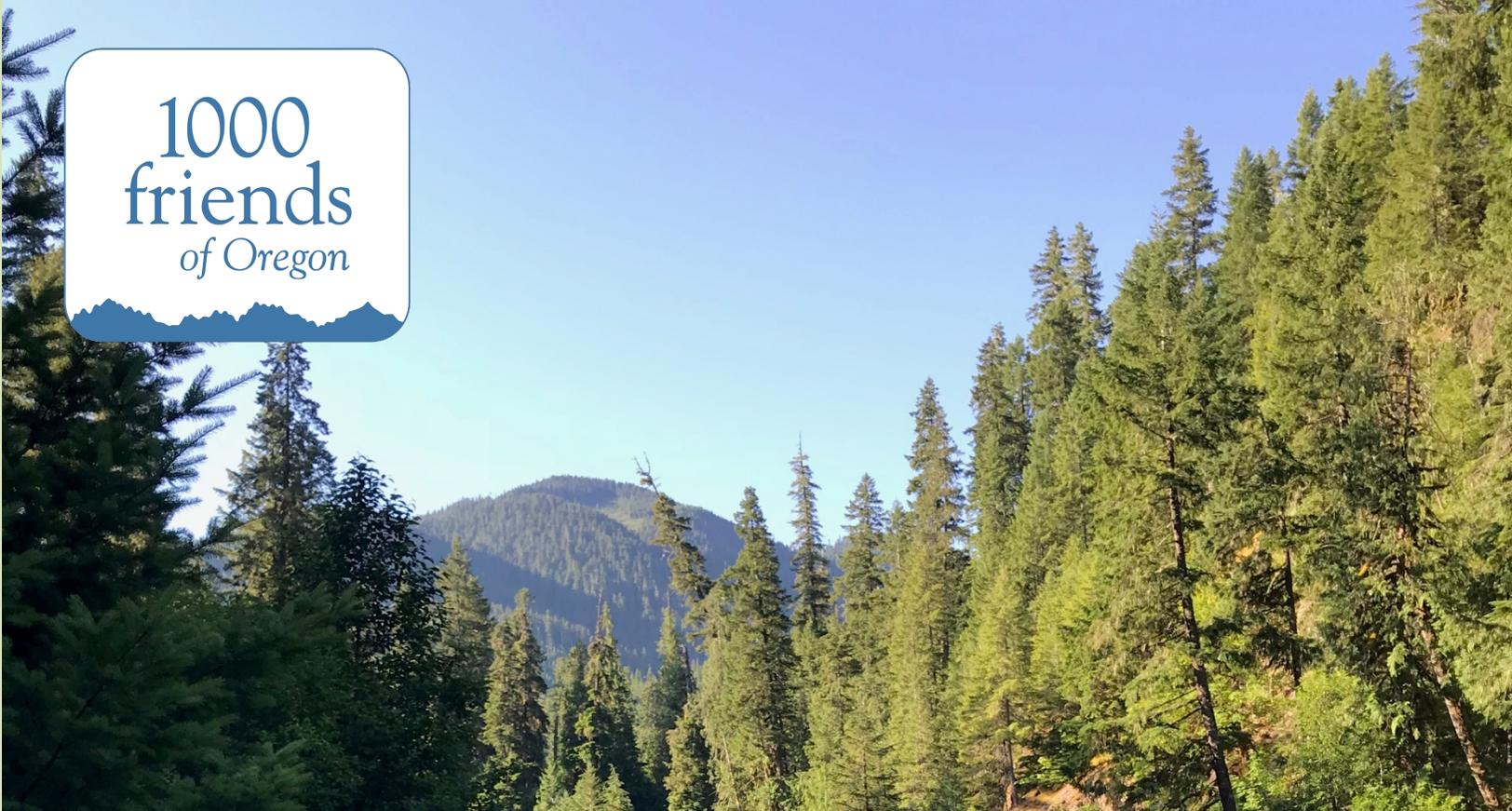




1000
friends
of Oregon



**A New Vision for
Wildfire Planning:**

A Report on Land Use and Wildfires



Executive Summary

More than 107,000 homes in Oregon, worth \$12.7 billion and representing 8 percent of the state's housing supply, face high or very high risk of wildfire.¹ In 2017 alone, wildfires threatened more than 20,000 structures.² With growing urgency, it is critical that Oregon's land use system be used and strengthened to keep development out of high-risk areas, such as forests, rangelands, farmlands, and the wildland-urban interface.

In recent years, every wildfire season seems to break records. There are three key reasons for this phenomenon: heavy fuel loads, climate change, and increased development. The West's average wildfire season has grown by 84 days since the 1970s³ and climate change is estimated to have doubled the number of acres burned, resulting in an extra 4.2 million hectares of fires.⁴

Oregon's comprehensive land use system provides the tools, and establishes the necessary legal requirements, to ensure local governments engage in wildfire planning and risk avoidance. In this paper, we examine the interaction between wildfires, development, and Oregon's comprehensive land use system. We conclude with a discussion of policy recommendations that can guide policymakers and the Land Conservation and Development Commission as they endeavor to keep Oregonians safe and address growing concerns about wildfires in Oregon. Our policy recommendations are summarized below.

POLICY

1) Map wildfire risk across Oregon Wildfire risk should be identified across the state and the Department of Land Conservation and Development should adopt a risk map.



2) Avoid development in high risk areas New development should be kept out of forests, rangelands, farmlands, and the wildland-urban interface.

3) Minimize structures in high risk areas to those necessary for farm and forest use In high risk areas, structures should be limited to those necessary for forest or agricultural use. Do not allow new non-farm and non-forest uses in resource zones where these uses will increase wildfire risk or hazard.



4) Mitigate risks to existing and future developments where development cannot be avoided altogether Where development cannot be avoided, rigorous and enforceable fire siting standards and fire-resistant building materials should be established and used.

5) Enforce laws and standards New regulations should be mandatory and contain suitable enforcement mechanisms.



6) Don't delay in search of perfect information Acknowledging that information is changing, we should utilize best available data and provide for frequent updates.

Table of Contents

Executive Summary	2
Chapter I. Introduction to the Science and History of Wildfires in Oregon and the West 6	
Section 1.01 Oregon’s Land Use System	9
Section 1.02 The Role of Land Use.....	10
Section 1.03 Wildfire Risk and Hazard.....	11
Section 1.04 Causes of Wildfires.....	13
Section 1.05 Climate Change and Wildfires	13
Section 1.06 Types of Fires	14
Section 1.07 Oregon’s Fire Regimes	16
Section 1.08 How Do Governments Plan for Wildfire?	17
Section 1.09 Fuel Treatments: Prescribed Burning and Thinning.....	20
Chapter II. The Wildland-Urban Interface	23
Section 2.01 What Is the Wildland-Urban Interface?	24
Section 2.02 How Developed Is the Wildland-Urban Interface?	26
Section 2.03 Fires in the Wildland-Urban Interface.....	29
Section 2.04 Development Pressures in the Wildland-Urban Interface	30
Chapter III. Preserving Oregon’s Forestland	32
Section 3.01 Where Are Oregon’s Forests?	32
Section 3.02 Keeping Development out of the Forest	33
(a) Recreation and Natural Beauty.....	33
(b) Economic Role	33
(c) Carbon Storage	33
(d) Renewable Energy	33
Chapter IV. Preserving Oregon’s Agricultural Lands and Rangelands	34
Section 4.01 Fires in Different Ecosystems.....	34
Section 4.02 Rangeland Fire Protection Associations.....	34
Section 4.03 Rural Fire Protection Districts.....	35
Chapter V. The Benefits of Avoided Conversion	36

Section 5.01	What is Avoided Conversion?	36
Section 5.02	The Triple Benefit of Avoided Conversion: Carbon Storage, Sustainable Forest Management, and Efficient Urban Land Use	37
Section 5.03	Carbon Storage	37
(a)	Cap and Trade	37
(b)	Carbon Offset Projects	38
Section 5.04	Active Land Management	38
(a)	Active Rangeland Management	38
(b)	Sustainable Forest Management	39
Section 5.05	Compact Urban Growth	39
Chapter VI.	The Costs	41
Section 6.01	The Economic Impact of Wildfires	41
6.02	Suppression Costs	42
(a)	Firefighting Costs	42
(b)	Defending Structures Is Expensive	42
(c)	Who Foots the Bill?	43
Section 6.02	The Full Costs of Wildfires	45
Chapter VII.	Policy Recommendations	46
Section 7.01	Key Recommendations	46
Section 7.02	Recommendation 1: Map Wildfire Risk Across Oregon	47
Section 7.03	Recommendation 2: Avoid Development in High-Risk Areas	48
Section 7.04	Recommendation 3: Minimize Structures in High-Risk Areas to Those Necessary for Farm and Forest Use	48
Section 7.05	Recommendation 4: Mitigate Risks to Existing and Future Developments Where Development Cannot Be Avoided Altogether	48
Section 7.06	Recommendation 5: Enforce Standards and Laws	48
Section 7.07	Recommendation 6: Don't Delay in Search of Perfect Information	49
Section 7.08	It's Time for Action	49
Chapter VIII.	Appendix	50
Section 8.01	Detailed Policy Recommendations	50
(a)	Identify Wildland-Urban Interface Areas Statewide	50
(b)	Establish a "High-Risk" Threshold	50

(c)	Statewide Planning Goal 7 (Natural Hazards) Rulemaking.....	50
(d)	Goal 2 (Land Use Planning Exceptions) Recommendations.....	51
(e)	Goal 14 (Urbanization) Recommendations.....	51
(f)	Change the Nonfarm Dwelling Standard.....	52
(g)	Limit Forest Dwellings.....	52
(h)	Improve Fire Risk Standards for Destination Resorts.....	52
(i)	Minimize Template Dwellings.....	52
(j)	Tackle Enforcement Issues.....	52
(k)	Local Governments Should Share in Firefighting Costs.....	53
Section 8.02 Goals, Rules, Statutes, and Case Law Relating to Wildfires.....		53
(a)	Statewide Planning Goal 2: Land Use Planning and Exceptions.....	53
(b)	Statewide Planning Goal 3: Agricultural Lands.....	54
(c)	Statewide Planning Goal 4: Forestlands.....	54
(d)	Statewide Planning Goal 7: Areas Subject to Natural Hazards and Disasters.....	56
(e)	Statewide Planning Goal 14: Urbanization.....	56
(f)	ORS 197.455: Siting of Destination Resorts.....	57
(g)	Senate Bill 360: Oregon Forestland-Urban Interface Act.....	58
(h)	ORS 215.791: Review of Nonresource Lands for Ecological Significance.....	58

About this report

This report was researched and written by 1000 Friends of Oregon’s 2018 Paul Gerhardt, Jr. Intern, Ashlee Fox. It is an exploration of statewide wildfire planning as it relates to land use law.

About 1000 Friends of Oregon

1000 Friends of Oregon is a statewide land use advocacy organization with offices in Eugene, Grants Pass, and Portland. Founded in 1975, our mission is working with Oregonians to enhance quality of life by building livable urban and rural communities, protect family farms and forests, and conserve natural areas. To learn more about 1000 Friends of Oregon, visit www.friends.org.

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Chapter I. Introduction to the Science and History of Wildfires in Oregon and the West

Wildfires are a part of life in the West. They are a natural hazard, just like floods, earthquakes, and tsunamis. Fire is a natural and important aspect of the forest ecosystem, and it cannot be eliminated.⁵ Put another way, “healthy forests burn, sometimes catastrophically.”⁶ Fire is beneficial—critical, in fact—for building long-term tree resilience, cleaning the forest floor, providing habitat, killing disease, and generating new growth.⁷ For the last 100 years, however, forest management efforts focused almost entirely on fire suppression.⁸

Today, the vast majority of wildfires are fought using a fire suppression approach.⁹ This approach dates back to the Great Fire of 1910, which marked a shift in the way the public viewed wildfires. The fire burned across western Montana, northern Idaho, and northeastern Washington, becoming one of the largest fires in US history.¹⁰ By the end, the fire had burned across 3 million acres, burning entire forests and towns.¹¹ The United States Forest Service was only five years old at the time, and eager to establish its purpose.¹² The agency was influenced by the public’s newfound awareness and perceptions of wildfire, and soon made fire suppression its mission.¹³ The Great Fire marked a new era of fire prevention and suppression policies, which continue to influence wildfire policy today.¹⁴



Figure 1. Three Sisters Wilderness near Bend, Oregon. Photo by Ashlee Fox.

Fuel Types

1. **Surface Fuel:** Needles, leaves, grass, forbs, dead and down branches and boles, surface fuels stumps, shrubs, and short trees.
2. **Ladder Fuel:** Vegetation that connects surface fuels to canopy fuels, allowing fire to travel from the ground to the tops of trees.
3. **Canopy Fuels:** The live and dead foliage, live and dead branches, and lichen of canopy trees and tall shrubs that lie above the surface fuels.

Since 1940 scientists have long emphasized the importance of fire, though state and federal fire policy have not echoed the science.¹⁵ Federal guidelines rarely allow for strategies other than full suppression, and the policy of the Oregon Department of Forestry is suppression-only.¹⁶ While suppression may appear to be a beneficial means of fire management in the short term, suppression does not prevent fires; it only delays them and can even result in larger fires in the future.¹⁷ As a result of decades of suppression, abnormally high amounts of fuels are present in Oregon's forests.¹⁸ Ladder fuel is vegetation that connects surface fuels, like pine cones or leaves, to canopy fuels, like tree branches.¹⁹ Fire suppression leads to more ladder fuels. Ladder fuels increase the probability that surface fires will spread into the crowns of trees.²⁰ More ladder fuels translate to larger, higher-intensity fires that threaten lives, burn structures, and destroy forests that once experienced only low-intensity ground fires.²¹ Coupled with a changing climate, fires will continue to grow more intense in the future.²² Over the last 20 years, Oregon has experienced 15 megafires,²³ which are fires that burn more than 100,000 acres.²⁴ Before the late 1990s, megafires were essentially nonexistent.²⁵ Until recently, megafires were so rare that there was no term to describe them; the term *megafire* was adopted in 2015.²⁶

Rangelands are also experiencing larger, more frequent, and more severe wildfires.²⁷ Rangeland includes “prairie, plain, savanna, steppe, or grassland.”²⁸ In 2012, the Long Draw Fire burned more than 550,000 acres of rangeland in southeastern Oregon and in 2015, the Soda Fire burned almost 280,000 acres in southeastern Oregon and southwestern Idaho.²⁹ While some ecosystems, such as sagebrush steppe ecosystems, have always been home to wildland fires, such frequent, high-intensity, and severe burns impact the livelihood of ranchers, the well-being of wild horses, and the habitat for sage grouse.³⁰

Wildfires will always be part of the landscape, but charred homes do not have to be among the losses.³¹ In 2017, 2,058 wildfires burned a total of 717,212 acres in Oregon.³² No firefighter or civilian lives were lost.³³ Nearly 20,000 structures were threatened, but only 10 homes and 20 other structures were destroyed.³⁴ While Oregon is better off than most states when it comes to wildfire planning, development is on the rise in wildfire-prone areas.³⁵ Using conservative estimates

from 2014, more than 107,000 Oregon homes, which represent 8 percent of the state’s total housing supply and are worth \$12.7 billion, face high or very high risk of wildfire.³⁶ This estimate does not include other structures, crops, machinery, or

natural resources, and is based on wildfire risk as it was in 2014.³⁷ Risks are changing rapidly and wildfire is threatening more and more structures across the state.

