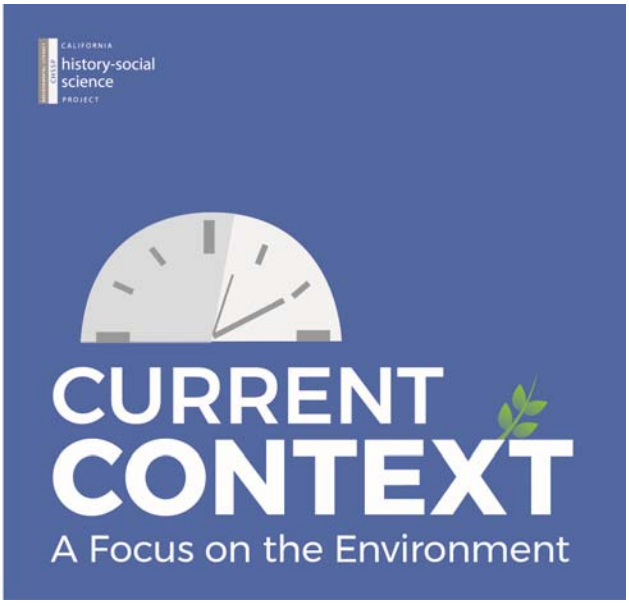
Our Complicated Relationship with FIRE

By Shelley Brooks, Ph.D.



Every year we hear about fires burning throughout California and the arid West. This year has been particularly historic as the Carr Fire became the state's third largest fire on record and the still-burning Camp Fire has become the deadliest. Experts tell us that we should expect fires of this size and ferocity to continue well into the future. The reasons for such destructive fires are many, including higher temperatures and extended droughts associated with climate change; historic fire suppression policies that leave built up fuel in the forests; and settlement in fire-prone areas that can help ignite fires and leave people and their homes vulnerable.

Though the danger posed by fire can suggest that it is something to battle against, fire is also a tool that provides light, heat and energy for humans. Moreover, fire is one of Earth's natural processes, and it plays an important role in many ecosystems that humans rely upon. In short, fire brings both benefits and danger to humans, and, not surprisingly, we have a long and complex relationship to this elemental force.

How Industrialization Changed our Relationship with Fire

For millennia, people found ways to harness fire to support life. In California and across North America, people used fire to encourage the growth of favorable plants and to enhance hunting; to heat dwellings and cook food; and as protection against predators. In the eighteenth century the industrial revolution dramatically changed people's relationship with fire. Instead of burning plant materials such as wood, people built machinery that ran on fossil fuels dug up from within the Earth. Miners extracted coal from the Earth that could then be burned to produce steam to run an engine; this type of engine was one of the most significant developments of the industrial revolution, and was used to operate trains and other machinery.

Today, cars rely on gasoline that has been converted from crude oil to usable fuel by subjecting the oil to very high heat. Machines such as the steam engine and the automobile require combustion, or fire, to work. Along with industrialization came large-scale efforts to clear forests, often with the use of fire, to increase agricultural production.

Together, industrialization and industrial agriculture have increased the Earth's overall fire load, while deforestation decreases the Earth's ability to capture the carbon dioxide emitted by industrialization. The result is increased greenhouse gas in Earth's atmosphere, which contributes to climate change.

Should We Allow Fires to Burn?

The U.S. Forest Service (USFS) is the federal agency in charge of taking care of our national forests, the site of many of the country's wildfires. Established in 1905, the USFS began its work after generations of private timber removal left many areas without trees for the future. The USFS was created to both a) maintain healthy forest ecosystems and b) support economic development. Leaders believed that maintaining the ecosystems and promoting the economy could best be achieved by:

- Protecting and improving the forests from damaging clear-cutting practices
- Protecting trees as a way to protect the rivers and streams flowing through the forest that supply communities and agricultural land downstream
- Ensuring a permanent supply of timber

