Wildfires

### Introduction

Alternate Ways to Evaluate Students  
Technology can be used to increase access to technical language, including hovering over words like “stakeholders” or “mitigation” for definitions and translations.

Northern California wildfires have had particularly devastating impacts in the last few years. The governor of California is creating a committee to address the current wildfire crisis in California. They want to hear from experts as well as many different local stakeholders before making any policy decisions.

During this task, you will represent different types of experts and stakeholders to advise the governor in minimizing the severity, frequency, and impacts of wildfires in Northern California. As a group, you will first write an opening statement for the committee meeting that defines the problem the committee is addressing. Then you will act as an expert group to describe a specific strategy to mitigate the severity and impacts of wildfires in Northern California. After hearing from the different expert groups, you will individually take the perspective of a stakeholder to advocate for a mitigation strategy(s) that best fits your interests.

*Overarching Challenge: What decisions should California make to minimize the severity, frequency and impacts of wildfires for different stakeholders in Northern California?*

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### Instructions

#### Launch Activity: Who Do Wildfires Affect?


Look at the [images](#) around the room.

1. Choose an image that is interesting to you. Describe a stakeholder who might feel that their experience is represented by this image. Why do you think this stakeholder would be concerned about wildfires?



Requires Critical Analysis of Diverse Perspectives  
Throughout this task, students consider a problem that affects different people in different ways. The task includes several opportunities to learn about diverse perspectives about this problem and even to adopt the role of a stakeholder to advocate for their specific needs

2. Make a list of at least five different ways you observe ecosystems and communities being affected by wildfires in the images.



## Group Product 1: Write an Opening Statement for the Committee Meeting that Defines the Problem

In order to decide on the best solution to address the wildfire crisis, we need to really understand the problem. To gather more information, look at some [data](#) about wildfires in Northern California over time.

### Part 1

First analyze the data on your own by responding to the questions below:

1. What does Data Source 1 tell you about a cause for the increase in wildfires in the last few years?

2. Use Data Source 2 to add to or refine your analysis.

3. Use Data Source 3 to add to or refine your analysis.

Promotes Student Agency: Electronic discussion boards can be used to provide diverse opportunities for students to share and observe each others' ideas. Some students may be ready to respond to the prompt at this point, but students at the emerging level with this performance or students who are developing their language skills may benefit from reading and responding to other students' ideas early in the task.

### Part 2

Use your analysis to do one of the following on the discussion board:

- ☐ Respond to the following prompt: Why do you think wildfires have increased in severity and frequency in recent years? Use all relevant sources of data to support your response.
- OR
- ☐ Respond to at least two existing posts from your classmates. Build upon your classmates' response with your own analysis of what you see in the data or ask a question about their analysis.

Check off the box for which option you decide to do.

After Part 2, the teacher identifies themes in the claims emerging on the jamboard or discussion board and students select a group based on a theme they were interacting with. These groups (4-5 students) will collaborate on their opening statement in Part 3.

### Part 3

1. **Write an opening statement.** In groups, use your data analysis to write a statement for the Wildfire Crisis Committee Meeting that explains the problem with wildfires.

Follow the steps below to create an opening statement that includes:

- ☐ The problem Northern California is facing in terms of wildfires
- ☐ How communities and ecosystems in Northern California are affected by wildfires
- ☐ What the historical data says about the likelihood of frequent and severe wildfires in the future
- ☐ How we might reduce the impacts of wildfires on communities and ecosystems

**Step 1.** In Part 2, you discussed claims about why wildfires have increased in severity and frequency in recent years. Write a claim below to share with your group that you think is best supported by the data. Make sure to use multiple sources of data and reasoning to explain how the data support your claim.

**Step 2.** Share and discuss each of your group member's claims. Work together to decide on one claim to use for your group's opening statement and record it below. It might be a combination of several students' ideas or one that you chose or revised together.

**Step 3.** Discuss and brainstorm how increases in the severity and frequency of wildfires affect specific communities and ecosystems in Northern California. Use what you already know and what you learned in the Launch Activity, and go to online and/or print resources as needed. Record key information below.

**Step 4.** Define the problem with wildfires in Northern California and a solution that your group wants to recommend at the Wildfire Crisis Committee Meeting.

**Step 5.** Use your work from Steps 1-4 to write an opening statement with your group that addresses all of the required criteria. Decide as a group how you will collaboratively distribute and complete this task.

Encourages meaningful collaboration

Students move from developing their own initial ideas about wildfires to listening to building a strong claim based on ideas shared across the group. After Step 5, all groups would engage in a structured peer review and feedback process and have an opportunity to revise and improve their statements prior to completing their individual reflection.

2. **Individual Reflection.** How did working with your peers and sharing your claims and supporting data impact your skills and confidence with analyzing science data? Will you do anything differently as you analyze your data in the future?

Promotes student agency and social-emotional development

After engaging in meaningful collaborative work and peer feedback and revision, students reflect on their growth. This step helps students incorporate new skills into the related analyses they will do in later stages of this task and in future activities.