To keep people and their homes safe, to prevent unnecessary risk to firefighter lives, to preserve natural areas from the mountains of the coast to the sage grouse of the eastern part of the state, and to protect the rangelands and forests so vital to rural Oregon’s economy and way of life, development in the wildland-urban interface, forestlands, and agricultural lands should be avoided and limited. Luckily, Oregon already has a tool to do this. The state’s land use system provides the framework to avoid and limit exposure to wildfire risk, and this system should be used to the fullest extent.



Section 1.01 Oregon's Land Use System

Signed into law in 1973, Senate Bill 100 established Oregon's comprehensive statewide growth management program.³⁸ The laws were established to protect food and fiber producing working lands and the natural beauty of Oregon and ensuring orderly, well-planned growth.³⁹ The Land Conservation and Development Commission (LCDC) is the public commission created by the state legislature to oversee the program and gather public input.⁴⁰ After hearing from Oregonians across the state, 19 Goals were established as the basis of planning.⁴¹ The legislature also created the Department of Land Conservation and Development (DLCD) to serve as implementation staff for the program.⁴² Local governments are required to meet each Goal by writing a Comprehensive Plan, establishing a zoning map, and adopting codes.⁴³

Most goals established by the land use program have associated rules and statutes. Rules are created by LCDC and statutes are created by the state legislature. The legislature can also make direct changes to the land use program through adopting legislation or ordering LCDC to make rules. See Appendix, Section 9.02 to read more about Oregon's land use system and statutes, rules, legislation, and case law relating to wildfires and the land use program.

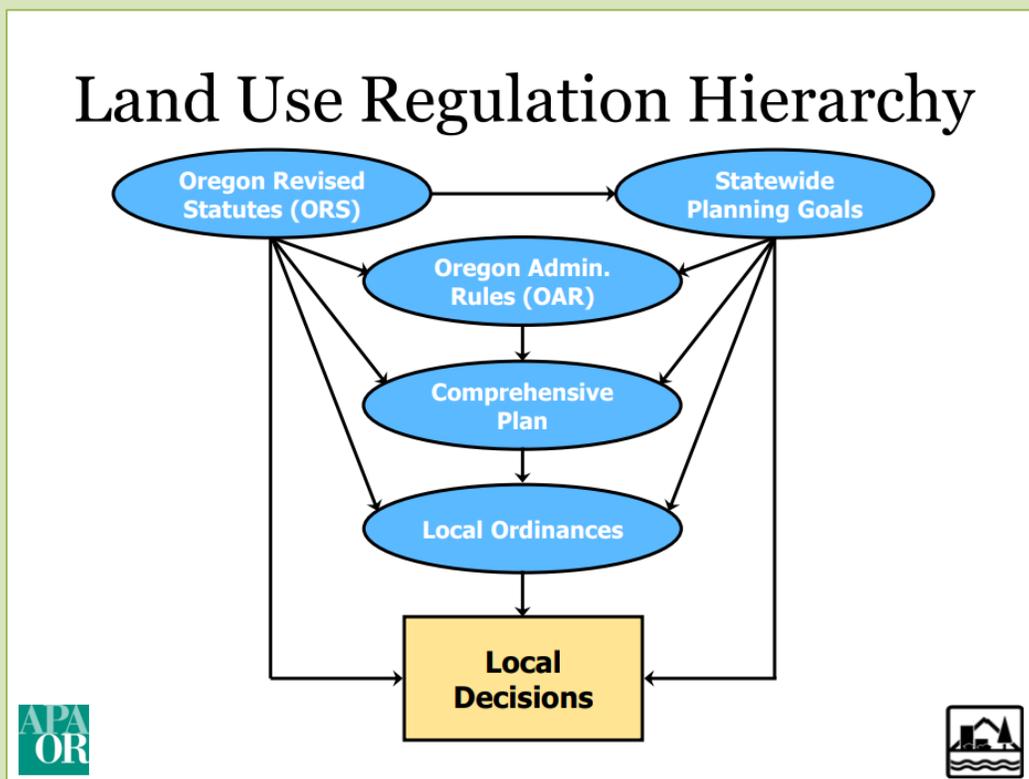


Figure 2. Graphic from the American Planning Association, Oregon Chapter.

Section 1.02 The Role of Land Use

Land use and wildfires are inextricably linked. Changes in land use alter fuel loads and ignitions, which are the foremost determinants of fire conditions.⁴⁴ On a large scale, land use also impacts climate change, which determines the climate variation that controls fire regimes.⁴⁵ Land use planning should be utilized in conversations and actions surrounding wildfire risk and vice versa. When the impacts of climate change and increases in development interact, the risks to lives, property, and homes are magnified.⁴⁶ Land use planning is a tool that works alongside traditional wildfire management practices. Where traditional fire risk management seeks to eliminate wildfires or improve resilience to them through particular building standards and practices, land use planning aims to avoid exposure to and avoid causing wildfire risk altogether “through the informed placement of new residential structures.”⁴⁷ Both tools are needed to successfully avoid losses to people and property.

Oregon’s land use program is a tool that should be used to keep homes out of the wildland-urban interface.⁴⁸ There is little evidence that awareness of wildfire risk on its own effectively detours developers or individuals from building homes or structures.⁴⁹ Development pressures, coupled with shortsighted or uninformed planning decisions, already pose significant, and increasing, wildfire risk to humans and are pushing the costs of wildland firefighting upward rapidly.⁵⁰ To mitigate this problem, municipalities, county governments, or states sometimes create a set of fire siting standards to lower risk, such as requiring that development be located near public roads or that driveways be prepared to handle heavy firefighting equipment. These standards are meant to alter development patterns in the wildland-urban interface, but there is little empirical evidence to show that these regulations are an effective means of fire risk reduction.⁵¹ Undoubtedly, these regulations are an important means to address problems in developed areas, but in areas without development, avoiding development in high-risk areas altogether offers a better alternative. State and local governments cannot alone entirely undo the effects of climate change, such as rising aridity, long droughts, and high temperatures, but they can make changes to Oregon’s land use system that will help tackle the challenges associated with wildfire risk to development.⁵²



Section 1.03 Wildfire Risk and Hazard

Wildfire risk and wildfire hazard are two distinct concepts. Researchers from the United States Forest Service have established definitions for wildfire-related terms, including *wildfire risk* and *wildfire hazard*. Wildfire hazard refers to physical attributes and conditions in an area that constitute a particular likelihood and level of intensity of wildland fire.⁵³ Wildfire risk, on the other hand, describes the potential for realization of wildfire effects on resources and assets, particularly high-value resources or assets.⁵⁴ While this distinction is important and should be kept in mind, this paper will refer to both as wildfire risk for convenience and uniformity, except where necessary in statutes and citations.

There is no single, widely agreed upon measure of risk, but the Joint Fire Science Program measures risk by multiplying the likelihood of an event occurring by the potential effect's magnitude.⁵⁵ In May 2018, the Oregon Department of Forestry released an online interactive map, called the Oregon Wildfire Risk Explorer, which highlighted new data on wildfire threat, risk, and impacts.⁵⁶

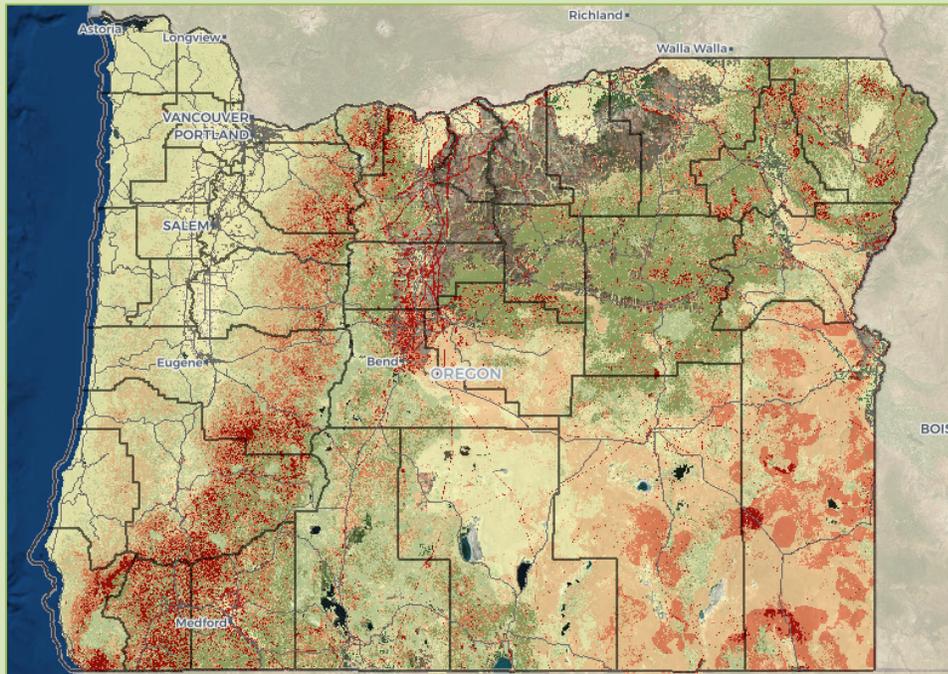
Wildfire Hazard

The physical attributes and conditions in an area that constitute a particular likelihood and level of intensity of wildland fire

—vs.—

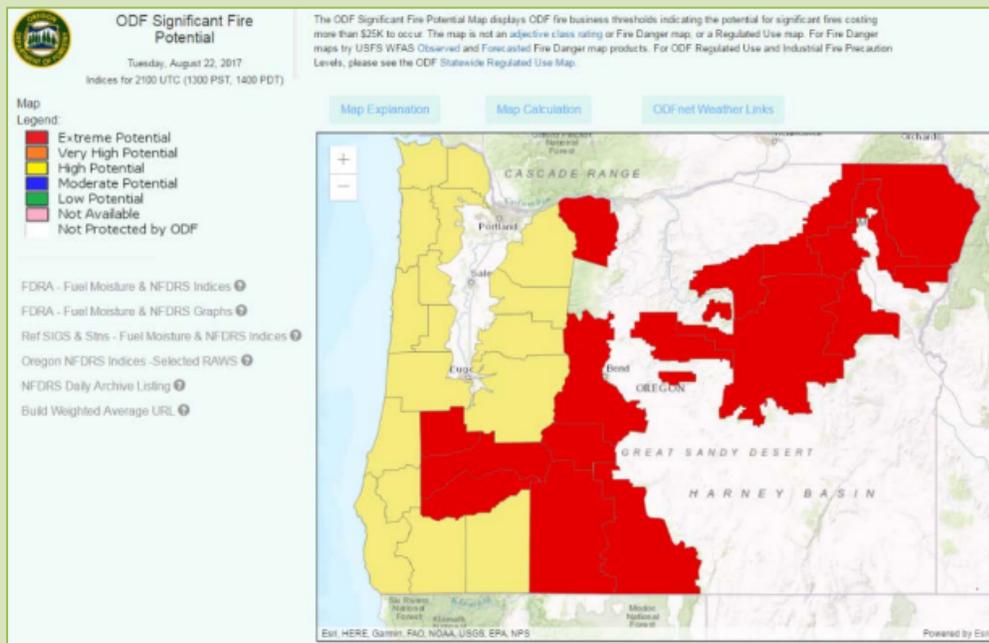
Wildfire Risk

The potential for realization of wildfire effects on resources and assets, particularly high-value resources or assets



◀ The Oregon Explorer Wildfire Risk Map to the left displays wildfire risk across the state. Darker shades of red indicate higher levels of risk.

▼ The Oregon Department of Forestry highlights significant fire potential across the state in an interactive map. The map below, from the height of fire season on August 22, 2017, displays the likelihood of the occurrence of a fire costing more than \$25,000.⁵⁷ Red indicates extreme potential while yellow indicates



high potential. This map is not intended to be used to make planning decisions, but it shows the vulnerability of various regions of the state present during wildfire season.

Section 1.04 Causes of Wildfires

Wildfires are ignited by two sources, either humans or lightning. Most fires are caused by humans.⁵⁸ In 2017, 73 percent of all wildfires on lands protected by the Oregon Department of Forestry were human-caused, with only 27 percent of fires ignited by lightning strike.⁵⁹ Across the state, however, lightning-caused fires burn more acreage than human-caused fires.⁶⁰ Lightning strikes most frequently occur in the Cascades and in eastern Oregon, which has the highest number of lightning-ignited fires.⁶¹ While only 27 percent of fires were ignited by lightning, those fires burned 55 percent of the total acreage burned in the 2017 season.⁶²

Given that humans ignite most wildfires, development in high-risk fire areas has consequences. When more homes are built in the wildland-urban interface, humans are not only exposed to greater wildfire danger, but they are also more easily able to ignite fires there. Because humans start most wildfires, greater land use intensity in the wildland-urban interface⁶³ is associated with more fires.⁶⁴ This means that wildfire risk increases with development in already fire-prone areas. As development sprawls outside of urban areas, as well as into forest and farmlands, more wildfires occur and when they do occur, they pose greater risks because more property and more lives are at stake.⁶⁵

Section 1.05 Climate Change and Wildfires

Climate change impacts wildfire duration, intensity, and frequency, which compound to increase risk and consequently, costs.⁶⁶ Since the 1970s, the West's average wildfire season has increased by 84 days.⁶⁷ During that same time, fuel aridity has increased, which refers to the dryness of the forest and is correlated with the likelihood of ignition. Over half (55 percent) of the increase in fuel aridity was due to climate change.⁶⁸ Forests west of the Cascade Mountains historically experienced fire much less frequently than forests east of the Cascades.⁶⁹ However, west-side forests are becoming drier, experiencing vegetation shifts, and being subjected to higher temperatures.⁷⁰ This indicates that they will face bigger and more severe fires in the future.⁷¹ Land burned increased by 2.56 acres per square mile in Oregon from the 1980s to the early 2000s.⁷² Oregon had the second-largest increase in acreage burned in the nation.⁷³ In total, it is estimated that anthropogenic, or human-caused, climate change resulted in an additional 4.2 million hectares of fires in the forests of the western United States from 1984 to 2015, which is double the area that would have been expected to burn without climate change.⁷⁴

Human-caused climate change resulted in an additional 4.2 million hectares of fires in the forests of the western United States from 1984 to 2015, which is double the area that would have been expected to burn without climate change.

