



# WESTERN U.S. WILDFIRES AND THE CLIMATE CHANGE CONNECTION

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According to the U.S. National Academy of Sciences, over the past 30 years, there has been a fourfold increase in the number of large and long-duration forest fires in the American West<sup>1</sup>. The length of the fire season expand by 2.5 months, and the size of wildfires increase severalfold.<sup>1</sup> More than half the U.S. Western states have experienced their largest wildfire on record since 2000.<sup>2, 3, 4, 5, 6</sup>

Contributing to these changes are increasing spring and summer temperatures, reduced snowpack and earlier spring snowmelt, drought, invasive species, and fire management practices that can make conditions more conducive to wildfires.<sup>7, 8, 9, 10</sup>

Wildfires, like prescribed burns, can help maintain healthy ecosystems, reduce threats like fuel sources for large-scale wildfires, and provide ecological benefits by returning nutrients into the soil.<sup>11</sup> However, excessive wildfires (e.g., running crown fires), can harm the environment, local communities and economies, and public health.<sup>12, 13</sup>

This fact sheet highlights the regional trends, impacts, and vulnerabilities associated with wildfires in the Western United States, explains how climate change is amplifying the duration and severity of these wildfires, and summarizes the leadership and initiatives taking place to help address the issue.

**Disclaimer:** *This Fact Sheet contains preliminary research, analysis, findings, and recommendations. It is intended to stimulate timely discussion and critical feedback and to influence ongoing debate on emerging issues. Its contents may eventually be revised and published in another form.*

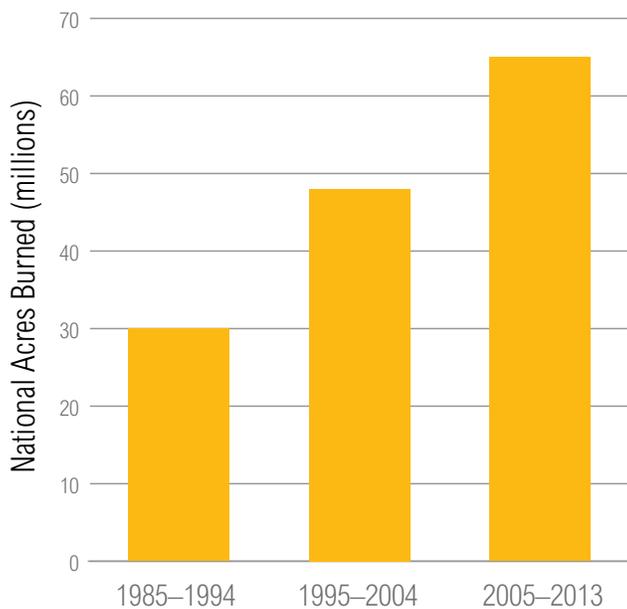
<sup>1</sup> When considering the information provided in this factsheet, it is important to understand that there is not one universal "Western US" defined by all of the referenced sources. We present information from each source in a manner consistent with the terminology and language used by each source in their respective published documents.

## LOCAL TRENDS, IMPACTS, AND VULNERABILITIES

Individual wildfires are mentioned in this section to provide information regarding the magnitude of impacts these types of events are already causing. No single wildfire can be attributed to climate change. However, research shows that climate change is increasing the duration and severity of wildfires in certain regions, and is expected to continue doing so in a warmer world.<sup>14</sup>

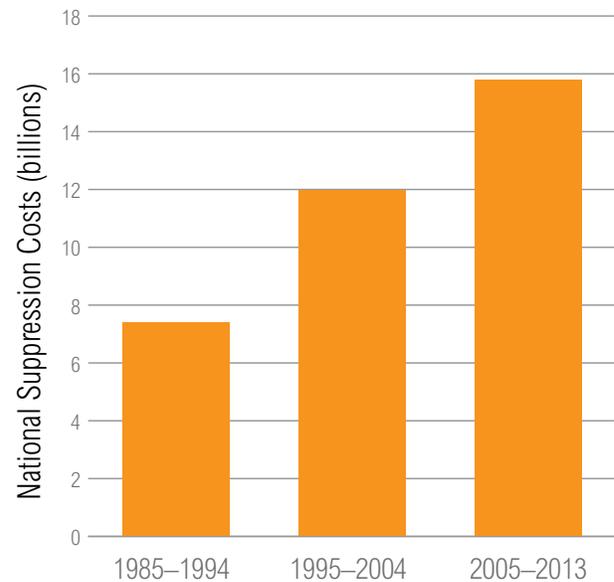
- The annual national cost of putting out wildfires has exceeded \$1 billion (in 2014 dollars)<sup>15</sup> since 2000, and both the acreage burned and the cost to suppress wildfires has grown significantly in each of the last three decades (see Figures 1 and 2).<sup>16</sup> One of the most significant contributors to the cost of wildfire suppression is growing population along the “wildfire-urban interface,” where human development meets natural areas like forests.<sup>17</sup> Other factors contributing to these costs include the large amount of acreage burned and the severity and duration of wildfires, all of which are impacted by climate change.<sup>18, 19, 20</sup>

