

# Living With Fire High School Wildfire Science Curriculum: Earth Science Unit

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A partnership of Nevada counties; University of Nevada, Reno; and the U.S. Department of Agriculture.

This project was funded by the Federal Emergency Management Agency.

# Teacher Overview & Standards Alignment

#  Earth Science Unit One and Two

## Acknowledgment

These materials are the result of an extensive stakeholder engagement process featuring input from over 160 different teachers, scientists, tribal members and fire professionals across Nevada and the western United States. The University of Nevada, Reno Extension Living With Fire Program greatly appreciates all these individuals and groups who helped shape, revise, and pilot this curriculum.

## Teacher Overview: Living With Fire Earth Science Units

The Nevada High School Fire Science Curriculum is designed to fit into existing earth science high school courses, helping teachers meet required standards. Unit one is focused on wildfire severity, erosion, and nutrient cycling. Unit two explores how wildfire may be impacted by climate change. These units do not need to be used back-to-back. Each lesson is built for a 45-minute class period. Both units build on concepts covered in the Biology Curriculum unit, but the Biology Curriculum unit is not a prerequisite.

## Schedule

Unit 1 Wildfire Severity, Erosion, and Restoration (Lessons 1 - 3)

Lesson 1: Students will explore factors that impact wildfire behavior and severity by viewing wildfire severity data of the 2018 South Sugarloaf in Google Earth and then using an online wildfire behavior simulation.

Lesson 2: Students will design and conduct a short lab experiment to explore the effects of wildfire on the potential for erosion and landslides. Requires some basic lab materials.

Lesson 3: Students will apply their knowledge of wildfire severity and post-fire erosion to design a post wildfire report plan for a Nevada wildfire of their choice. Students’ reports will describe the impact of the wildfire and identify priority areas for conducting restoration.

Unit 2 Climate Change and Wildfire (Lessons 1 - 2)

Lesson 1: Students are given an overview of factors that affect wildfire behavior and connections between those factors and Nevada’s climate. Then, students review projections for temperature, precipitation and evaporative demand from the Nevada Climate Initiative Strategy to create their own prediction of future wildfire in Nevada.

Lesson 2: Students will compare their predictions to scenarios described in the Nevada Climate Initiative. Then finish by brainstorming ways humans could adapt to or mitigate some of the possible negative future scenarios.

## Standards Alignment

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| --- | --- | --- |
| Standards and DCIs | Unit One | Unit Two |
| **Lesson 1** | **Lesson 2** | **Lesson 3** | **Lesson 1** | **Lesson 2** |
| ESS 2-2 | X | X |  |  |  |
| ESS 2-5 |  | X |  |  |  |
| DCI 2.A |  | X | X |  |  |
| DCI 2.C |  | X |  |  |  |
| ESS 3-5 |  |  |  | X | X |
| ESS 3.D |  |  |  | X | X |
| ETS S1 B |  |  |  |  | X |

|  |  |  |
| --- | --- | --- |
| Science and Engineering Practices | Unit One | Unit Two |
| **Lesson 1** | **Lesson 2** | **Lesson 3** | **Lesson 1** | **Lesson 2** |
| 1 Asking questions | X |  |  |  | X |
| 2 Developing models | X |  |  |  |  |
| 3 Planning investigations |  | X |  |  |  |
| 4 Analyzing data | X |  | X | X |  |
| 5 Computational thinking |  |  |  |  |  |
| 6 Constructing explanations |  | X | X |  | X |
| 7 Evidence based arguments | X |  | X |  | X |
| 8 Obtaining and communicating information | X |  |  | X | X |

|  |  |  |
| --- | --- | --- |
| Cross Cutting Concepts | Unit One | Unit Two |
| **Lesson 1** | **Lesson 2** | **Lesson 3** | **Lesson 1** | **Lesson 2** |
| Patterns | X |  | X |  |  |
| Cause and effect | X | X |  | X | X |
| Scale, proportion, and quantity |  |  |  |  | X |
| Systems and system models | X | X |  |  |  |
| Energy and matter |  |  |  |  |  |
| Structure and function |  |  |  |  |  |
| Stability and change | X |  | X | X | X |

## Teacher Notes and Materials

### Before the lesson

* Send home the parent letter to notify parents of the upcoming unit in case any of your students have significant wildfire-related trauma you do not know about.
* Read the included trauma-informed guide for teachers.
* If students have not previously used the Biology Curriculum unit you may want to spend some additional time emphasizing the fire behavior triangle at the end of lesson 1 and beginning of lesson 2.
* Print color copies. The information sheets are designed to be printed in color and reused in multiple classes. The worksheets can be printed in black and white with one copy per student or group.

 **Unit 1 Wildfire Severity, Erosion and Restoration**

* Lessons 1 and 3 require the use of computers. This activity works best with one student per computer, however, groups of 2-3 students sharing a single computer is reasonable.
* Lesson 2 requires a lab activity with some materials that need to be gathered ahead of time
	+ Required materials (per group of 3-5)
	+ 2 aluminum cookie/roasting trays
	+ 1-2 printed and laminated erosion color cards
	+ 2 clear plastic cups or beakers (suggested 400 mililiters or 6 ounces in size or greater)
	+ A large scoop or ladle to move soil into trays
	+ Bucket of soil (3 gallons per class of 30)
	+ Bucket of organic litter (pine needles work great; 1.5 to 2 gallons per class of 30)
	+ A large plastic tub or Rubbermaid bin to collect wet soil mixtures (one per class)
* Lesson 2 assumes students understand abiotic factors and can name examples of abiotic factors in Nevada. If your students are not at that level, plan to cover that at the beginning of the lesson.

**Unit 2 Climate Change and Wildfire**

* This lesson can be completed entirely with pencil and paper. However, the student information sheet has several maps that need to be printed in color for students to read.
* If you have any questions about using the curriculum, contact Living With Fire Curriculum Developer Spencer Eusden at seusden@unr.edu.

## Table of Contents

### Overview Documents

* Teacher Curriculum Guide and Table of Contents
* Earth Science Parent Letter
* Wildfire Curriculum Trauma-Informed Teacher Information

### Unit One

### Lesson 1: Wildfire Severity

* Lesson 1 (Wildfire Severity) PowerPoint
* Lesson 1 (Wildfire Severity) Severity Map Instructions
* Lesson 1 (Wildfire Severity) Student Worksheet

### Lesson 2: Erosion and Wildfire

* Lesson 2 (Erosion and Wildfire) PowerPoint
* Lesson 2 (Erosion and Wildfire) Student Worksheet
* Lesson 2 (Erosion and Wildfire) Soil Color Chart 4x

### Lesson 3: Post Wildfire Report

* Lesson 3 (Post Wildfire Report) PowerPoint
* Lesson 3 (Post Wildfire Report) Choosing a Wildfire Instructions
* Lesson 3 (Post Wildfire Report) Student Information Sheet
* Lesson 3 (Post Wildfire Report) Student Worksheet

### Unit Two

### Lesson 1: Predicting Future Wildfire

* Lesson 1 (Predicting Future Wildfire) PowerPoint
* Lesson 1 (Predicting Future Wildfire) Student Information Sheet
* Lesson 1 (Predicting Future Wildfire) Student Worksheet

### Lesson 2: Prediction Evaluation

* Lesson 2 (Prediction Evaluation) PowerPoint
* Lesson 2 (Prediction Evaluation) Future Wildfire Projection