Optional scaffold: Modify Part 3 to provide opening statements to students. Students do a critique-correct-clarify activity working in groups to analyze the statement and strengthen it with more evidence, clearer and more complete reasoning, etc.

**Group Product 2: Present a Wildfire Mitigation Strategy as an Expert Group**

The Governor of California wants to hear from different expert groups that have ideas about the best strategy to mitigate the Northern California Wildfire Crisis.

As a group,

- Select an expert group from the list below that you will represent during the committee meeting expert panel:
  - ☐ United States Forest Service
  - ☐ Firefighters
  - ☐ Fire Scientists
  - ☐ Tribal Leaders
  - ☐ Climate Scientists
  - ☐ Ecologists
- Review the [sources](#) provided for your expert group. To help you evaluate these sources and organize the information, use the following organizer:

Source (include link)	Describe the source's recommendations for mitigating wildfires	What is the evidence for their argument?	What are the costs and benefits of this mitigation approach? Who is affected?
Encourages Meaningful Collaboration Students use small group work to help them make sense of complex data, but each group brings what they have learned to the whole class for collaborative knowledge building; each group builds on their knowledge from the expertise developed by the other groups.			

- Use the sources for your expert group to identify the strategy that will be most effective at mitigating the severity and frequency of wildfires in Northern California.

4. Your group will be on an expert panel at the Wildfire Crisis Committee Meeting. You will give a presentation acting as your expert group. Use the checklist below to prepare your presentation::

- ☐ Describe your mitigation strategy
- ☐ Explain how your strategy will help mitigate the severity and frequency of wildfires in Northern California in the future.
- ☐ Weigh the costs and benefits of your strategy (including costs, safety, reliability, and social, cultural, and environmental impacts)
- ☐ Use evidence from the sources to support your argument

**As a whole class**

Each group presents their wildfire mitigation strategy at the expert panel during the Wildfire Crisis Committee Meeting. Use the notetaker below to capture ideas and evidence that you might consider as a stakeholder in the next section of this task.

Strategy	How Strategy Will Mitigate Severity and Frequency of Wildfires	Costs and Benefits for different stakeholders

## Individual Product: Represent a Local Stakeholder Advocating For a Strategy That Fits their Interests

The Governor of California also wants to make ethical policy decisions that consider the interests of all stakeholders affected by the Northern California Wildfire Crisis.

### Individually,

1. Select a stakeholder that you will represent during the public comments segment of the Wildfire Crisis Committee Meeting and record your role below:

- ☐ Housing Developers
- ☐ Farmers in High-Risk Areas
- ☐ Residents in Urban Interface or Rural Areas
- ☐ Business Owners in Urban Interface or Rural Areas
- ☐ Firefighters
- ☐ Tribal Groups
- ☐ Vulnerable Populations (ie. Disabled or Elderly)

Make Sense of an Information-rich Environment Students select information sources from a set of articles that is provided, but they need to evaluate what the information means to their stakeholder as well as the credibility of these sources.

2. Review the different [sources](#) that are currently circulating in support of different mitigation strategies and stakeholder interests.
  - a. Select a few sources that you think are relevant to your stakeholder.
  - b. To make a solid argument, you want to use credible sources. To help you evaluate these sources for credibility and organize the information, use the following organizer:

Source (include link)	What argument does it make about wildfire mitigation?	Who is behind the information? <ul style="list-style-type: none"><li>• What qualifications or expertise do they have?</li><li>• Why are they interested in this issue?</li></ul>	What is their evidence? <ul style="list-style-type: none"><li>• What source(s) is the evidence from?</li><li>• Is the data reliable and relevant?</li></ul>

3. Take the point of view of your selected stakeholder and prepare a statement to advocate for the mitigation strategy(s) that best fits your interests. This should include:
  - ☐ The problem from your perspective
  - ☐ The mitigation strategy(s) that make the most sense for you
  - ☐ An explanation of how this strategy(s) reduces impacts of wildfires more than the other strategies from your perspective
  - ☐ Use evidence from the Group Product 1 data and the Group Product 2 expert panel to support your explanation
  - ☐ A discussion of the additional sources you used to make this argument, including how you know they are credible

## Appendix

### A Selection of images for the launch activity



<https://www.newsweek.com/pge-planned-power-outage-shutdown-weekend-1467681>



<https://www.cnn.com/2020/09/29/us/large-ash-california-wildfires-trnd/index.html>



<https://www.nationalgeographic.com/environment/article/150914-animals-wildlife-wildfires-nation-california-science>

#### School closures from California wildfires this week have kept more than a million kids home



BY RICARDO CANO  
NOVEMBER 15, 2018 UPDATED JUNE 23, 2020

[Twitter](#) [Facebook](#) [WhatsApp](#)