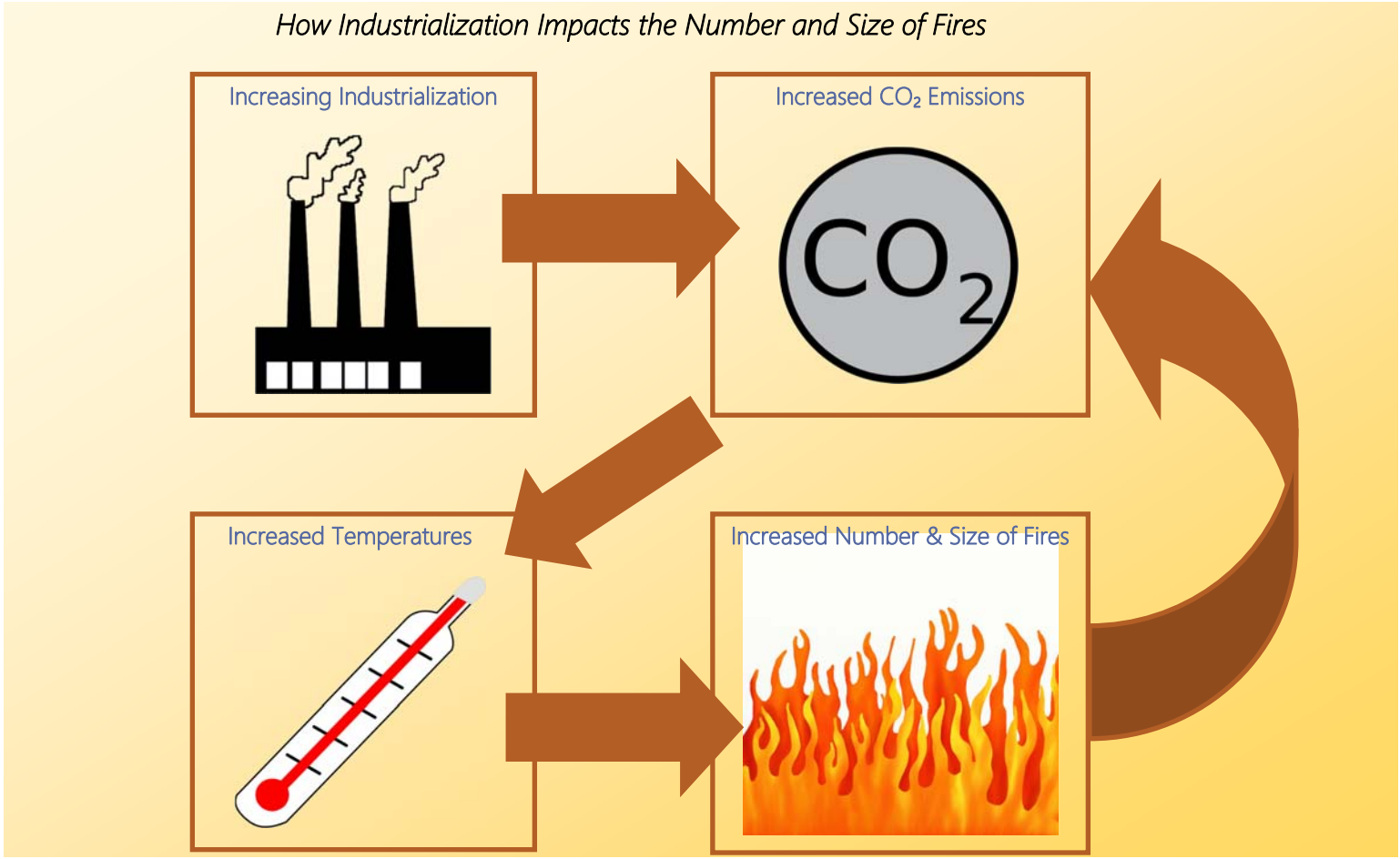
Given these goals and priorities, the USFS' original fire policy was to stop wildfires as soon as possible. This policy of stopping all fires quickly continued into the 1960s, when timber was used to support the building boom in America's suburbs. The Forest Service also rejected an age-old practice common in forest communities of strategically burning underbrush as a way to improve land and hunting conditions, and to help eliminate fuel that could cause wildfires to burn more intensely.