Section 1.06 Types of Fires

Wildfires can be described based on their characteristics. There are four types of wildfire: ground, surface, understory or subcanopy, and crown.⁷⁵ Different types of fires may be present in a single wildfire.⁷⁶

Ground Fires

Ground fires typically smolder and produce fewer active flames. They burn surface materials like peat and sometimes kill roots due to their tendency to hover at high temperatures at the ground level.

Understory Fires

Understory or subcanopy fires (sometimes also referred to as a surface fire) burn smaller trees and tall shrubs that are not part of the main canopy.

Surface Fires

Surface fires burn surface-level vegetation such as shrubs, grasses, or mosses. These fires are often low or moderate in severity and do not kill overstory vegetation such as trees.

Crown Fires

Crown fires burn through the entire canopy and into the crowns of the tallest trees and shrubs. Crown fires sometimes kill all vegetation, but depending on vegetation types and species, some may survive.

In addition to fire type, fires also burn at different intensities and severities. Fire intensity refers to a fire's impact to the ecosystem as well as a fire's level of heat transfer and flaming front characteristics.⁷⁷ Severity refers to fire effects on soil and fuels or vegetation, as measured by "fuel consumption (what is burned), vegetation mortality, and measures such as bark char and foliage scorch."⁷⁸ These terms, however, are sometimes used interchangeably. Stand replacement fires kill nearly all vegetation in the forest. On the other hand, mixed severity fires burn in patches, with some areas where nearly all overstory vegetation is killed and other areas where understory is burned but with little killed vegetation.⁷⁹ In addition, flame length is "the length of the flame at the head of the fire measured from the middle of the combustion zone to the average position of the flame tip."⁸⁰ Fireline intensity (Btu/ft/s) is "the amount of heat released per second by a foot-wide slice of the flaming combustion zone" and is directly related to flame length.⁸¹ Wildfires can be described in various ways, but it is important to emphasize that wildfires do not often intensely scorch entire forests; instead, they burn in patches.⁸²

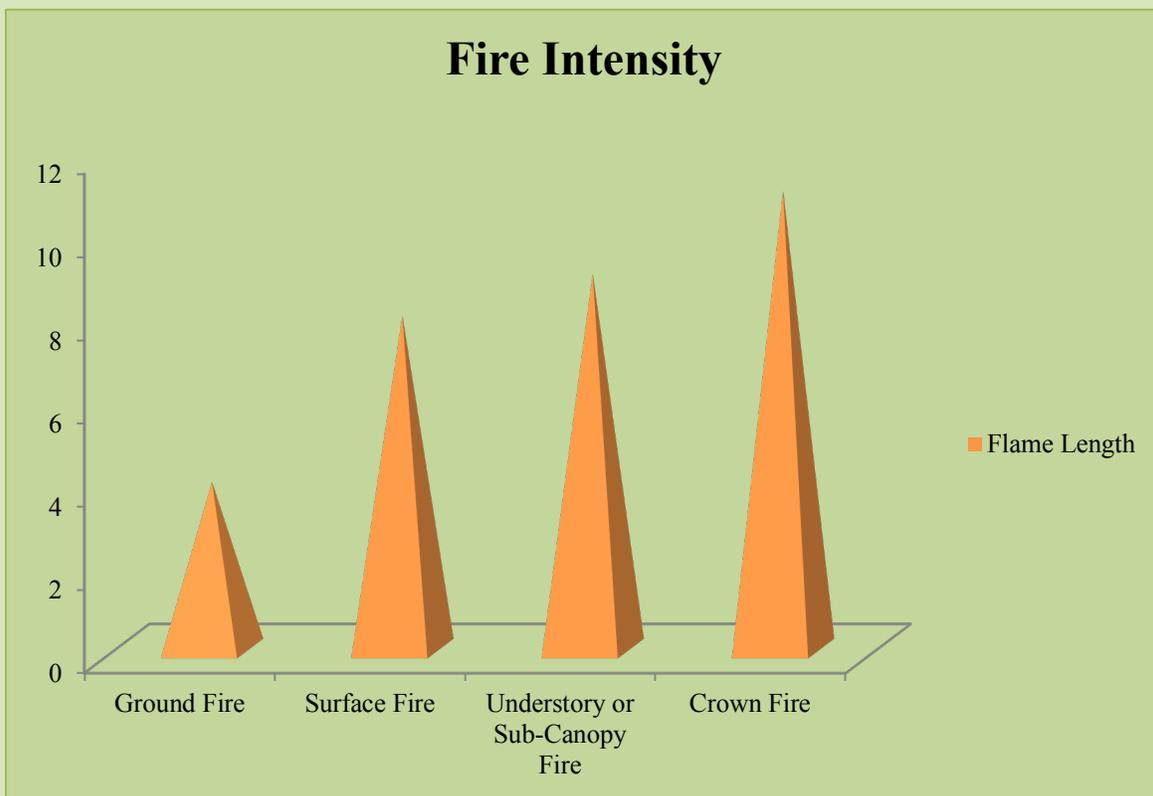


Figure 3. Chart created by Ashlee Fox. Data from Andrews and Rothermel, United States Forest Service.

Section 1.07 Oregon's Fire Regimes

Today, Oregon's fire regimes are in flux, but they historically behaved in particular ways. In Oregon's dry ponderosa pine forests, located in the central and eastern parts of the state, wildfires burned frequently and were not very intense.⁸³ These fires, known as surface fires, burned low to the ground, which killed excess vegetation but larger trees survived. In the wet Douglas-fir forests of western Oregon, fire was infrequent.⁸⁴ Forests west of the Cascade Mountains and in the Coast Range burned only once every several hundred years, but when they did burn, fires known as stand replacement fires were high-intensity and killed most of the forest. In southwestern Oregon's interior forests, forests were drier than most west-side forests but more productive than east-side forests.⁸⁵ Fires burned with varying

levels of severity, known as mixed severity. Southwest Oregon forests had fire return intervals of about 25 to 50 years. Oregon's fire regimes have changed, and continue to evolve, due to land use changes that allow development in fire-prone areas, climate change, and forestry management practices such as fire suppression.⁸⁶

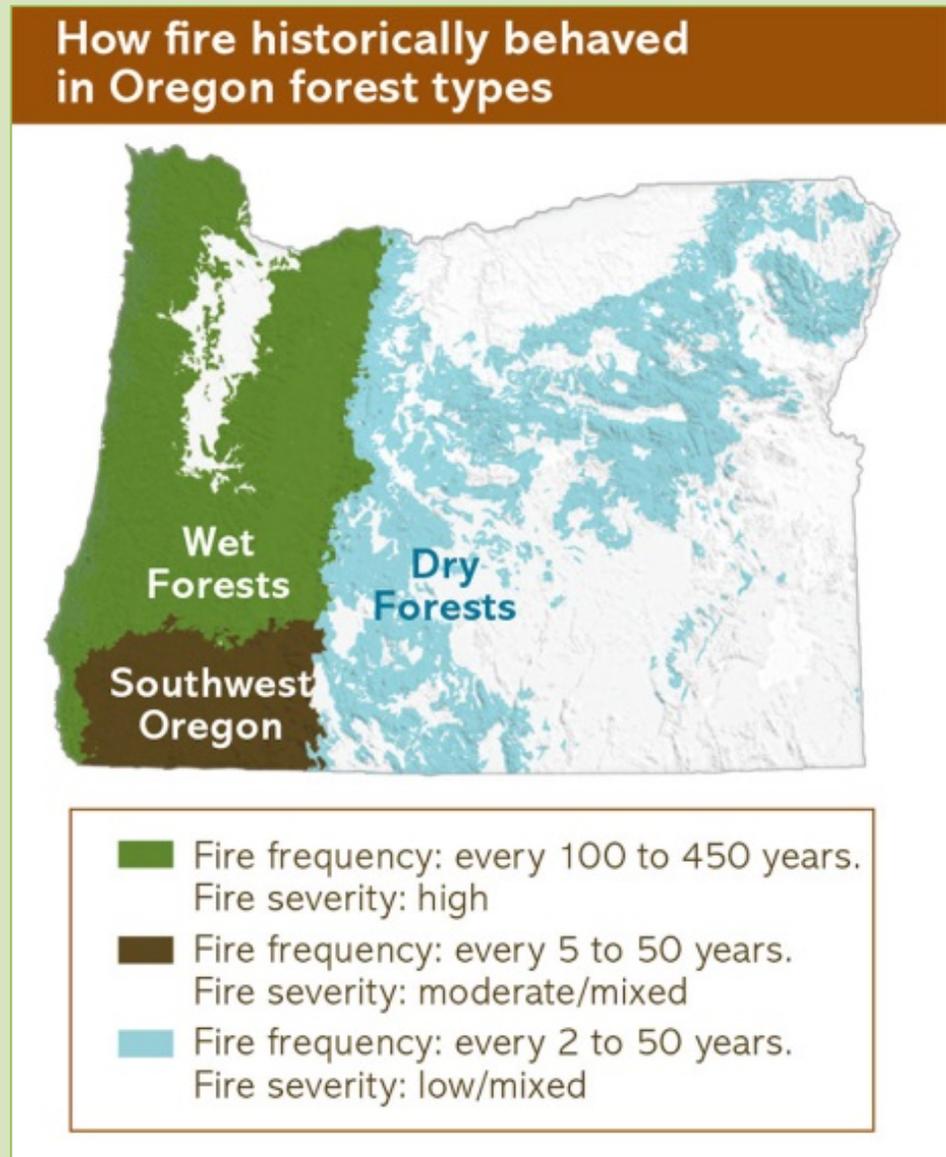


Figure 4. Graphic from Oregon Forest Resources Institute.

Section 1.08 How Do Governments Plan for Wildfire?

State and local governments prepare for wildfires using different methods and to various extents. Few mandatory wildfire preparedness requirements exist at the state and federal level, so planning is often left up to local governments. Local governments are often constrained by resources, which can prevent them from using the best data or techniques to prepare communities.

Few counties have wildfire hazard zone maps in their Comprehensive Plans,⁸⁷ but Deschutes County is an outlier. The Deschutes County Fire Hazard Zones map is included in Chapter 3: Rural Growth Management of the Deschutes County Comprehensive Plan and identifies wildfire hazard throughout the county. In total, 96 percent of the land in Deschutes County is identified as located in a fire hazard zone.⁸⁸ This map identifies wildfire hazard areas and, when combined with maps of wildfire risk (such the Oregon Explorer Wildfire Risk map), can help identify areas where development should be avoided. Wildfire hazard exists in much of the county, but wildfire risk is different across the county.

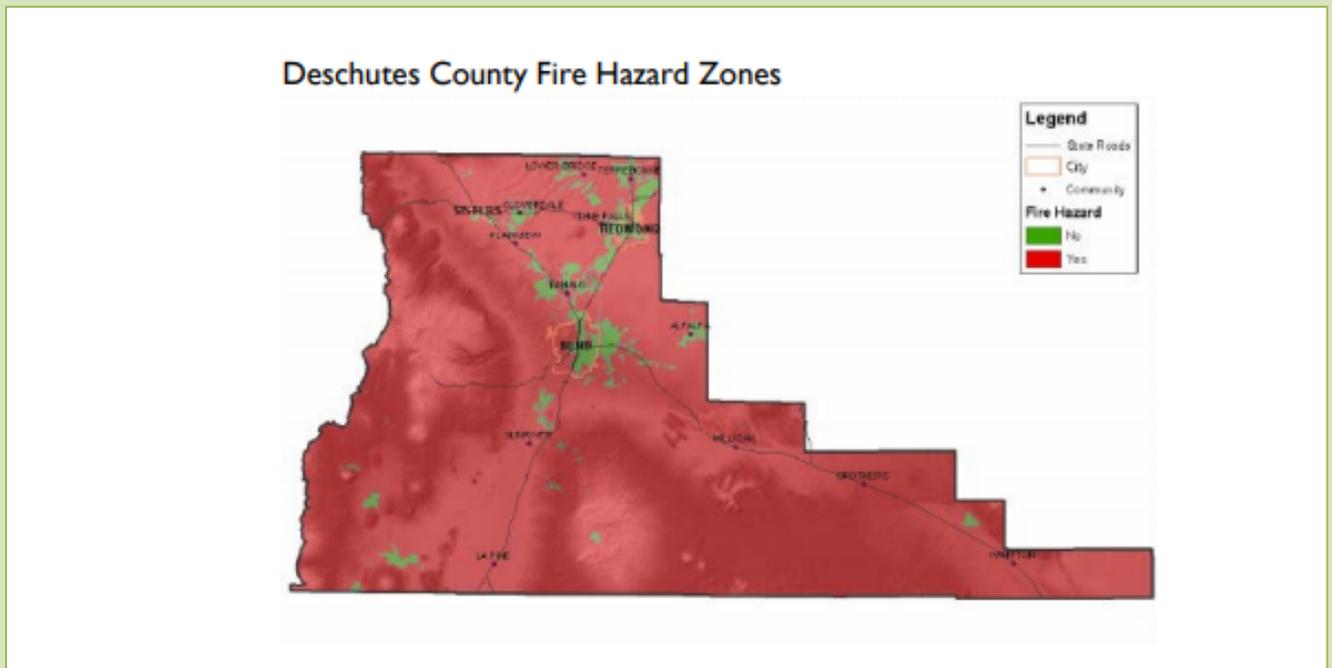


Figure 5. Map taken from Chapter 3, Rural Growth Management, Deschutes County Comprehensive Plan.

