

Math in Idaho - Forestry: Exploring Wildfire Data

BACKGROUND INFORMATION

This is a single-day introduction to exploring Wildfire data within Idaho counties with the aid of the online CODAP platform. Students will explore basic statistical measures that help students form stories from data.

LESSON DURATION

Teachers should use their discretion to keep pace with the needs of students. This introductory lesson is designed for 50 minutes, but this lesson could easily be extended for a longer exploration.

INSTRUCTIONAL SEQUENCE SUMMARY

This lesson is built to engage students in guided-inquiry using the 5E lesson model. In this model, there are 5 phases that students will experience; (1) **Engage**: The teacher provides context to engage the students in curiosity and surface existing knowledge through class discussion, (2) **Explore**: The students collaborate to investigate targeted questions from the context; (3) **Explain**: The teacher leads a whole class discussion making explicit connections between student's thinking from the explore phase and formalizing the mathematics; (4) **Elaborate**: The teacher provides context or discussion to generalize the important concepts and their connections beyond the original lesson context; (5) **Evaluate**: Teacher provides students with a brief assessment to gauge understanding and inform future instruction.

- [Idaho Wildfires Data By County](#)
- [CODAP Tutorial Video \(for teachers & students\)](#)
- Video: Forestry and how this industry has developed since The Big Burn in 1910 (possible intro topic)

STANDARDS ALIGNMENT

S.ID.A.1 Differentiate between count data and measurement variable.

S.IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

STUDENT LEARNING TARGETS

- I can explore a large data set and build skills in creating charts, graphs, or tables.
- I can interpret large data sets and make important statements about them from charts, graphs, or tables I have created.
- I can identify and ask good statistical questions from large data sets.

ASSESSMENT

Students will complete an exit ticket to demonstrate their understanding.

KEY VOCABULARY

“Good statistical question”, data set, measurement variable, center, spread, parameter, sample, inference, rate

IMPORTANT QUESTIONS

How many wildfires are reported in Idaho each year?

What are the sizes of wildfires in Idaho?
What is the impact of these fires for Idaho?

LESSON PLAN/LEARNING EXPERIENCE

Engage (5-10 minutes)

Video: Forestry and how this industry has developed since The Big Burn in 1910 (possible intro topic)

Discuss:

How did The Big Burn in 1910 impact the forestry industry? What are some of the questions, concerns, or challenges in the forestry industry in Idaho? What data might help inform the forestry industry?

Steer this discussion towards the need for data analysis and statistics.

Explore (25-30 minutes)

Students can watch the [CODAP Tutorial Video \(for teachers & students\)](#) to get acquainted with CODAP or the teacher can demonstrate functionality during the engage section.

Students access and download the [Idaho Wildfires Data By County](#) data as a .csv file and upload it to CODAP. This data set is large and students who are not familiar with CODAP will need time to explore without thinking about what the data suggests yet. Students can watch [this how-to video](#) or the teacher can demonstrate functionality during the engagement section. **Be sure to look at the "guide" tab on the original data file to better understand the column headings.** Then answer the following:

1. **Where** have wildfires been reported in Idaho (i.e., make a map)?
2. **Where** has each **agency** reported wildfires? (hint: color the points on your map by agency)
3. What is the distribution of wildfire **sizes** reported by each **agency**?
4. What other plots can you use to describe the wildfires?

Alternatively, you could ask students to choose a data set from CODAP and create two distinct displays. Share your **interpretations** of the displays **and** what you learned, what you noticed, what patterns emerged, what surprised you, or what confused you while exploring this data set.

By the end of this exploration period, you will want students to start pulling in more useful data to look at in their data displays.

Explain (Together With Explore Section)

The teacher intentionally makes connections to statistical measures such as average, range, population size, inference, evidence (as opposed to proof), and so on. The teacher monitors student progress during the exploration. As students use data (counts from differing populations, rates, different parameters, etc) to make and record their conclusions, the teacher finds opportunities to ask questions and make comments leading toward more rigorous statistical questions and conclusions.

Example questions:

“Is that a fair comparison? If not, what would make that a fair comparison? If so, what makes that a fair comparison?”

“Will you share with (another student) what you just learned about rates and fair comparisons?” or “(Another student) has a really good answer to your question – will you go talk to them about this?”

Select a few of the arguments to highlight in a classroom discussion.

After students have had a chance to look at the wildfire data in different ways, come back together for a class discussion about their observations. In what ways did they look at the data? What parts of the data set did they use? Which of these seems most useful? Which data helped them ‘tell a story’ about wildfires in Idaho? What did they learn about wildfires in Idaho? The takeaway should connect back to the S.IC.A.1, in that students are making inferences based on the sample. Acknowledging their inferences and where they came from.

Elaborate (10-15 minutes)

Have some students share their claims and arguments classwide (or have them share their partner’s arguments). Ideally, the selected claims will have clusters of students who gathered applicable evidence so that conversation will include more students. The purpose of this section is to get students talking in statistical terms about their conclusions. Sentence starters for discussion might include:

“I wondered if ...”, “I concluded that..., because...”, “I don’t understand why... but I think that...”, “Can you please explain why you said...” I don’t agree with... because...”, “I changed my mind about... because...”

Have students continue to write notes or revisions to their conclusions during the class discussion.

This part of the discussion ideally helps us answer the question posed during the exploration portion of the lesson.

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Evaluate (5 minutes)

Give students some additional time to write down their thoughts, especially in reaction to the class discussion. There are multiple prompts that you can use based on your refined lesson goals:

Prompt 1 (Specific to context): “What inferences were you able to make about wildfires today and how did the statistical data inform those decisions?”

Prompt 2 (Specific to standards): “What issues can arise when you are making inferences from a sample of a population?”

Prompt 3 (Learning/Growth Focused): “Take another few moments to consider the most important things you thought about today. Did you revise any of your conclusions? Write down what changed! That’s evidence of your brain stretching and growing!”