Things began to change in the 1960s and 1970s when the USFS and the National Park Service decided to selectively allow some lightning-induced fires to burn and adopted a policy of planning and setting controlled fires in areas where fire had long been extinguished. The policy shift reflected a growing scientific understanding that in many places fire is necessary for the life cycle of certain plants, it can prevent some tree pests, and improves overall forest health. CAL FIRE, the state agency in charge of forest and fire management, is also involved in prescribed burns on state lands to reduce the fuel that can lead to large, damaging wildfires.

Fires Hotter, Longer, and Faster

Fires are becoming more frequent and widespread. This has to do in part with climate change, and the higher temperatures that accompany it. And climate change is unfolding because of the increasing amount of industrial activities of a growing population. More people are burning more fossil fuels and felling more trees for agricultural and residential lands. And, ironically, as greenhouse gases help heat up the Earth and cause more fires, these fires in turn release more carbon dioxide into the atmosphere. It is a cycle that prompts more fire. The result in California, according to spokeswoman for CAL FIRE Amy Head, is that climate change is making the state's fires "much longer-burning, much hotter, and much faster-spreading."

How Industrialization Impacts the Number and Size of Fires



Our History Linked to Fire

Fire can never be eliminated from the Earth, though we often help to postpone it. With all the influence that people have in the realm of fire, our challenge will be to continually seek a responsible relationship to fire during years of drought, in densely populated areas, in forests, in agricultural regions, and in the face of climate change. Where we choose to build communities, and how careful we are in protecting against human-sparked fires will be of increasing importance. Fire has its own influence and power over us, too, and humans' history and the Earth's will always be linked by fire.

Climate change is making the state's fires "much longer-burning, much hotter, and much faster-spreading," so that there "are parts of California that don't go out of fire season."

Crew member ignites prescribed burn, Sequoia National Park.

Terms

Carbon dioxide – a colorless gas that is released into the atmosphere from fires and other burning processes, and from the respiration, or breathing, of humans and animals. Plants, like trees, naturally absorb carbon dioxide and release oxygen into the atmosphere that allows people and plants to breathe.

Emissions – the release of matter or energy into the environment, such as gases like carbon dioxide.

Economic development – activities that contribute to a growing economy, like new technologies and business pursuits that increase production of goods and services.

Ecosystem – a specific area, such as a forest, that contains a set of interdependent species that interact with one another.

Fossil Fuels – fuels such as coal, oil, and natural gas, formed from the remains of plants and animals that lived millions of years ago. This is a finite, non-renewable energy source.

Greenhouse gases – gases that result from the burning of fossil fuels for industry, energy, and transportation, and trap heat in the atmosphere that contributes to rising temperatures and weather extremes. Carbon dioxide is one such gas, as is methane and chlorofluorocarbons (CFCs).

Timber – trees that are harvested for building material.