Many counties and cities have developed Community Wildfire Protection Plans (CWPPs) to evaluate and address wildfire risk in their jurisdictions.⁸⁹ CWPPs are not legally required by the state or federal government, nor do they have any enforcement mechanisms after they are created, but they do enable communities to receive priority grant funding for hazardous fuels reduction projects from the Bureau of Land Management and the United States Forest Service.⁹⁰ While these plans can help communities work together to identify risks and better prepare for wildfires, they are not enough to avoid risks and overcome the challenges posed by wildfire. The creation of a CWPP does not guarantee implementation, nor does it guarantee local governments will fund or provide staff for projects or needs identified in the document.⁹¹ They sometimes serve as an information source for fire departments more frequently than planners, but are seldom updated, thus providing out-of-date information.⁹²

In addition, some communities in Oregon participate in Firewise. Firewise is a national program led by the National Fire Protection Association that encourages neighbors to work together to reduce wildfire risk.⁹³ The program is administered through a state liaison.⁹⁴ Oregon is home to approximately 141 Firewise sites (sites are often subdivisions).⁹⁵ To become a recognized Firewise site, the site must meet a set of recognition requirements. The state forestry agency or local fire department must first conduct a risk assessment; then, the site must form a board, create an action plan, host one educational outreach event, and engage in one hour of wildfire risk reduction efforts per dwelling within the site's boundaries each year.⁹⁶ While this program has strengths, such as spreading awareness and encouraging homeowners to take steps to improve fire resiliency, it is entirely voluntary and has few recognition requirements. It is not clear that one hour of risk reduction efforts per year greatly reduces the likelihood of a house succumbing to wildfire. In addition, home risk reduction efforts do not change the likelihood of wildfire, and the cost of defending dwellings from wildfire still falls on state and federal agencies.⁹⁷

Further, the state has a Natural Hazards Mitigation Plan (NHMP). Some communities also have individual NHMPs. NHMPs are required for state and local governments that wish to be eligible for certain nonemergency disaster funding.⁹⁸ Wildfires are taken into account if hazard is present.⁹⁹ Plans are meant to assess risk, develop a mitigation strategy, and encourage implementation.¹⁰⁰ According to the state's NHMP, the counties most vulnerable to wildfires are Deschutes, Douglas, Grant, Jackson, Jefferson, Josephine, Klamath, Umatilla, Union, Wallowa, and Wasco counties.¹⁰¹

Despite the resources and planning efforts discussed above, gaps exist in wildfire risk and hazard data at the county and municipal level. Wildfire risk data is most instructive at the tract level, but most efficiently collected by the state. Risk and hazard maps often focus at larger scales or fail to identify particularly hazardous areas, such as the wildland-urban interface.¹⁰² While this can be a result of practical resource constraints and the time required to assess wildfire risk, it poses significant challenges to planners, government officials, and even property owners considering development. For example, a county may consider the entirety of their jurisdiction a wildfire hazard zone, but that is not particularly informative when deciding which

areas are better for development and which pose greater risks. Sometimes, risk may also be defined using less informative measures, such as fire regime condition class. Fire regime condition class does not describe wildfire risk; rather, it describes how departed a fire regime is from its original state. The state needs an informative, accessible data set for the state that includes county-level data.

Since this lack of data creates challenges for local governments, the state should administer and oversee wildfire risk data collection across the state. This will ensure local governments are not burdened by the cost of data collection and will centralize information for

all governments and property owners. The map should highlight risks across areas, from wildland-urban interface areas to farmlands, forestlands, and rangelands. Property owners and local governments should be able to access this data to make informed decisions about planning and development. Without a comprehensive statewide wildfire risk database, Oregonians face unknowns.

Figure 6. Communities that take part in wildfire preparedness measures, such as Project Wildfire, can still be susceptible to fires. In this photo by Ashlee Fox, there are houses and wildland fuels intermixed. This creates dangerous levels of wildfire risk.



Section 1.09 Fuel Treatments: Prescribed Burning and Thinning

One common type of wildfire risk reduction is fuel treatments. The Forest Service defines fuel treatments as the “rearrangement or disposal of fuels to reduce fire hazard.” Fuels are all vegetation, living or dead, which can be consumed by fire.¹⁰³ Typically, thinning, prescribed burning, or other modification of forest vegetation are all techniques used to reduce the intensity or likelihood of the spread of wildfires.¹⁰⁴ Fuel treatments such as prescribed burns and thinning are an important part of the equation, but they must work alongside other wildfire planning practices. Further, there is debate regarding the effectiveness of prescribed burns and thinning. This section outlines both sides, but ultimately argues that fuel treatments are one tool for addressing wildfire risk.



Figure 7. Above is a photo of Deschutes National Forest near Sisters, Oregon, which experienced a severe fire. As is apparent in the photo, wildfires do not burn an entire forest—they burn in patches. Photo by Ashlee Fox.

Central Oregon has been particularly proactive at using fuel treatments as a method to mitigate wildfire risks. Deschutes County and Deschutes National Forest engage in prescribed burns. Fire managers use prescribed burning only when the conditions are just right: 50- to 80-degree days, 25 to 40 percent humidity levels, and winds blowing away from communities.¹⁰⁵ During the spring of 2018, fire managers at Deschutes National Forest oversaw 4,700 acres worth of prescribed burns.¹⁰⁶ In total, central Oregon lands managed by the Bureau of Land Management and the Forest Service saw 22,000 acres worth of prescribed burns between the summer of 2017 and summer of 2018.¹⁰⁷ In Bend, the West Bend Project aims to reduce fuels in a 26,000-acre forest at the edge of the city.¹⁰⁸ Since its fuel treatments started in 2014, the project has carried out 1,000 acres' worth of prescribed burns.¹⁰⁹

Advocates of burning and thinning point to several benefits. First, forests are stocked with high fuel loads.¹¹⁰ Fuel treatments can be used to reduce fuel loads, which is one of the leading causes of growing forest fires and fire suppression costs today.¹¹¹ Fuel treatments, like prescribed burning and thinning, can lower the amount of fuel in forests and, in turn, lower fire severity and its ability to spread.¹¹² Fuel-treated areas can give firefighters a leg up when working to suppress fires.¹¹³

Second, prescribed fires offer a better alternative in areas where homes are built and fire must be suppressed. In the wildland-urban interface, where wildfires will never be able to burn without posing enormous danger to lives and property, fuel treatments are critical. Third, prescribed burning and thinning provides some protection against insect infestations.¹¹⁴ Insects can invade forests and destroy trees, which then become a significant problem. In a forest infested by mountain pine beetles, the tree death rate was more than 50 percent for untreated forest areas but 14 percent for areas of the forest that had been thinned and burned.¹¹⁵

Fourth, prescribed burns and thinning can provide important economic benefits, like preserving better timber for harvest.¹¹⁶ Thinned trees are valuable timber. Smaller thinned trees and vegetation, known as woody biomass, can be converted into renewable energy.¹¹⁷ Finally, while treated areas may not be entirely fireproof, "as treatments accumulate over the landscape or are placed in strategic locations, they have the potential to make a significant impact on the behavior of individual wildfires and overall fire patterns."¹¹⁸ Fuel treatments are an important component of wildfire risk management.

On the other hand, critics of fuel treatments such as prescribed burning and thinning point to several challenges. First, while fuel treatments may alter fire behavior, they do not change the likelihood of a wildfire happening.¹¹⁹ Fuel treatments may play an important role, but they are simply not enough to reduce the likelihood of a wildfire occurring in the wildland-urban interface. Second, in terms of ecological impacts, prescribed burns cannot take the place of wildfire, which is historically and presently important for the health of the forest.¹²⁰ Prescribed burns also typically take place in the spring, which is when budding plants are most vulnerable, unable to withstand the heat, and likely to be killed.¹²¹

Third, fuel treatments are oftentimes not used in locations where they would be the most effective, such as in the wildland-urban interface.¹²² Even so, if fuel treatments were used in

every vulnerable location, other obstacles would still prevent fuel treatments from lowering risk entirely. Scattered development is a challenge for firefighters to access, and without firefighters, fuel treatments do almost nothing to protect homes.¹²³ Fuel treatments are also ineffective defense mechanisms against embers, which are the source of most wildfire-related disasters to homes in the wildland-urban interface.¹²⁴ Embers can travel several miles and ignite everything in their path.¹²⁵

Finally, attempts to intentionally lower fire risk, such as through fire suppression efforts or fuels reduction initiatives, can have the adverse effect of heightened levels of development and exposure to losses in terms of human lives, property, and homes.¹²⁶ This effect is observed because wildfire risk is reduced only narrowly and for a short period of time, which leads to the belief that development is safe when, in fact, it is not.¹²⁷ Speaking on increased development after areas are targeted for fuel treatment, Wasco County Planner Will Smith says, “Once we do that [fuel treatment], though, then that area becomes high-risk because people build there.”¹²⁸ Counterintuitively, more fire suppression and more fire treatments have led to more homes in high-risk areas.¹²⁹

On a practical level, fuel treatments need to take place at a larger scale. Using the 2000–2003 rate of fuel reduction, to treat all 622 million acres across the United States that fall into the at-risk category, it would take more than a century.¹³⁰ If the pace of fuel treatments was increased by 10- or 20-fold to treat all vulnerable areas within the next 20 years, the undertaking would mark the “largest human environmental modification ever taken” and would result in enormous economic and environmental costs.¹³¹ Additionally, vegetation grows back. Fuel treatments would need to happen continuously to be effective, requiring a continuous input of resources for posterity.¹³²

There are other obstacles as well, from resources to air quality standards. Smoke rules, or air quality standards, impose restrictions on how much smoke is permitted in the air. According to Deschutes County Forester Ed Keith, “[Air quality standards] limit[s] the days you can burn because of the wind. This pencils out to about 9 days per year, with 120–150 acres burned per day. To be effective, this needs to be increased 10-fold because we’re so far behind.”¹³³ Currently, the Oregon Department of Forestry and the Oregon Department of Environmental Quality are working together to loosen restrictions and allow greater levels of prescribed burning.¹³⁴ Ultimately, thinning and prescribed burns are one part of a larger, complex equation.¹³⁵ Fuel treatments are part of the solution, but they should not be the only solution on the table.¹³⁶

Wildfire risk is reduced only narrowly and for a short period of time, which leads to the belief that development is safe when, in fact, it is not.

Chapter II. The Wildland-Urban Interface

The wildland-urban interface (WUI) is a critical area of concern for wildfire planning because WUI fires are the most hazardous and most expensive fires in the country.¹³⁷ The high costs of WUI fires are the result of the presence of structures, which are more expensive to defend than undeveloped forest and rangelands.¹³⁸ Wildfire risk does not go away when homes are built in the WUI; instead, risk increases.¹³⁹ The number of homes and other structures developed in the WUI is growing rapidly in the United States, and with increased population growth driving the pressure for development, will only grow faster in the future.¹⁴⁰ WUI development also increases the likelihood that wildfires will move from forests and rangelands into populated neighborhoods because WUI acts as a bridge between the forest and homes.¹⁴¹ Once one home in a densely developed area catches on fire, others easily ignite due to their close proximity. As a result, efforts to avoid development in wildfire-prone areas should not only focus on forestlands and rangelands, but also on the WUI.

Nationwide, 60 percent of the houses built in the last 10 years have been built in the WUI, an area highly susceptible to ignition. It should not come as a surprise, then, that the total number of houses lost to wildfire has tripled in the last 10 years.

Section 2.01 What Is the Wildland-Urban Interface?

There is no single definition of the WUI. While the term has several different definitions, each definition encapsulates the same basic idea: the area where wildlands meet housing and other developments. Importantly, the WUI is not a fixed area. It can expand and change over time. An expanding WUI can negatively impact the natural environmental, wildlife habitat, and natural resources, as well as increasing wildfire risk. For that reason, 1000 Friends of Oregon advocates for compact urban development, which is reinforced through implementation of Oregon’s land use planning system. However, the reality of development is that some expansion into the WUI is likely. The details of the definition, when applied in different contexts, determine the extent of the WUI.

Agency	Definition
Federal	The “urban wildland interface community exists where humans and their development meet or intermix with wildland fuel.” Within the WUI, there are three smaller communities outlined by the federal government: the interface community, the intermix community, and the occluded community.
State of Oregon	The forestland-urban interface refers exclusively to forestland, not other land types that might be susceptible to wildfire, such as rangeland. The Forestland-Urban Interface Act requires lands meeting certain criteria to be evaluated by a county committee and classified according to wildfire hazard level.
Ready, Set, Go!	WUI refers to “areas where homes are built near or among lands prone to wildland fire.” The organization further elaborates that the WUI is “not a place, per se, but a set of conditions that can exist in nearly every community. It can be a major subdivision or it can be four homes on an open range.”

The federal government’s definition of WUI was adapted from a 2000 report titled “A Report to the Council of Western State Foresters—Fire in the West—The Wildland/Urban Interface Fire Problem,” which was released following a particularly severe wildfire season.¹⁴² Because the definition refers to areas where wildland fuels and homes intermix, the WUI is typically synonymous with high fire risk. Within the WUI, there are three smaller categories of communities outlined by the federal government: the interface community, the intermix community, and the occluded community. The federal government focuses its efforts primarily on the interface and intermix communities. The interface community refers to the area where structures are built directly against wildland fuels, but fuels do not continue into the developed area.¹⁴³ The intermix community refers to the area where wildland fuels and structures exist together, in the same space.¹⁴⁴ Finally, the occluded community, which is not a priority for the federal government, refers to areas where there is a clearly demarcated risk area within a city, such as a park containing wildland fuels.¹⁴⁵

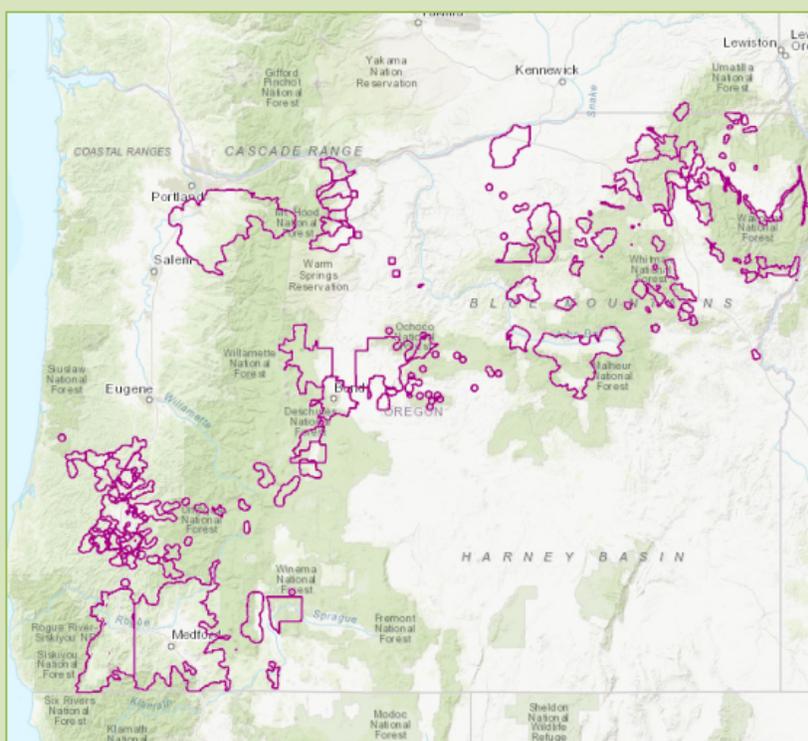


Figure 8. The Wildland-Urban Interface in Oregon according to the federal definition. Map from Data Basin.

The state of Oregon refers to the “forestland-urban interface” in the Oregon Forestland-Urban Interface Act (Senate Bill 360),¹⁴⁶ which was enacted to mitigate growing wildfire risk in Oregon. The state defines forestland-urban interface lands to be identified by a committee based on the following criteria, wherein “a committee shall identify for classification only those lands which:

- a. Are within the county of its jurisdiction;
- b. Are within a forest protection district;
- c. Meet the definition of forestland; and
- d. Meet the definition of suburban or urban.”¹⁴⁷

In addition to definitions used by state and federal governments, nongovernmental organizations also use their own definitions. Ready, Set, Go! is a program created and managed by the International Association of Fire Chiefs and aims to foster better communications between fire departments and local residents across the country.¹⁴⁸ The organization takes a broader approach to defining the WUI to include areas where homes are built in or around wildfire-prone lands, which is flexible and conditions-based.¹⁴⁹ Each definition is useful in different contexts, but the Ready, Set, Go! definition provides the most complete and encompassing description.



