

WILDFIRES

**Why They Are
Increasing and How
We Can Adapt**



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CHAPTER ONE

What Are Wildfires?

On August 8, 2023, a spark from a broken power line on the Hawaiian island of Maui ignited a nearby patch of dry vegetation. Winds from a nearby hurricane quickly fanned the small fire into a deadly wildfire. The high winds carried burning embers to dry grassland areas, where flames erupted. The fire continued to grow and spread in minutes, overwhelming the town of Lahaina and reaching the island's Pacific coast in an astoundingly short time. "We saw spot fires at the oceanfront within an hour, within about 90 minutes," says Steve Kerber, vice president and executive director of the Fire Safety Research Institute, which issued a 2024 fact-finding report on the Maui fire. "So, traveling over a mile within about 90 minutes is incredibly fast."⁵

The speed and size of the Maui fire caught many Lahaina residents off guard. Flames, downed utility poles, and electrical lines blocked several evacuation routes. In desperation, some people went into the ocean to escape the fire. John Singer attempted to save his home as the wildfire moved closer to his neighborhood. He climbed onto the roof, used a garden hose to soak his home, and tried to put out flames as they got close. But the fire was too fast and too strong. Singer ran into the ocean to escape the flames. Once he was in the water, Singer looked back at his house. "Devastation—everything gone. There's just nothing left. From the houses to the markets to the businesses, it's like a nuclear bomb went off here. There's nothing left,"⁶ Singer says.

The 2023 Maui wildfire was the worst natural disaster in Hawaiian history and the fifth-deadliest wildfire in US history. It destroyed over twenty-two hundred homes and other structures and caused approximately \$5.5 billion in damages. The deadly wildfire also claimed the lives of more than one hundred people.

“Devastation—everything gone. There’s just nothing left. From the houses to the markets to the businesses, it’s like a nuclear bomb went off here. There’s nothing left.”⁶

—John Singer, survivor of the 2023 Maui fires

What Are Wildfires?

Wildfires are uncontrolled fires that burn through natural areas like forests, grasslands, prairies, and wetlands. These fires can start with a small spark and quickly grow into massive blazes that cover thousands of acres. Wildfires can burn in vegetation that is above or in the soil. A ground fire usually starts in soil rich with organic matter, such as plant roots. A ground fire can burn slowly for a long time until it grows into a surface fire. A surface fire burns in dry or dead vegetation near the ground. Dry grasses and

The 2023 Maui fire caught many residents off guard. This memorial in Lahaina shows photos of those who died in the fire.



fallen leaves often provide fuel for surface fires. A crown fire burns higher and climbs into the leaves and tops of trees and shrubs.

Wildfires are a natural part of many ecosystems. Some environments depend on wildfires to stay healthy. Fires can help clear out dead plants, allowing new grasses and plants to grow. Fires clean the forest floor, burning debris and returning nutrients to the soil. They thin heavy forest cover, allowing sunlight to reach small plants near the ground and allowing large trees to grow. Wildfires can also kill insects and diseases that harm trees and plants. Wildfires can even help some plants reproduce. For example, some pine cones only open and release their seeds when exposed to heat from a fire. Other plants, including the chamise and scrub oak, need the fire's heat for their seeds to germinate. Some plant species depend on wildfires every few years, while others only need a fire a few times a century to move through their natural life cycle.

While wildfires can be beneficial, they are unpredictable. Wildfires that are too frequent, too intense, and burn too close to human communities can do serious harm. A 2023 study by the US Congress Joint Economic Committee estimated that wildfires cost the United States \$394 billion to \$893 billion annually. These costs include direct damages to homes and businesses, wildfire suppression and firefighting, and indirect costs such as lost income and tourism. And wildfires can be deadly, injuring and killing people in their path. In 2023, 130 people in the United States died from wildfires, the highest number since 1990.

How Wildfires Start

Every wildfire begins with a spark that sets material on fire. Sparks can come from natural sources or human activity. Lightning is the most common natural cause of wildfires. When lightning strikes trees, shrubs, or dry grass, it can cause flames that ignite the surrounding vegetation. According to the National Interagency Fire Center, more than sixty-one hundred wildfires in the United States were caused by lightning strikes in 2024.

The Wildland–Urban Interface

In recent decades, more people have moved into areas considered to be part of the wildland–urban interface (WUI). The WUI is the region where homes, businesses, and other structures are built near or within forests, shrublands, grasslands, and other wilderness areas. As the US population has increased and housing prices in cities have risen, more people have moved into the WUI. An estimated 33 percent of all US homes were located in the WUI in 2020, according to Resources for the Future. And that amount is expanding. According to the US Fire Administration, the WUI grows by approximately 2 million acres (809,371 ha) annually. In the United States, California, Texas, Florida, North Carolina, and Pennsylvania have the most houses in the WUI. As more people and businesses move into the WUI, their risk from wildfires increases. Homes in the WUI are more likely to be damaged by wildfires because nearby vegetation fuels the fires and allows flames to rapidly spread. Once the fire engulfs one home, it can easily spread from home to home, quickly engulfing entire streets and neighborhoods. Additionally, fighting fires in the WUI can be challenging because dense vegetation and nearby structures make it difficult for firefighters to access and control flames.

The majority of wildfires are caused by human activity. Experts estimate that 85 to 90 percent of wildfires are started by human activity. Many wildfires start by accident. A smoldering campfire, burning backyard trash, sparks from power lines, and even sparks from hot engines can ignite a fire in dry grass or other vegetation. Even something as simple as a glass bottle that focuses and magnifies the sun’s rays can ignite a fire on a warm, dry day. A fire only needs the right conditions and a single accidental spark to ignite and burn.

Sometimes, wildfires are set intentionally, a serious crime called arson. More than 20 percent of all human-caused wildfires in the United States are the result of arson, according to the National Interagency Fire Center. In 2024 Ronnie Dean Stout II was arrested and charged with arson in connection with the Park Fire in Northern California. Prosecutors said Stout started the fire by pushing a burning car down a 60-foot (18 m) embankment. Because the region was in the middle of an extreme heat wave, the initial blaze quickly spread across the dry land and burned more than 430,000 acres (174,015 ha). In court, Stout pleaded

When lightning strikes trees, shrubs, or grasses, it can ignite vegetation. Lightning is the main natural cause of wildfires.



innocent to the arson charges and insisted he did not intend to start the massive wildfire. “If they light that fire, regardless of their intent, they have no control of how big it gets,”⁷ says Gianni Muschetto, staff chief at the California Department of Forestry and Fire Protection.

Other times, a person does not intend to hurt anyone, but their carelessness leads to a fire. “Human carelessness is the biggest contributing factor to the start of wildfires,”⁸ says Joseph Roise, a professor of forestry and environmental resources at North Carolina State University. Unattended campfires, discarded cigarettes, sparks from power tools or machinery, matches, and fireworks can create the initial spark needed to ignite a wildfire. When people burn garbage or other debris in their yards, the wind can spread burning embers to other areas, causing a new fire to spark. Sometimes, people do not completely put out a campfire or other fire,

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