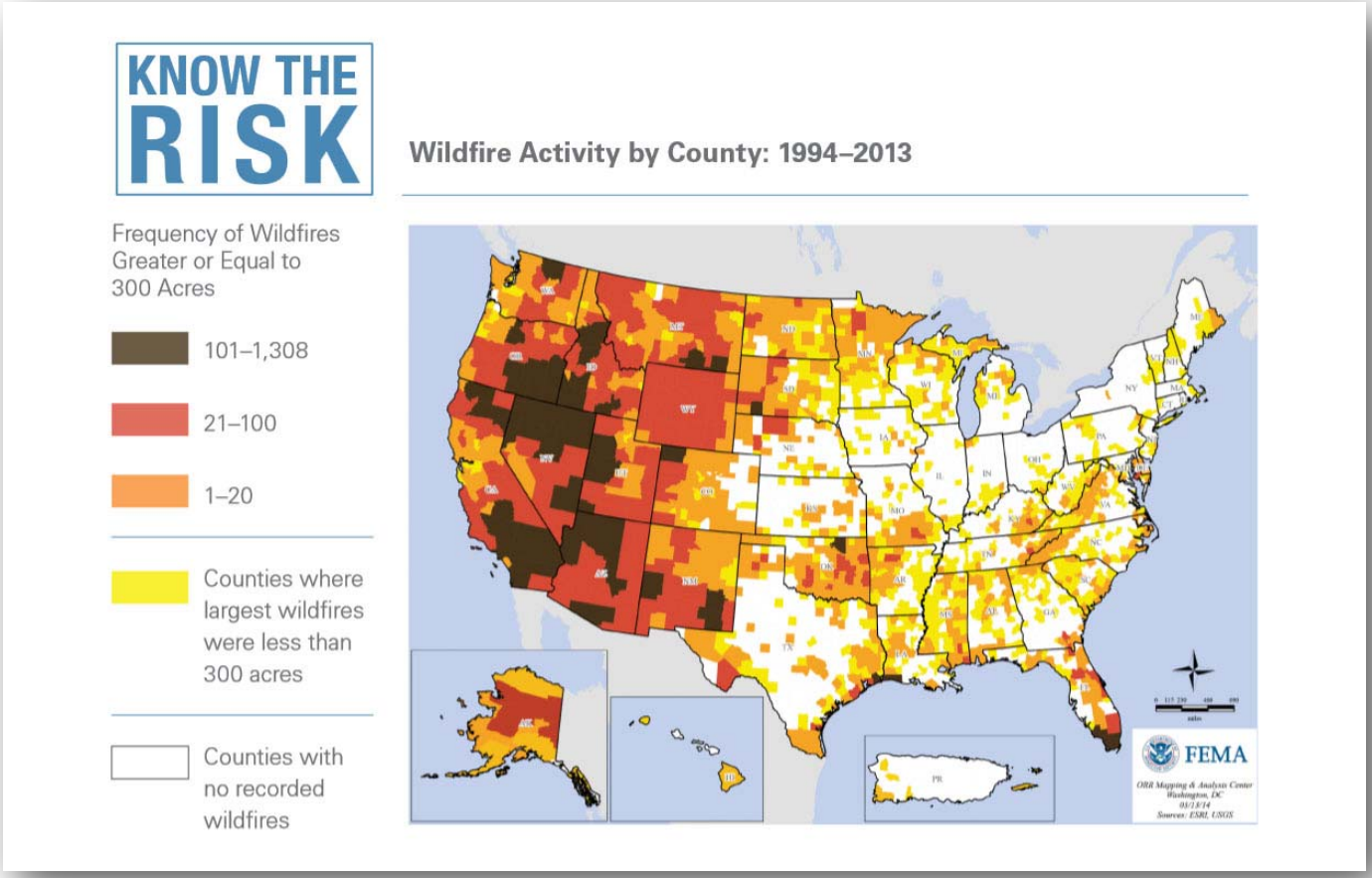
Top 10 Most Destructive California Wildfires

Note the number of fires caused directly by people or by the powerlines or electrical equipment that provide service to communities.

Fire Name (cause)	Date	County	Acres	Structures lost	Deaths
1. *Camp Fire (under investigation)	November 2018	Butte	125,000	7,639	42
2. Tubbs (under investigation)	October 2017	Napa, Sonoma	36,807	5,636	22
3. Tunnel/Oakland Hills (rekindle)	October 1991	Alameda	1,600	2,900	25
4. Cedar (human related)	October 2003	San Diego	273,246	2,820	15
5. Valley (electrical)	September 2015	Lake, Napa, Sonoma	76,067	1,955	4
6. Witch (powerlines)	October 2007	San Diego	197,990	1,650	2
7. Carr (human related)	July 2018	Shasta, Trinity	229,651	1,604	7
8. Nuns (under investigation)	October 2017	Sonoma	54,382	1,355	3
9. Thomas (under investigation)	December 2017	Ventura, Santa Barbara	281,893	1,063	2
10. Old (human related)	October 2003	San Bernardino	91,281	1,003	6

* Fire is still burning and totals are likely to change

Table from http://www.fire.ca.gov/communications/downloads/fact_sheets/Top20_Destruction.pdf



Map Source: FEMA, https://www.fema.gov/media-library/assets/images/115288#details

Discuss:

- Why do you think that the West has so many more large fires than other parts of the country?
- What natural features and economic developments are dominant in the western states? In other words, what lays in the path of fire in the West?
- How might growing population pressures impact fire management plans in the future?
- What responsibilities do property owners bear in fire management? How do those responsibilities compare with those of the government?

Crew members fall a dead tree which ignited near the perimeter of the Hockett fire on Sequoia National Park in 2013. Source: National Park Service, https://www.nps.gov/seki/learn/nature/crew-91.htm

Did You Know?