Not all high-risk wildfire areas are in the wildland-urban interface, but the wildland-urban interface always has a high wildfire risk because by definition, it is where houses and wildland fuels intermix.

Section 2.02 How Developed Is the Wildland-Urban Interface?

The extent of development in Oregon's WUI varies based on which definition is used. Therefore, it is difficult to pinpoint exactly how many homes are built in the WUI. Ultimately, regardless of the level of development in the WUI, any undeveloped areas represent the opportunity for greater pressures on Oregon's land use system to develop in areas previously zoned for forest or agricultural uses.¹⁵⁰ Oregon has fewer structures in the WUI than most states thanks to its comprehensive land use program, and it is important to keep it that way.

Oregon has fewer structures in the WUI than most states thanks to its comprehensive land use program, and it is important to keep it that way.

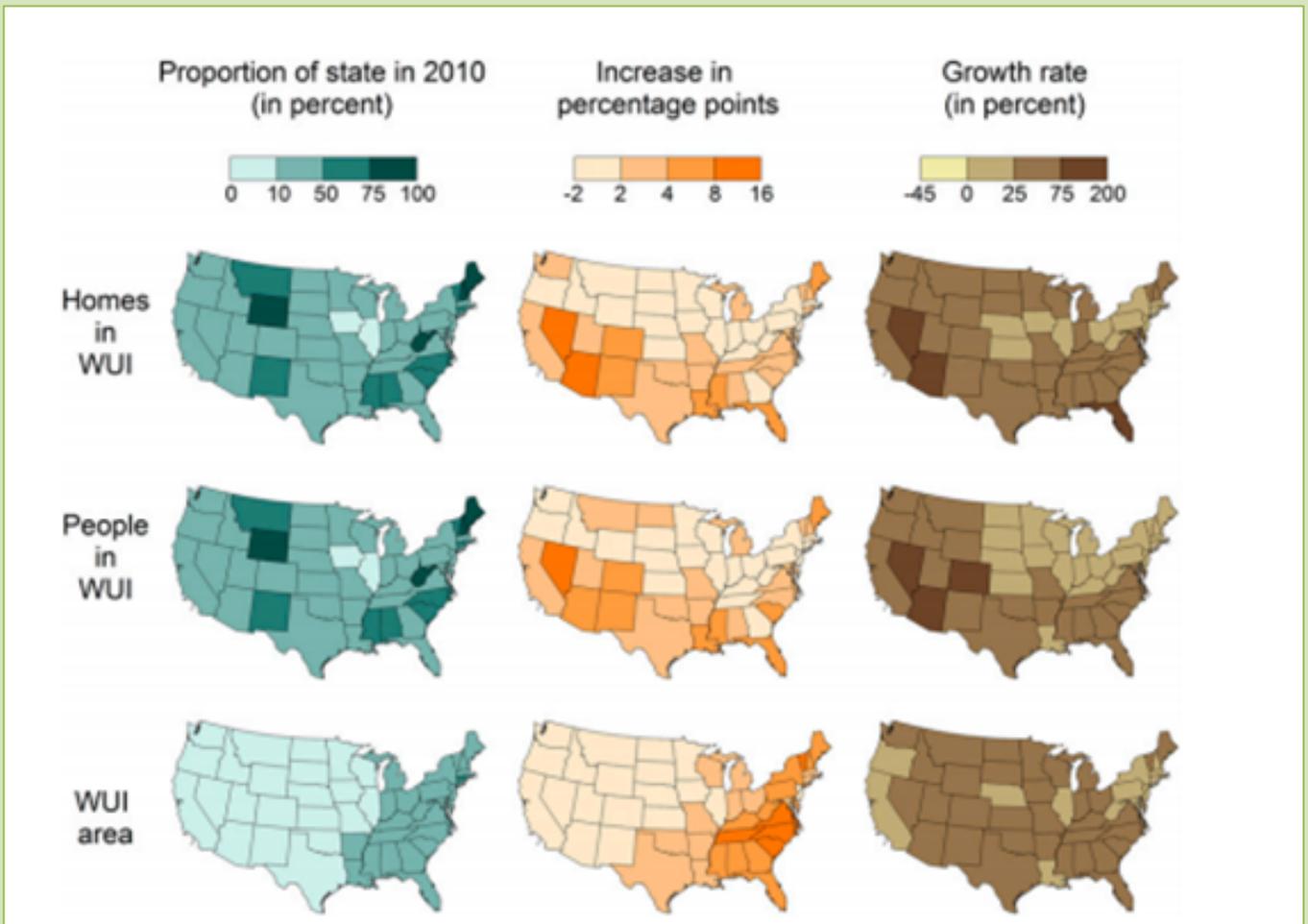


Figure 10. Graphic from Radeloff et al.

Some studies have sought to identify the level of development present in the WUI. Radeloff et al. published a study identifying WUI development. In this study, the WUI was defined as: “The area where houses are in or near wildland vegetation is the area where wildfires pose the greatest risk to people due to the proximity of flammable vegetation.”¹⁵¹ Using this definition, Oregon was identified as having a relatively low percentage of homes and people in the WUI but a fairly high growth rate of new homes and new people in the WUI.¹⁵²

The United States Forest Service published a study identifying the WUI according to the federal government's definition of the WUI. The study finds that 36 percent of all homes in Oregon are built in the WUI and 80.4 percent of seasonal (vacation) homes in Oregon are built in the WUI.¹⁵³ Oregon has one of the highest proportions of seasonal homes in the WUI in the nation.¹⁵⁴

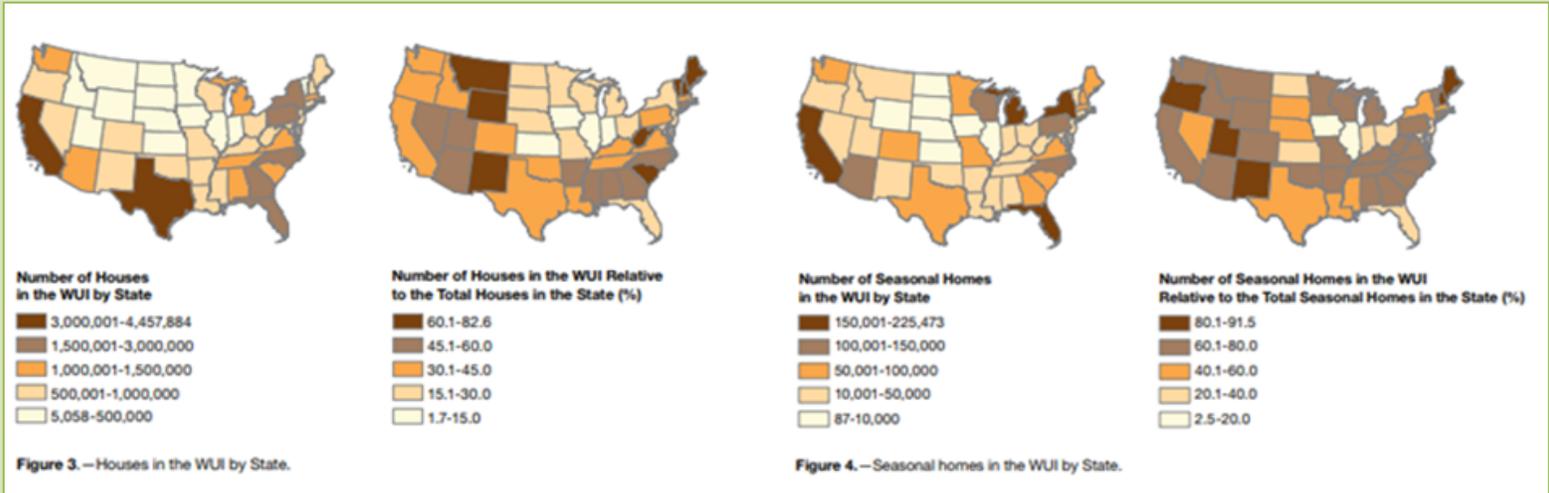


Figure 11. Graphics from Martinuzzi et al.

This study likely underestimates the extent of the WUI because the federal government's definition is narrow compared to other definitions, such as that of Ready, Set, Go! New development in the WUI, or an expansion of the WUI, will exacerbate fire suppression costs, increase risk of fire, and increase risk to property and lives.¹⁵⁵ Ultimately, the WUI and development in high-risk areas will continue to grow unless planners turn their focus from mitigation to avoidance.¹⁵⁶

Section 2.03 Fires in the Wildland-Urban Interface

Fires in the WUI are common. Since 1988, 64 percent of fires on lands protected by the Oregon Department of Forestry took place within a mile of the WUI.¹⁵⁷ Of these, 87 percent are human caused.¹⁵⁸ Figure 10 uses the federal definition¹⁵⁹ of the WUI to show fires within a mile of the WUI. The area is likely underestimated. If a broader definition were used, such as the definition from Ready, Set, Go!,¹⁶⁰ the WUI might include other areas of concern where wildland fuel meets development, such as where one or two houses exist in the forest or on rangelands. Nonetheless, the data is clear that over half of fires take place in the WUI, and thus it should be targeted for policy-making around avoiding risk.

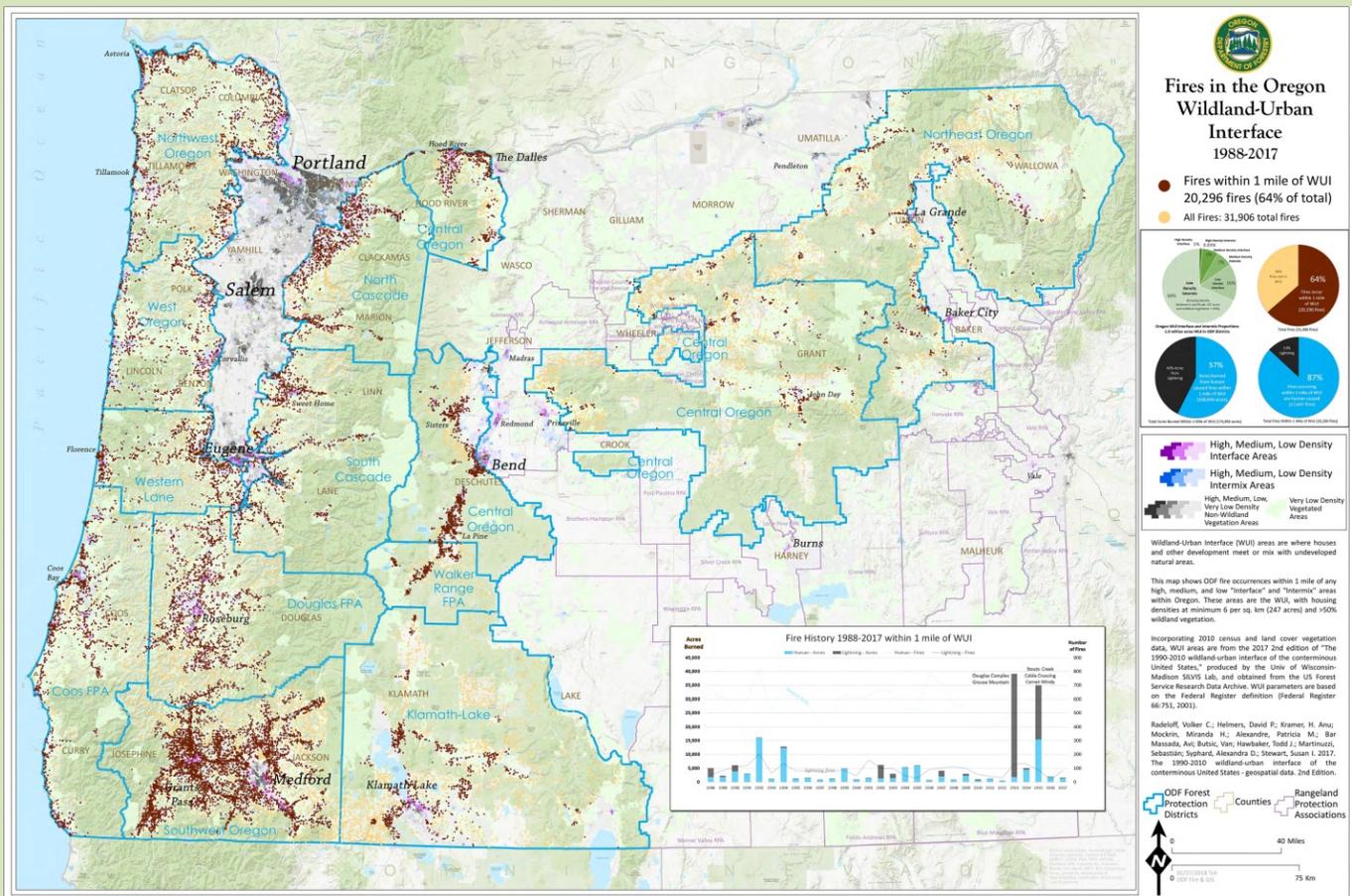


Figure 12. Map from the Oregon Department of Forestry.