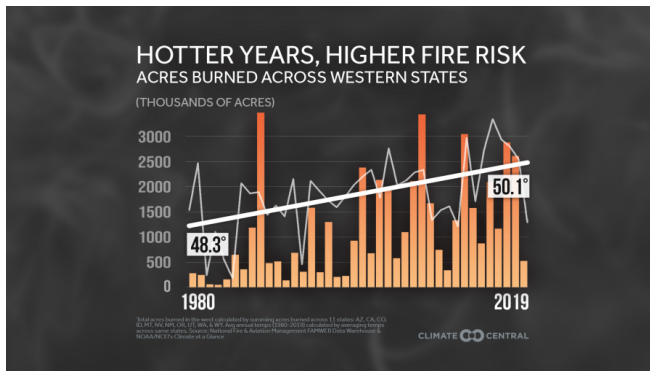


A school bus sits abandoned on the main road out of Paradise in Butte County in the aftermath of the Camp Fire. (Karl Mondon/Bay Area News Group)

<https://calmatters.org/environment/2018/11/school-closures-california-wildfires-1-million-students/>

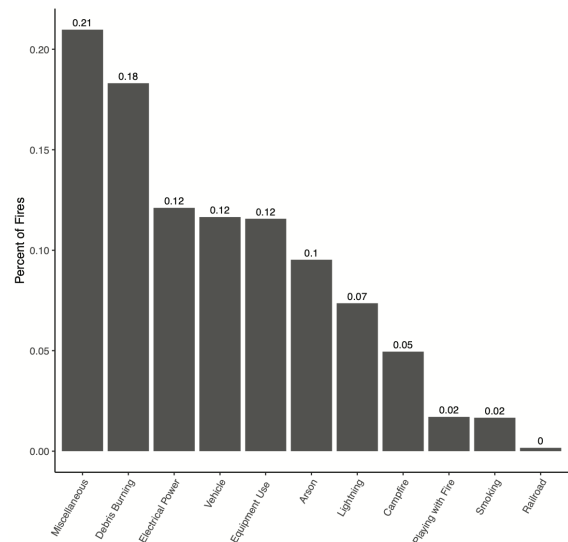
## Data Sources for Group Product 1

### Data Source 1: Temperature vs. Acres Burned in Western State Wildfires, 1980 - 2019



<https://www.climatecentral.org/gallery/graphics/worsening-western-wildfires>

### Data Source 3: How Wildfires Were Started in California, 2014-2018

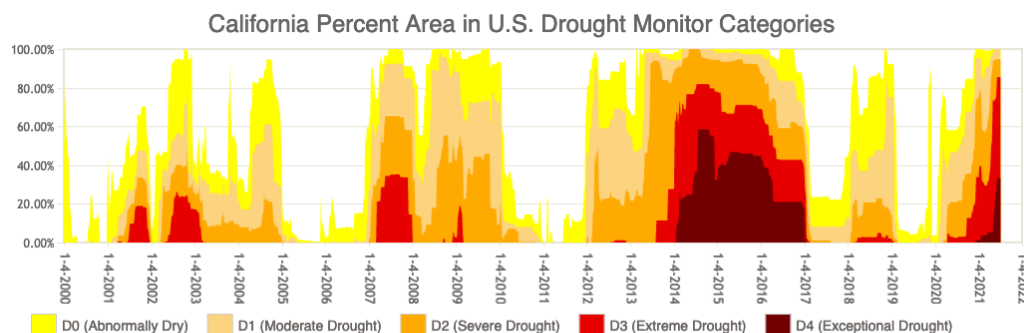


**Figure 3.2.** The five-year average (2014–2018) of CAL FIRE fires by cause. Only fires with known causes are included. Wildfires of unknown causes account for approximately 25% of total ignitions. Miscellaneous ignitions include any ignition not in one of the other categories. Source: CAL FIRE 2018 wildfire activity statistics.

Data from:

<https://ccst.us/wp-content/uploads/The-Costs-of-W>

### Data Source 2: California Drought, 2000-2021



Or, click on [the link to explore the interactive dataset about California droughts](#).

## Sample Sources for Group Product 2

### Expert Group: United States Forest Service

- [A Better Way to Think About Wildland Fires](#) (Youtube Video)
- [Thinking and Prescribed Fire Treatments Reduce Tree Mortality](#) (News Release)
- [National Cohesive Wildland Fire Management Strategy](#) (Summary Document)

## Sample Sources for Individual Product

### Different Perspectives on Fire Suppression

- [“Suppressing fires has failed. Here’s what California needs to do instead”](#) (News Article)
- [“An Indigenous practice may be key to preventing wildfires”](#) (Article)
- [“Forest Service Promises Swifter Action on New Wildfires, After Plea From California”](#) (News Article)
- [“Forest Service Chief says wildfires will be suppressed, rather than ‘managed’ for now”](#) (News Article)
- [Opinion: Wildfires show need to unite behind forestry solutions](#) (Op Ed)

Many people contributed to SCALE's development of these assessments and design criteria through participating in focus groups, brainstorming sessions, and working on task development.

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