Not until 400 million years ago, did Earth first contain the three necessary components for fire - oxygen, heat, and fuel.

Approximately 400,000 years ago humans learned to control fire, that is to spark it, maintain it, and spread it at will. Humans are the only species with this ability, and it allowed people to begin to clear land for agriculture, cook food, and move into harsher climates and terrains, all of which significantly shaped humans' social and cultural development.

Chaparral grows in abundance in California, and is the most flammable type of vegetation in the entire United States. Leather leg coverings, "chaps," used to protect the legs of cowboys who chased cattle into this thick vegetation, got their name from chaparral.

The redwood is also native to California, and its natural resistance to fire includes its height, which lifts its branches well above surface flames, and its thick bark made of spongy fibers and tannin, which is a chemical that resists burning (and also protects against insects and fungi).

Additional Resources

Education and the Environment Initiative (EEI) Connections http://www.californiaeei.org/

A program of CalRecycle's Office of Education and the Environment, EEI lessons are designed to foster environmental literacy among California students. The EEI collection includes a variety of lessons that support learning on the topic of fire and human history, including connections to industrialization, fossil fuels, and climate change.

1st Grade: 1.2.4 *People and Places,* Lesson 3 "Change Related to Natural Events" and Lesson 4 "Change Related to Human Activities"

3rd Grade: 3.2.2 *California Indian People: Exploring Tribal Regions*, Lesson 5: "Changing the California Landscape"

4th Grade: 4.1.5.1.3 & *Reflections of Where We Live*, Lesson 4 "Population Density and Services"4.2.1 *California Indian Peoples and Management of Natural Resources,* Lesson 5 "Managing the Pre-California Landscape" and Lesson 6 "A Burning Question - California Indians' Use of Fire"

6th Grade: 6.1.1 *Paleolithic People: Tools, Tasks, and Fire*, Lessons 2-4, "Life in Paleolithic Times," "Investigating Implements," and "Fabulous Fire" 6.1.2 Paleolithic People: Adapting to Change, Lesson 3, "Responding to Change"

8th Grade: 8.12.1 *Agricultural and Industrial Development in the United States (1877-1914),* Lesson 3, "A Second Industrial Revolution" 8.12.5 *Industrialization, Urbanization, and the Conservation Movement,* Lesson 5, "America's Conservation Movement"

10th Grade: 10.3.1 & 10.3.5 *Britain Solves a Problem and Creates the Industrial Revolution*, Lessons 2-5, "The Industrial Revolution Changes Everything," "More People, More Cotton, More Coal," "The Ultimate Causes of the Industrial Revolution," "Inventions of the Industrial Revolution" 10.3.3 *Growth of Population, Cities, and Demands*, Lesson 3, "How Modern Cities Influence Natural Systems" 10.4.1 *New Imperialism: The Search for Natural Resources*, Lesson 2, "Natural Resources for an Industrial Economy"

11th Grade: 11.5.7 *Mass Production, Marketing, and Consumption in the Roaring Twenties*, Lesson 4, "Changing the American Landscape" 11.8.6 *Postwar Industries and Emerging Environmental Movement*, Lessons 2-4, "Environmental Regions and Resources of North America," "Tracking the Postwar Industrial Boom," "Effects of Postwar Boom" 11.11.5 *Many Voices, Many Visions: Analyzing Contemporary Environmental Issues*, Lessons 1-3, "Decisions, Decisions, Decisions (in National Parks)," "Our Public Lands: Conserving Resources and Preserving Natural Systems," "Our Public Lands: Assessing Costs and Benefits"

12th Grade: 12.3.1 *Government and the Economy: An Environmental Perspective*, Lessons 3, "Cap and Trade"

Suggested reading:

David Carle, *Introduction to Fire in California* (Berkeley: University of California Press, 2008)
Stephen J. Pyne, *Fire: A Brief History* (Seattle: University of Washington Press, 2001).

Images: Cover image: https://en.wikipedia.org/wiki/Wildfire; in-house graphic on page 2; prescribed burn in Sequoia: https://www.nps.gov/seki/learn/nature/crew-91.htm

Current Context: A Publication of the California History-Social Science Project

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