Section 2.04 Development Pressures in the Wildland-Urban Interface

Oregon's land use system allows for several types of developments to occur in the WUI:

- *Destination Resorts:* Destination resorts are self-sufficient communities of seasonal homeowners and seasonal visitors, known for their positioning in natural areas and strong emphasis on recreational activities.¹⁶¹ Destination resorts are sited in natural areas (such as in lands previously zoned for forest use), which oftentimes makes them prone to wildfire risk. New WUI area is also often created when destination resorts are sited. Structures abut or intermingle with vegetation, creating high wildfire risk.
- *Template Dwellings:* Template dwellings are new homes added in areas where homes already exist in forest zones.¹⁶² The number of dwellings approved has significantly increased, with 86 percent of dwelling approvals taking place on the most productive forest soils and 69 percent on parcels smaller than 21 acres.¹⁶³ The nature of template dwellings is such that they can exist only in areas with other dwellings, which increases density. Small, clustered areas of development are understood to have the highest wildfire risk.¹⁶⁴ If dwellings are too dense in forest zones, or in the WUI, this increases fire risk and susceptibility; when one structure catches on fire, another structure more easily catches on fire.¹⁶⁵ Jackson County approved the second-highest number of forest dwellings in 2014 and 2015—34 in total, most of which were template dwellings.¹⁶⁶ Much of Jackson County is considered a high wildfire risk;¹⁶⁷ two of its cities were also listed in the top five worst air quality cities in the United States in July 2018 due to wildfire smoke.¹⁶⁸
- *Nonfarm Dwellings:* Nonfarm dwellings are new homes approved in an Exclusive Farm Use (EFU) zone that are unrelated to agricultural activities.¹⁶⁹ Adjacent to rangelands, nonfarm dwellings are susceptible to wildfire. These dwellings are located in rural parts of the state, which poses an additional strain on Rangeland Fire Protection Associations and rural fire protection districts. Deschutes County approved the largest number of nonfarm dwellings in 2014 and 2015, totaling 32.¹⁷⁰ Most of Deschutes County is considered a part of the wildfire hazard zone.¹⁷¹
- *Measure 37 and Measure 49:* Measure 37¹⁷² was a ballot measure passed in 2004 that loosened Oregon's land use laws. In 2007, Measure 49¹⁷³ passed, reinstating some of the authority of the land use system that was originally stripped away by Measure 37. Combined, the two measures allow limited residential development in rural areas where it otherwise would not be allowed.¹⁷⁴ More development in rural areas constitutes greater vulnerability to wildfires in much of Oregon. Some changes to the law that limit development might trigger Measure 49, which requires compensation for land use law changes that prohibit development. However, since the land use law change would be in

the context of protecting people and property from wildfire risk, then the changes are in the interest of public safety. Therefore, Measure 49 might well not be triggered.¹⁷⁵

- *Partitions*: Partitions are used to divide up a single tract of land into multiple (two or three) parcels.¹⁷⁶ Partitions are often necessary when a tract of land already has one dwelling on it, but the owner would like to add an additional dwelling.¹⁷⁷ If a tract of land is located in the WUI, adding additional dwellings increases wildfire risk and increases the number of people and structures at risk.¹⁷⁸
- *Secondary Dwellings*: Secondary dwelling units (SDUs), or accessory dwelling units (ADUs), are additional dwellings located on a parcel of land that already contains a dwelling, either attached or unattached to the existing dwelling.¹⁷⁹ While ADUs are useful tools for providing additional and diverse housing inside urban growth boundaries (UGBs), they can increase wildfire risk and increase risk to property and lives in rural residential (RR) zones, especially in the WUI.

Together, these uses described above represent numerous opportunities for new development in the WUI. More structures in the WUI make for costlier fires, increased threats to lives, and more structures at risk. Not only is the WUI expanding, but an increasing number of fires are occurring there and a growing portion of firefighting expenses are attributed to its expansion.¹⁸⁰

Chapter III. Preserving Oregon's Forestland

Section 3.01 Where Are Oregon's Forests?

Oregon is home to more than 30 million acres of forestlands, comprising 48 percent of the state's total land base.¹⁸¹ The federal government owns 60 percent of these lands, private owners hold 35 percent, the state owns 3 percent, tribes own 1 percent, and other public ownerships hold the remaining 1 percent.¹⁸² Lands in designated forest zones, classified under Oregon's comprehensive land use system, can be utilized only for related uses, such as timber harvest or preservation.¹⁸³

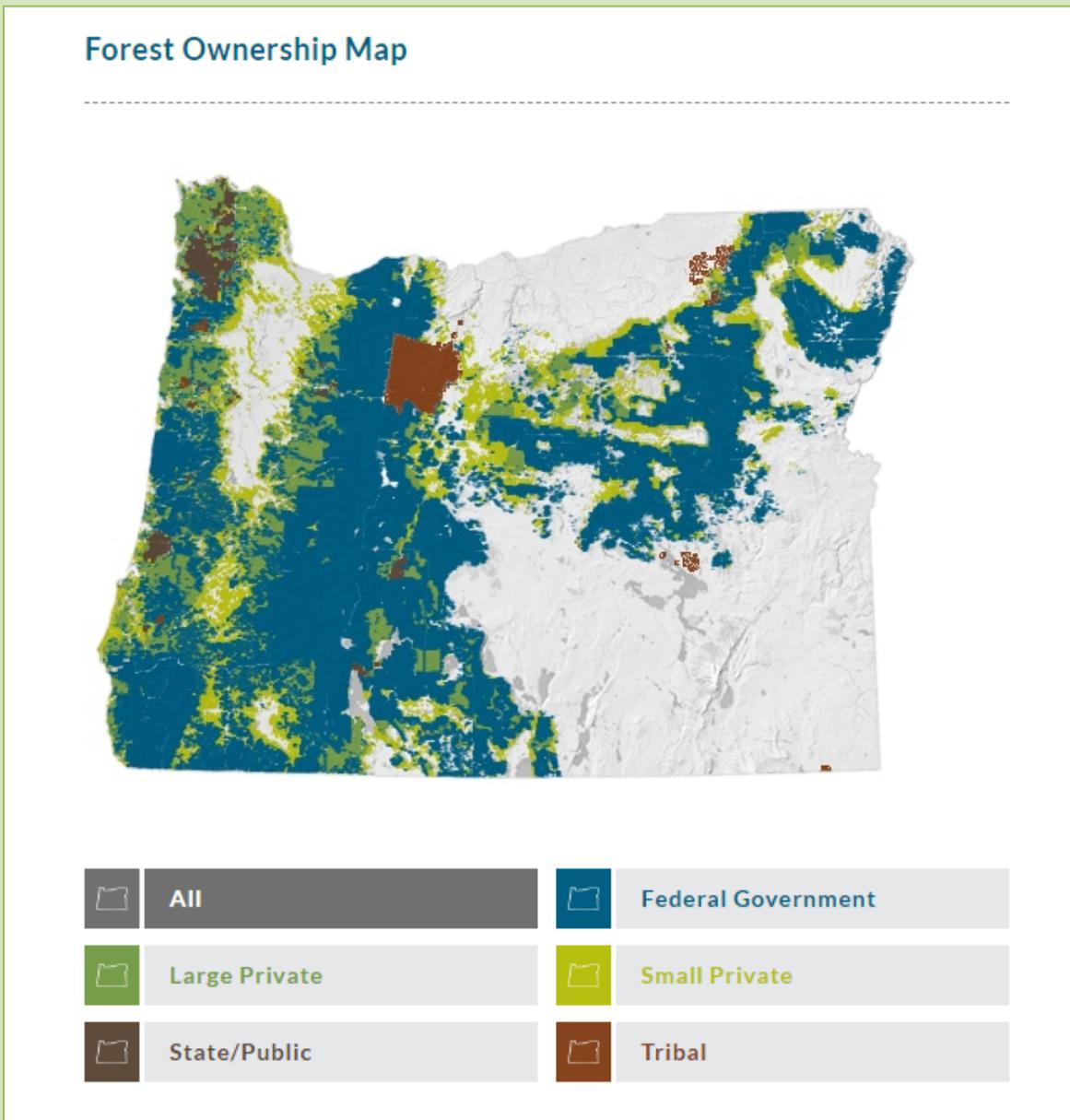


Figure 13. Map from Oregon Forest Resources Institute.

Section 3.02 Keeping Development out of the Forest

Many tracts of forestland, particularly on private land, are undergoing a rise in residential development, resulting in a proliferation of people and structures and creating new WUI in forest zones.¹⁸⁴ Consequently, fire control costs¹⁸⁵ and fire risk are increasing dramatically.¹⁸⁶ When development creeps into the forest, other harms also occur: inability to use forests for economically productive uses (such as timber harvest), wildlife habitat destruction, erosion of natural beauty, environmental degradation, and loss of opportunity to sequester carbon. It is more important than ever to keep development out of the WUI in forest zones.

(a) Recreation and Natural Beauty

Oregonians value the state's natural beauty. From the vast ponderosa pine forests east of the Cascades to the seas of Douglas-fir trees west of the Cascades, Oregon's forests provide opportunities for recreation and maintain the state's iconic natural beauty. Forests are also critical safe havens for wildlife habitat, both before fires and after fires.¹⁸⁷

(b) Economic Role

Forests make a substantial economic impact in Oregon, from both logging and tourism. Oregon is the nation's number one producer of softwood lumber and plywood.¹⁸⁸ The forest sector provides over 61,000 jobs with an average salary of \$50,000.¹⁸⁹ Timber and wood product sales total \$12.5 billion.¹⁹⁰ Furthermore, tourism contributes \$11.8 billion to the Oregon economy every year.¹⁹¹ In rural counties, the forestry and wood products industry and the tourism industry are two of the primary economic engines.¹⁹² Forests play an important role in the health of the economies of rural and urban Oregon alike.

(c) Carbon Storage

One unexpected benefit for forest landowners, and the state as a whole, is the opportunity for carbon sequestration on forestlands.¹⁹³ Trees naturally harness carbon dioxide (CO₂) through photosynthesis, a process known as carbon sequestration.¹⁹⁴ As a result, trees are a key tool in efforts to achieve the state's goal of reducing atmospheric carbon.¹⁹⁵ Carbon is one of the foremost drivers of climate change.¹⁹⁶ In addition to the environmental benefits of carbon sequestration, landowners can receive a revenue stream from carbon-offset projects.¹⁹⁷ By avoiding development in forests, maximum carbon storage potential can be realized.

(d) Renewable Energy

Maintaining Oregon's forests also brings new potential for renewable energy use.¹⁹⁸ Woody biomass can be used to create energy. On-site pyrolysis and the expansion of biofuel processing facilities provide the opportunity for additional revenue sources and renewable energy creation.¹⁹⁹ Given that more than 6.4 million tons of small trees inadequate for lumber use could be available each year for the next two decades,²⁰⁰ woody biomass energy projects are of increasing interest. For wildfires, woody biomass is fuel—fuel that creates larger and more intense fires.²⁰¹ By using woody biomass for energy, forests become less susceptible to severe fires.²⁰²

Chapter IV. Preserving Oregon's Agricultural Lands and Rangelands

In total, 26 percent of Oregon's land is categorized as being in nonfederal farm use.²⁰³ Oregon's farmlands are working lands, producing goods worth \$5.7 billion in 2015.²⁰⁴ The agricultural sector comprises 11 percent of Oregon's net product and is linked to 13 percent of total sales in the state.²⁰⁵ When Oregon's farmlands are rezoned for development, this not only threatens a vital economic driver for the state, but also represents a lost opportunity for carbon storage and increases susceptibility to, and risk of, wildfires. Like forests, rangelands experienced wildfire historically and continue to experience wildfire today.²⁰⁶ Wildfires are also larger and hotter today than they were historically, posing a danger to fragile ecosystems and to the livelihood of farmers and ranchers.²⁰⁷

Section 4.01 Fires in Different Ecosystems

Rangelands encompass a variety of different topographies, including prairies, steppe ecosystems, plains, savannas, and grasslands.²⁰⁸ As a result, these different topographies experience wildfire differently. For example, rangeland grasses recover rapidly following a wildfire.²⁰⁹ Cattle grazing, which occurs on much of Oregon's rangelands, is only temporarily disrupted by wildfire.²¹⁰ Steppe ecosystems also historically experienced wildfires, but with the increasing severity of wildfire on rangelands, these ecosystems, which include sagebrush and sage grouse, are threatened.²¹¹ This is especially true in eastern Oregon and the mountainous terrain of western Oregon. Fire impacts different terrain in unique ways, but all rangelands are adversely impacted by development. The most effective safeguard against fire risk is keeping residential development off of working lands.

Fires also impact valuable croplands. The 2018 Substation Fire burned more than 58,689 acres of croplands,²¹² which accounts for nearly 75 percent of the total acreage burned in the fire.²¹³ The primary crops on the lands burned were wheat, grass, and fallow.²¹⁴ The fire hit at the cusp of harvest season, which was a financial disaster for farmers.²¹⁵ Additionally, a volunteer firefighter—a local farmer—died fighting the blaze. Farmers already experience the financial hardships of fire. If development sprawls onto these lands, not only will valuable croplands be destroyed, but human lives and structures will also experience high risks.

Section 4.02 Rangeland Fire Protection Associations

Rangeland Fire Protection Associations (RFPAs)²¹⁶ are volunteer-based fire crews comprised of farmers and ranchers that respond to wildfires on rangelands where there is no local, state, or federal fire department.²¹⁷ RFPAs respond to fires most frequently in eastern Oregon,²¹⁸ but often, farmers and ranchers are the first responders to wildfires on farm and ranch lands across the state.²¹⁹ In total, RFPAs cover more than 3.2 million acres of private lands in the eastern part of the state, along with 500,000 acres of state lands.²²⁰ According to central Oregon rancher Jim Wood, “the average age of the Rangeland Fire Protection Association I'm part of is about 70. They give us old equipment that the [federal government] deemed unserviceable. They

ask us to go into situations where we're way over our heads.” Wood goes on, “I do think that the important role it serves is like when in 2014, a series of lightning strikes happened on our property and we were able to put out those fires. But to have us fight fires beyond initial attack will lead to tragedy one day. But, they do give us training and old equipment.”²²¹ Farmers and ranchers carry the burden of wildland firefighting in some parts of the state.

Section 4.03 Rural Fire Protection Districts

Rural fire protection districts (RFPDs) provide fire and emergency medical services in rural areas outside city limits.²²² RFPDs are formed under statutes in ORS Chapter 478.²²³ Typically, RFPDs do not cover forestlands, railroad rights of way, coastal shores, or water supply districts.²²⁴ RFPDs often cover large areas, and sometimes hundreds of square miles.²²⁵ Some RFPDs are made up entirely of volunteers,²²⁶ while others may have paid firefighters or a mixture of paid and unpaid firefighters.²²⁷ Additionally, some RFPDs contract with other fire departments, such as city fire departments, to fight fires in RFPD jurisdictions.²²⁸ There are no limitations to RFPDs expanding their boundaries to include developments in high-risk areas. Thus, property owners who want to develop can seek a RFPD boundary expansion that would result in local fire standards being met. This could result in financial implications for RFPDs. Many RFPDs are resource constrained.²²⁹ There are also volunteer firefighter shortages across the state.²³⁰ RFPDs sometimes also lack adequate training and experience to fight wildland fires.²³¹ The first few moments after a wildland fire is ignited are critical because they can determine whether or not the fire will balloon into a larger and less controllable fire.²³² As a result, RFPDs often provide the initial response to fires, or arrive at the same time as state or federal firefighters.²³³ However, RFPDs are easily overwhelmed by larger wildland fires, when lightning ignites more than one fire at once, or when more than one structure is affected.²³⁴

Chapter V. The Benefits of Avoided Conversion

Section 5.01 What is Avoided Conversion?

Avoided conversion means preventing the conversion of privately owned forestland or rangeland to a nonresource land use (such as residential, commercial or industrial). While several tools can be used to avoid conversion, the state's comprehensive land use program is a very effective mechanism. Without the statewide land use planning program, it is estimated that 1.2 million acres of western Oregon's farm and forestland would have been lost to conversion for

development.²³⁵ That is the same as avoiding 1.7 million tons worth of carbon emissions each year.²³⁶ Put another way, that is equivalent to avoiding over 30 percent of annual emissions from Oregon's agriculture sector.²³⁷ Currently, Oregon releases around 60 million tons of carbon annually, but the state's climate goals aim to reduce that level to 14 million tons of carbon annually by 2050. Avoided conversion is not just good for the environment; it is good for all Oregonians.