Figure 1 | **Cumulative U.S. Forest Acres Burned Since 1985**



Source: National Interagency Fire Center adjusted for inflation (2014 dollars).<sup>21</sup>

Figure 2 | **Cumulative U.S. Fire Suppression Costs Since 1985**



Source: National Interagency Fire Center adjusted for inflation (2014 dollars).<sup>22</sup>

- Washington State witnessed its largest wildfire in recorded history in 2014, burning more than 250,000 acres (more than six times the size of San Francisco) and 300 homes.<sup>23, 24</sup>
- Colorado’s 2013 Black Forest Fire was the most destructive wildfire in the state’s history in terms of property loss, destroying more than 500 homes and causing more than \$420 million in estimated insured losses.<sup>25, 26</sup>
- In Arizona and New Mexico, record 2011 wildfires scorched record amounts of land combining to burn nearly 700,000 acres (more than three times the size of New York City).<sup>27, 28</sup>
- Jonathan Overpeck, Co-Director of the Institute for Environment and a professor of geosciences and atmospheric sciences at the University of Arizona stated (May, 2014):

*“The fires in California and here in Arizona are a clear example of what happens as the Earth warms, particularly as the West warms, and the warming caused by humans is making fire season longer and longer with each decade.”<sup>29</sup>*

- Evidence demonstrates that the wildfire season in the U.S. West has grown since the 1970s, extending from an average of approximately five months to more than seven months, according to Climate Central.<sup>30</sup>
- The average number of annual large-scale wildfires (wildfires that burn more than 1,000 acres) has almost quadrupled in Arizona and Idaho since the 1970s, while doubling in California, Montana, New Mexico, Oregon, Utah, and Wyoming.<sup>31</sup>
- Statement by the Western Governors' Association (August, 2014):
 

*“Over the past decade, wildfires have increased in size and intensity and the fire season now extends 60–80 days longer than historic averages.”*<sup>32</sup>
- Wildfires decreasing air quality and harming human health has been well-established.<sup>33</sup>
  - Exposure to smoke from wildfires increases the number of hospitalizations and medical visits associated with health issues like asthma, bronchitis, respiratory infections, and lung illnesses.<sup>34, 35</sup>
  - In Nevada's Reno/Sparks area alone, the 2008 fire season resulted in almost \$2 million in hospital costs from wildfires within a 350-mile radius.<sup>36</sup>
- Philip Dennison, fire expert and professor of geography at the University of Utah stated (May, 2014):
 

*“We are going to see increased fire activity all across the West as the climate warms.”*<sup>38</sup>
- Research shows that climate change has been a significant driver of changes in Western U.S. fire activity.<sup>39, 40</sup>
- Increases in spring and summer temperatures, as well as earlier spring snowmelt, have been strongly connected with longer lasting wildfires and more frequent large wildfires.<sup>41</sup>
- Wildfire risk is increasing significantly in the Western U.S. partly due to warmer and drier conditions, which can increase the flammability of vegetation and create more potential fuel for fires. These risks are expected to increase as global temperatures rise, likely leading to more frequent large wildfires.<sup>42, 43, 44, 45, 46</sup>
- Beetle outbreaks can lead to substantial trees deaths that provide more short-term fuel for wildfires. Warmer temperatures create conducive conditions for beetle outbreaks because more beetles survive warmer winters and reproduce more over longer warm seasons. The impacts of climate change provided favorable conditions for recent unprecedented mountain pine beetle outbreaks in high-elevation communities across the Western U.S.<sup>47, 48</sup>
  - Between 2000 and 2010, more than 43 million acres (larger than the size of New England) of forests in the Western U.S. were harmed by bark beetles.<sup>49, 50</sup>

## THE CLIMATE CHANGE CONNECTION

Experts and research on the connection between wildfires and climate change.