Figure 14. Even lands that have experienced a recent wildfire have carbon storage potential. Photo by Ashlee Fox.

Section 5.02 The Triple Benefit of Avoided Conversion: Carbon Storage, Sustainable Forest Management, and Efficient Urban Land Use

Good wildfire planning offers benefits outside of keeping people and homes safe. The benefit of avoiding conversion of rangelands and forestlands is threefold: carbon storage, potential for active timber and rangeland management, and compact efficient urban development. The triple benefit means that the principles of Oregon’s land use program are upheld, while also providing secondary benefits.

Section 5.03 Carbon Storage

Carbon storage in agricultural soils represents a practical, cost-effective, and readily available tool in the fight against climate change. Agriculture not only boasts a \$5.7 billion impact on Oregon’s economy, but also delivers important environmental benefits like carbon storage.²³⁸ The premise is simple. The basic story behind climate change is that there is too much carbon in the atmosphere, and that can be addressed in two ways: emit less carbon or sequester existing carbon already in the atmosphere.²³⁹ Both solutions must be employed in order to effectively tackle the growing problem.²⁴⁰ Solving the puzzle involves the use of agricultural lands. Carbon stored in agricultural lands produces environmentally beneficial effects at a large scale, a practice known as carbon farming.²⁴¹

Researchers argue that by maintaining farmlands as working lands, as well as by integrating more sustainable farming, grazing, and water retention practices, soil has the potential to store even larger amounts of carbon.²⁴² On a global scale, even using the most conservative estimates, researchers say soil could store an additional 1 to 3 billion tons of carbon each year, equal to about 3.5 to 11 billion tons of carbon dioxide (CO₂) emissions.²⁴³ Oregon farmers play an active and integral role in the state’s mission to sequester carbon and meet its climate goals. Keeping rural working lands intact is important for the livelihood of farmers and ranchers, maximizing carbon storage potential, and wildfire risk avoidance. Farm and ranch lands are often under pressure for development, but avoided conversion can be leveraged to keep working lands working and keep Oregonians safe.

Regardless of the amount of carbon released during wildfires, avoided conversion carbon offset projects, sustainable forest management, and forest preservation are all important tools for keeping development out of wildlands and protecting Oregonians from wildfires.

(a) Cap and Trade

Cap and trade is a market-based system used to achieve lower greenhouse gas emissions.²⁴⁴ In this instance, carbon emissions are the basis of the market. The government establishes a market, allowing a certain number of carbon emission permits at the onset and

limiting the total amount of carbon emissions in the air.²⁴⁵ Businesses and organizations must have a permit for each ton of carbon emitted, but they are allowed to buy and sell allowances.²⁴⁶

(b) Carbon Offset Projects

Carbon offset projects are designated emissions reduction projects from industries left unregulated in cap and trade programs, such as farming and forestry.²⁴⁷ Projects are meant to be equivalent to certain levels of carbon emission reductions due to their ability to store carbon, such as trees sequestering carbon naturally through photosynthesis.²⁴⁸ On average, forests in the United States sequester 0.85 metric ton of carbon dioxide per acre each year, making them a popular offset option.²⁴⁹ For example, someone who owns forestlands but prefers not to engage in logging can decide to use their forestlands for a carbon offset project. The lands will need to meet some requirements, such as meeting forest cover standards and working to increase stock levels annually.²⁵⁰ Carbon offset projects complement, rather than replace, emission reductions in regulated industries.

In the world of cap and trade, avoided conversion refers to a particular type of carbon offset project.²⁵¹ An avoided conversion project can be used for forestlands under threat of conversion to some other use, such as residential development, by permanently conserving the land through a conservation easement or a transfer of ownership to the public.²⁵² For example, if lands zoned for forest use undergo conversion to put a golf course on those lands, then 80 percent of the forest's carbon sequestration capacity is lost.²⁵³ While rangelands are not often considered for avoided conversion projects, both grassland and shrubland soils store high levels of carbon underground.²⁵⁴ If these lands undergo a land use change, carbon storage capacity is greatly reduced. Avoided conversion is an important tool for maintaining lands and reducing harmful environmental impacts.

While there is diversity of opinions regarding carbon releases and wildfires, carbon storage and wildfire planning are not mutually exclusive. Some researchers argue that large amounts of carbon are emitted during burns, but other researchers argue that carbon releases are minimal.²⁵⁵ Regardless of the amount of carbon released during wildfires, avoided conversion carbon offset projects, sustainable forest management, and forest preservation are all important tools for keeping development out of wildlands and protecting humans from wildfires.

Section 5.04 Active Land Management

(a) Active Rangeland Management

Active rangeland management, especially when ranchers incorporate sustainability as a management practice, can offer environmental and economic benefits to rural Oregonians.²⁵⁶ Oregon's rangelands cover much of the state.²⁵⁷ These lands are vastly different across Oregon, from the sagebrush steppe in the southeastern corner of the state to the grasslands of the southern coast.²⁵⁸ While active rangeland management practices vary, most involve attention to some combination of livestock, wildlife, crops, soil, water, climate, equipment, finances, and people in order to consider which activities and business practices would be most economically and

environmentally beneficial.²⁵⁹ Whether farmers and ranchers choose to make sweeping changes to their rangeland management practices or retain their current practices, working rangelands can provide environmental benefits, such as the conservation of wildlife habitat, watersheds, and open space. Rangelands are integral to Oregon's economy, environment, and way of life.

(b) Sustainable Forest Management

Sustainable forest management promotes the sustainability and health of Oregon's forests. Activities of sustainable forest management include timber harvesting, thinning and vegetation control, tree planting, wildlife habitat and watershed restoration, road maintenance, trail creation and maintenance, recreation area upkeep, and fire management.²⁶⁰ Together, these practices provide economic benefit, promote the health and sustainability of forests, and importantly, keep forests intact.

Sustainable forest management promotes economic health, advances forest restoration goals, and allows for carbon storage. Moreover, active management creates jobs in rural Oregon.²⁶¹ Forestry is responsible for over 61,000 jobs across the state.²⁶² In addition, sustainable forest management practices also promote forest conservation.²⁶³ Climate change and development pressures threaten forest conservation, but active management can curb these forces.²⁶⁴ Biodiversity and natural regimes are already disturbed due to years of fire suppression, but active management can be an important tool for restoration and conservation.²⁶⁵ Finally, carbon storage is a benefit of sustainable forest management. Sustainable management can actually increase carbon sequestration potential.²⁶⁶ Ultimately, a sustainably managed forest is better for carbon storage than a subdivision.

Section 5.05 Compact Urban Growth

Avoided conversion minimizes sprawl and facilitates upward instead of outward growth. Urban sprawl is expensive.²⁶⁷ It requires long stretches of roads, water and sewage services, and public services of every kind. Sprawl demands extensive infrastructure not adequately funded by the taxes generated through sprawl, which burdens the budgets of local governments across Oregon.²⁶⁸ Higher density development saves cities money and creates livable cities for everyone.²⁶⁹ Avoided conversion preserves both forestland and agricultural land, and ensures cities grow smartly.



Figure 15. Oregon's treasures, like Smith Rock, can be preserved only when cities grow smartly. Photo by Ashlee Fox.

Chapter VI. The Costs

Section 6.01 The Economic Impact of Wildfires

Wildfires pose significant economic costs to local communities and economies around the state as well as the state as a whole. During the 2017 wildfire season, fires primarily burned near communities, structures, and infrastructure, which created additional economic costs around the state. From canceled festivals to delayed grocery shipments, the impact was felt long after the fires ceased.²⁷⁰

Oregon tourism, which annually represents an \$11.3 billion impact on the state's economy, suffered in 2017.²⁷¹ The Sisters Folk Festival, which generates \$1.2 million in revenue in a single weekend, was canceled.²⁷² The Oregon Shakespeare Festival canceled nine performances. A direct loss of \$370,000 combined with the loss of the average attendee's spending of \$167.40 per day; the amount of lost revenue was significant.²⁷³ Cycle Oregon's cornerstone ride was canceled, which meant \$1.7 million in foregone economic impact.²⁷⁴ In addition to the cancellation of some of Oregon's best-known events, other tourist activities lost revenue from forced early closures, tourists' lack of access, and direct losses from fire.²⁷⁵

The transportation sector also felt the impacts of fire. Road closures across the state, including interstates and major highways, delayed deliveries and resulted in lost revenue.²⁷⁶ For example, I-84, a major freight route carrying over 5,600 trucks each day, was shut down for three weeks.²⁷⁷ Shipments of all kinds were delayed, creating additional costs for trucking companies and companies dependent on timely shipments. Putting a number on the exact economic loss from the I-84 shutdown is difficult but unquestionably the losses were substantial.

In regions of the state that experienced the most wildfires, Oregon's economy felt the effects the strongest. In particular, the Columbia Gorge, central Oregon, and southern Oregon saw 600 more jobs lost in September than usual, which was attributed to the impact of wildfire and smoke on the leisure and hospitality industry.²⁷⁸ State economist Nick Beleiciks emphasized that this number likely underestimates unemployment levels, hours lost, and days absent due to wildfire and smoke conditions.²⁷⁹ Lost days of work add up to smaller paychecks and financial hardship for workers and business owners alike.

ECONOMIC IMPACT AT A GLANCE

- 5,600 TRUCKS DELAYED DAILY FOR 3 WEEKS
 - 600 JOBS LOST IN SEPTEMBER 2017
- MILLIONS OF DOLLARS LOST IN TOURISM ALONE
- FAR-REACHING IMPACT ACROSS OREGON'S ECONOMY

6.02 Suppression Costs

(a) Firefighting Costs

Fire suppression efforts are costly. In 2017 alone, \$454 million were spent fighting wildfires in Oregon.²⁸⁰ This number is more than triple the average amount spent on fire suppression efforts each year in Oregon from 2010–2015, which was \$146 million.²⁸¹ The primary reason for the extraordinary costs of the 2017 season was not due to acres burned.

FIREFIGHTING COSTS WERE DRIVEN UPWARD BECAUSE MOST FIRES BURNED NEAR HOMES OR INFRASTRUCTURE.

In fact, the number of acres burned in 2017 was not even close to a record number.²⁸² Instead, the costs were driven upward because most of the wildfires burned near homes or infrastructure.²⁸³

(b) Defending Structures Is Expensive

Structures represent the most significant, and most costly, challenge for firefighting efforts. During the 2017 wildfire season in Oregon, a total of 19,978 structures were threatened by wildfires across the state.²⁸⁴ When homes are threatened, homeowners are forced to evacuate, firefighters must change their strategy and expend vast amounts of resources to defend homes, valuable natural resources such as timber are left to burn, and at an increasing rate, firefighters lose their lives.²⁸⁵

According to the Oregon Department of Forestry, forestland residential development drives the risk of wildfire and the cost of fire suppression upward significantly.²⁸⁶ The Forest Service estimates that the lion's share of its firefighting dollars, between 50 percent and 95 percent, are spent defending homes.²⁸⁷ While it is impossible to predict whether the next wildfire season will bring fires that burn primarily near homes, there is little question as to whether this will happen sometime in the future. The question, then, is “when” instead of “if” areas near structures will go up in flames. If new structures are built in high-risk areas, such as in the WUI, in forest zones, in farm zones, and on rangelands, costs will only further increase.

19,978

structures threatened

\$454 million

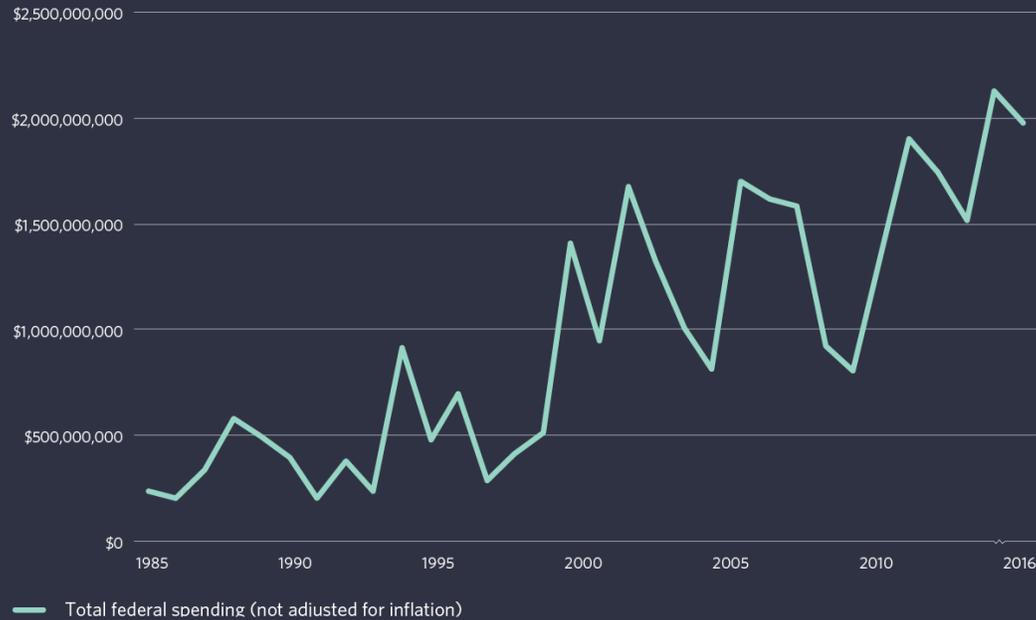
spent on fire suppression
by Oregon in 2017

665,000

acres burned

Federal Spending on Wildfires

The federal government has spent over \$2 billion on wildfire suppression already in 2017, making it the most expensive wildland firefighting year in history.



Source: National Interagency Fire Center.

© 2017 The Pew Charitable Trusts

Figure 16. Graph from USA Today.

(c) Who Foots the Bill?