- Elizabeth Reinhardt, Assistant Director, Fire and Aviation Management of U.S. Forest Service stated (September, 2013):

*“The frequency, severity, and extent of wildfires are strongly linked to climate. In a warming climate, we are experiencing earlier snowmelt, lower summer soil moisture and fuel moisture, more drought, and longer fire seasons. Collectively, these conditions have led to increases in fire extent and challenges for land managers.”*<sup>37</sup>

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## LOCAL LEADERS RESPONDING, ACTION PLANS, AND RESOURCES

Leaders in the Western<sup>ii</sup> states are responding to the challenge of climate change:

Number of local elected official signatories of the Resilient Communities for America Agreement<sup>51</sup>—a pledge to create more resilient cities, towns, and counties to challenges like climate change—in the Western U.S. as of September, 2014:

**Arizona:** 13  
**California:** 138  
**Idaho:** 7  
**Montana:** 22  
**Nevada:** 5  
**Oregon:** 16  
**Utah:** 4  
**Washington:** 34

Number of signatories of the U.S. Mayors' Climate Protection Agreement<sup>52</sup>—a pledge by mayors to take action to reduce carbon emissions from city operations and as a community—in the Western U.S. as of September, 2014:

**Arizona:** 6  
**California:** 3  
**Idaho:** 2  
**Montana:** 2  
**Nevada:** 0  
**Oregon:** 3  
**Utah:** 2  
**Washington:** 3

## Examples of State and Local Responses to Wildfires in the Western U.S.

States and localities throughout the Western U.S.<sup>iii</sup> are taking steps to address the risk of wildfires. From educational fire prevention tools and materials, to comprehensive community wildfire protection plans, to statewide fire mitigation plans, action is being taken across the region to better prepare for wildfires and reduce the potential for costly impacts.

**Arizona:** [Community Wildfire Protection Plans](#)<sup>53</sup>

**California:** [Cal-Adapt Wildfire Fire Risk Map](#)<sup>54</sup>

**Idaho:** [Idaho Firewise](#)<sup>55</sup>

**Montana:** [FireSafe Montana](#)<sup>56</sup>

**Nevada:** [Wildland Fire Protection Program](#)<sup>57</sup>

**Oregon:** [Oregon Climate Change Research Institute](#)<sup>58</sup>

**Utah:** [Communities at Risk to Wildland Fire Tool](#)<sup>59</sup>

**Washington:** [Washington State Hazard Mitigation Plan—Wildland Urban Fire Profile](#)<sup>60</sup>

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<sup>ii</sup> The Western U.S. as defined by the National Oceanic and Atmospheric Administration (<http://www.nws.noaa.gov/om/csd/index.php?section=programs>)

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## ENDNOTES

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## ABOUT WRI

WRI is a global research organization that works closely with leaders to turn big ideas into action to sustain a healthy environment—the foundation of economic opportunity and human well-being.

### Our Challenge

Natural resources are at the foundation of economic opportunity and human well-being. But today, we are depleting Earth's resources at rates that are not sustainable, endangering economies and people's lives. People depend on clean water, fertile land, healthy forests, and a stable climate. Livable cities and clean energy are essential for a sustainable planet. We must address these urgent, global challenges this decade.

### Our Vision

We envision an equitable and prosperous planet driven by the wise management of natural resources. We aspire to create a world where the actions of government, business, and communities combine to eliminate poverty and sustain the natural environment for all people.

### Our Approach

#### **COUNT IT**

We start with data. We conduct independent research and draw on the latest technology to develop new insights and recommendations. Our rigorous analysis identifies risks, unveils opportunities, and informs smart strategies. We focus our efforts on influential and emerging economies where the future of sustainability will be determined.

#### **CHANGE IT**

We use our research to influence government policies, business strategies, and civil society action. We test projects with communities, companies, and government agencies to build a strong evidence base. Then, we work with partners to deliver change on the ground that alleviates poverty and strengthens society. We hold ourselves accountable to ensure our outcomes will be bold and enduring.

#### **SCALE IT**

We don't think small. Once tested, we work with partners to adopt and expand our efforts regionally and globally. We engage with decision-makers to carry out our ideas and elevate our impact. We measure success through government and business actions that improve people's lives and sustain a healthy environment.