(i) The Federal Government

Largely driven by the proliferation of new structures, the firefighting budgets of federal wildland management agencies have tripled in the last 10 years.²⁸⁸ The majority of those funds are directed toward fire suppression efforts, leaving increasingly little funding for risk reduction measures such as fuels reduction.²⁸⁹ For example, the Forest Service's budget is now over \$3 billion, and more than half of those funds are spent on firefighting.²⁹⁰ Most dollars spent on firefighting are spent defending homes.²⁹¹ The Forest Service is unable to spend its dollars elsewhere, such as on conservation, restoration, or many other activities because the vast majority of its money is spent fighting wildfires, and to a large extent, keeping structures from burning down. At the same time, 60 percent of the houses built in the last 10 years have been built in the WUI, an area highly susceptible to ignition.²⁹² It should not come as a surprise, then, that the total number of houses lost to wildfire has tripled in the last 10 years.²⁹³

(ii) The State of Oregon

In addition to costs borne by the federal government, a heavy cost burden falls on the state of Oregon. In 2017, the state spent \$38 million fighting large wildfires.²⁹⁴ The state legislature was forced to come up with an additional \$22 million beyond the Oregon Department of Forestry's initial appropriation to fund firefighting efforts.²⁹⁵ While the year's costs were unusually high, a changing climate and increased pressure to build in wildfire-prone areas will continue to exacerbate costs. Over the course of the last decade, the Oregon Department of Forestry spent over \$226 million fighting wildfires.²⁹⁶



The state's wildfire budget is funded by an amalgamation of revenue sources:

- **Forest Patrol Assessment:** Forest landowners are charged a fee known as the Forest Patrol Assessment, which is matched by the state's General Fund.²⁹⁷ Currently, the fee rate is set at \$1.62 per acre.²⁹⁸
- **Oregon Forest Land Protection Fund (OFLPF):** This source is funded exclusively by landowners, and when the state's resources are depleted by large fires, the OFLPF funds additional equipment and staff.²⁹⁹
- **Special-Purpose Appropriation (SPA):** During particularly extreme years, the Oregon Department of Forestry can request additional funding from the Oregon legislature, known as a special-purpose appropriation (SPA).³⁰⁰ The extra \$22 million allocated to the Oregon Department of Forestry in 2017 was the result of an SPA.
- **Private Wildfire Insurance:** Once all other resources have been exhausted and the deductible is met, a private wildfire insurance policy, paid for by the state of Oregon, can assist with firefighting costs.³⁰¹



Oregon is the only state in the nation that purchases catastrophic wildfire insurance.³⁰² In the 1970s, the state began purchasing wildfire insurance and has done so almost every year since. While undoubtedly a useful investment, premiums and deductibles have risen alongside heightened wildfire risk.³⁰³ Even after spending \$38 million on wildfire suppression, the state was shy of hitting its \$50 million deductible.³⁰⁴ In 2013, the insurance policy cost \$854,926, but by 2016, the premium rose to \$3,529,380 and the deductible doubled from \$25 million to \$50 million.³⁰⁵ In recent years, Lloyd's of London has considered canceling the policy altogether, which has created uncertainty and fear among state foresters.³⁰⁶ As a result, the future of the insurance policy is unclear. Even if the policy continues to be offered in the future, growing deductibles and premiums, along with increasing wildfire costs overall, are a strain on the state's budget.

(iii) Local Governments

Local governments share only a small fraction of the wildfire suppression costs. Primarily, costs are borne by state and federal authorities, not local governments.³⁰⁷ This creates an important but poorly recognized disconnect: land use decisions, such as approving subdivisions in the WUI or allowing a forest dwelling, are made at the local level. When wildfires threaten these homes, however, state and federal authorities—in other words, the public at large—pay for firefighting, not the local government. According to a report from the United States Department of Agriculture, “If state and local agencies became more financially responsible for WUI protection, it would likely encourage these agencies to more actively implement land use regulations that minimize the risk to people and structures from wildfire.”³⁰⁸

Section 6.02 The Full Costs of Wildfires

In addition to economic costs and suppression costs, wildfires bring a host of other costs, oftentimes felt for years after the fire. Yet these costs are often forgotten or neglected when conversations about the placement of new structures and new development take place. Lives lost, property damage, property loss, tax and business revenues lost, infrastructure damage (such as roads and power lines), landscape rehabilitation, and ecosystem damage mitigation all constitute additional expenses. While firefighting costs are borne mostly by state and federal governments, long-term damages are nearly entirely the responsibility of local governments.³⁰⁹

For local governments, approving a new forest dwelling or permitting a few new homes in the WUI means short-term gains from a property tax base expansion. At face value, this can seem harmless. Oftentimes, these decisions are even lauded as beneficial for communities in terms of economic development and growth. While there might be short-term benefits, there are a host of unintended costs, especially in the long term. In reality, land use conversion and development in wildfire risk areas represent large and growing long-term costs to the state and federal governments. Cities and counties should focus on more efficient and resilient growth patterns to bring about the most benefits and fewest risks and associated costs.

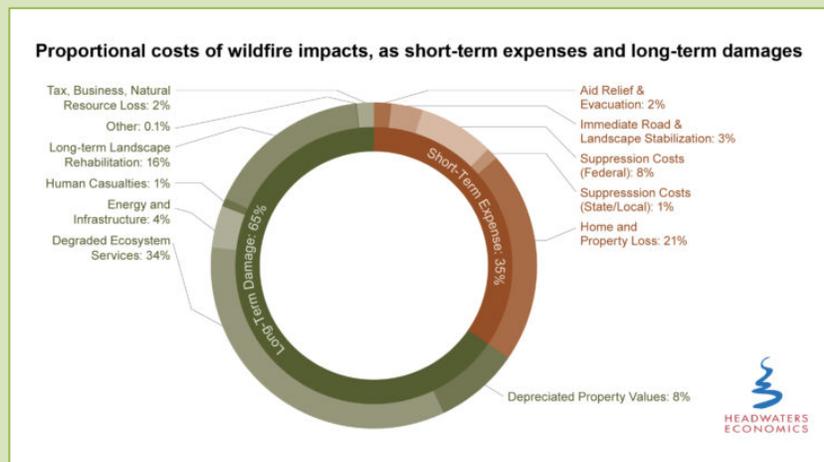


Figure 17. Graphic from Headwaters Economics.

Chapter VII. Policy Recommendations

Wildfires are a naturally occurring event that can sometimes turn high-risk, and regardless of our best practices and scientifically informed mitigation strategies, wildfire will always remain part of the ecosystem in which we live. But we can make smarter planning decisions to reduce risk to human lives, property, and other values. Oregon should to the extent possible reduce the amount of structures allowed in high fire risk areas to keep Oregonians out of harm's way. While there is a wealth of literature about creating safer communities through mitigation and minimization in already developed areas where high wildfire risk exists, this paper focuses on avoidance.³¹⁰ Planning decisions should be forward-thinking and account for the reality of risk, not just short-term economic benefit. Current requirements for destination resorts, nonfarm dwellings, forest dwellings, and development in the WUI should be enforced. Oregon is better off than most states because a robust system for land use planning that protects resource lands already exists, but it is time for the land use system to be put to work to keep Oregonians safe from wildfire. This report outlines potential strategies for reducing wildfire damage to life and property in high wildfire risk areas.

Section 7.01 Key Recommendations

1) Map wildfire risk across Oregon Wildfire risk should be identified across the state and the Department of Land Conservation and Development should adopt a risk map.



2) Avoid development in high-risk areas New development in forests, rangelands, farmlands, and the wildland-urban interface should be avoided or minimized.

3) Minimize structures in high-risk areas to those necessary for farm and forest use In high-risk areas, structures should be limited to those necessary for forest or agricultural use. Do not allow new nonfarm and nonforest uses in resource zones where these uses will increase wildfire risk or hazard.



4) Mitigate risks to existing and future developments where development cannot be avoided altogether Where development cannot be avoided, rigorous and enforceable fire siting standards should be established and fire-resistant building materials should be used.



5) Enforce laws and standards New regulations should be mandatory and contain suitable enforcement mechanisms.



6) Don't delay in search of perfect information Acknowledging that information is changing, we should utilize best available data and provide for frequent updates.



Section 7.02 Recommendation 1: Map Wildfire Risk Across Oregon

The first step toward keeping firefighters, civilians, and property safe during wildfires is identifying wildfire hazard and risk across the state. While wildfire risk data is available from several sources, including the Oregon Explorer Wildfire Risk Map³¹¹ and LANDFIRE data,³¹² there is no official source of data for planners, local governments, and property owners to use. The state should remedy this problem by creating a single, go-to source that is uniform across Oregon's statutes and rules as well as local and state planning practices.



When creating a map and presenting data, a few things should be kept in mind:

- 1) Wildland-urban interface areas should be clear, using a single definition, with an area's high-risk nature emphasized.
- 2) Agencies should make data available to local planners and decision makers. Individual development permits are made on a small scale, which means that current wildfire data is needed locally if it is to be most useful to planners and local governments.
- 3) Experts should define the term *significant* as it relates to wildfire risk, or the law should be changed to include a more specific threshold of risk. This will provide clarity to local governments and courts.³¹³
- 4) Maps and data should be updated regularly. Risks are changing rapidly, which requires that governments work proactively to keep Oregonians safe.



The wildfire risk data and thresholds should be made easily accessible to the public and to local planners and decision makers. Classification and thresholds should be clear and simple. This has already been done for other natural hazards. For example, tsunamis are classified using “T-shirt scenarios,” which classify tsunamis as small, medium, large, extra large, or extra extra large.³¹⁴ This language, as well as the associated maps and color coding of these scenarios, provides a clear and succinct description of tsunami risk to the public and also gives planners a wider range of tools and in-depth information. Second, a website should be created with all relevant information, maps, and data for planners and the public. This has also been done for other natural hazards. For example, the Oregon Risk Map website provides information about flood hazards, maps, planning tools, news, and resources.³¹⁵ A similar tool for wildfire planning should be created and adopted.

Section 7.03 Recommendation 2: Avoid Development in High-Risk Areas

Unless they are related to farming or forestry, structures should be kept away from areas prone to wildfires, including forestland, rangeland, and the wild-urban interface. Not only is this consistent with the aims of the land use system, it is also an important aspect of wildfire planning. While this could be achieved in several ways, including stronger enforcement of existing land use laws, Statewide Planning Goal 7 provides a framework for LCDC to adopt new, enforceable rules that provide clarity regarding where and when development can occur in the context of wildfire risk.

Section 7.04 Recommendation 3: Minimize Structures in High-Risk Areas to Those Necessary for Farm and Forest Use

In high-risk areas, structures should be limited to those necessary for forest or agricultural use. Nonfarm dwellings and forest dwellings (such as template dwellings) should not be permitted in areas subject to high wildfire risk. Every time land use protections are loosened or new uses are added, additional people are put at risk. Allowing additional structures and additional people in areas with high wildfire risk only creates greater risk to firefighters and civilians, to forestland and rangeland, and to property. Outright permitted structures related to farm use [ORS 215.213(1) and 215.283(1)] and forest use (OAR 660-006-0025) should continue to be allowed because they are necessary to keep working lands in production.

Section 7.05 Recommendation 4: Mitigate Risks to Existing and Future Developments Where Development Cannot Be Avoided Altogether

In some instances, development cannot be avoided. For example, lands that were subdivided prior to the enactment of Oregon's land use program, or wildland-urban interface lands inside urban growth boundaries that already contain homes. In these cases, risks should be mitigated by establishing a statewide, enforceable set of fire standards that apply at the time of development siting and throughout the life of the development. These standards should be created by experts, with consideration of the highest possible safety standards to save lives and property. Development should be minimized, which can be done by establishing limits on density in high-risk areas. Where new dwellings are second homes, risk should be shifted to the property owner through insurance requirements and increased fire protection taxes.

Section 7.06 Recommendation 5: Enforce Standards and Laws

Enforcement of fire siting standards is a frequent and recurring issue for local governments. City and county governments simply do not have the resources to monitor defensible space requirements or vegetation restrictions on properties in their jurisdiction. As a result, developments might comply with fire siting standards at the time of approval, but 5, 10, or 20 years later, the development is no longer in compliance. The state should provide resources for local governments to enforce fire-related standards. Enforcement is an issue for the state as

well. For example, the Oregon Forestland-Urban Interface Act³¹⁶ is virtually unenforceable.³¹⁷ New laws and regulations should be mandatory and contain suitable enforcement mechanisms.

Section 7.07 Recommendation 6: Don't Delay in Search of Perfect Information

Information will never be perfect. Wildfire risk maps might change over time, but that is true of many other hazards that Oregon takes into account, such as earthquakes, flooding, and tsunamis. For example, the federal government has a policy of updating flood maps as soon as new and more accurate information becomes available.³¹⁸ This means that flood hazard planning can be undertaken in accordance with the best information available to keep Americans safe now, while also acknowledging that risks may change over time and result in better planning in the future. A similar approach should be taken when adopting and updating wildfire risk maps. Updates are a regular aspect of planning for state and local governments, and wildfire planning should be no different. The most important thing is that a map is adopted for use by local and state governments as soon as possible.

Section 7.08 It's Time for Action

Statewide Planning Goal 7, Natural Hazards, provides the framework for planning for wildfire. In order to comply with Goal 7, this planning effort should include mapping wildfire areas using best available scientific data, and undertaking rulemaking to assess how wildfire risk should be included in local decision-making. Such rulemaking should consider regulating the number of structures in high-risk wildfire areas and requiring mitigation measures where such structures are unavoidable. The Land Conservation and Development Commission (LCDC) should take immediate steps to implement Statewide Planning Goal 7 with respect to wildfire as a Natural Hazard through rulemaking. In conjunction with Goal 7 rulemaking, other Goals and associated rules and statutes should be used to address other weaknesses in wildfire planning. Specific recommendations and changes that will immediately address wildfire risk are included in the Appendix.

Chapter VIII. Appendix

Section 8.01 Detailed Policy Recommendations

This report specifies six key recommendations: identify, avoid, minimize, mitigate, enforce, and funding. There are a variety of solutions that can be used to achieve these goals, but this section outlines specific gaps in Oregon’s laws and regulations and includes suggestions for how policymakers should make changes. The state legislature should adopt statewide standards, but that should not stop local governments from creating their own standards in the meantime.

LCDC should also seek statutory authority as necessary to enforce these rules directly against noncomplying counties. The Governor should seek legislation requiring that local governments pay for firefighting costs to protect dwellings that were permitted and built in high-risk areas after the legislation's effective date. Below are specific changes that would have immediate impact on development and preparedness in high-risk areas across the state.

(a) Identify Wildland-Urban Interface Areas Statewide

The state should identify WUI areas across the state and create a publicly available website and database for planners, homebuyers, property owners, and local governments. While the Oregon Forestland-Urban Interface Act (1997) asked counties to identify WUI areas,³¹⁹ less than half of Oregon’s counties implemented the Act³²⁰ and no comprehensive database of the state’s WUI areas was created. As a result, there is a gap in information and a limited realization of the full extent and risk of Oregon’s WUI areas. The Oregon Wildfire Risk Explorer Map from the Oregon Department of Forestry³²¹ could also be included as part of the tool. The DLCD created a similar tool for flood hazards, which can serve as a model.³²² Information should be disseminated in an accessible and understandable manner to the public and to local governments.

(b) Establish a “High-Risk” Threshold

“High wildfire risk” and “significant wildfire hazard” mean little without an official policy. For example, ORS 215.791(3)(a)(C)(v) requires that new lands designated as nonresource lands will not lead to “significant adverse effects” on the “risk of wildland fire or the cost of fire suppression.”³²³ It is not clear, however, what is meant by “significant adverse effects.” The state legislature should direct experts to establish a threshold for these terms to ensure consistency across state policies and clarity for property owners, local governments, and planners.

(c) Statewide Planning Goal 7 (Natural Hazards) Rulemaking

The state legislature should direct LCDC to create rules for Statewide Planning Goal 7 and require DLCD to establish a program to help local governments avoid development in high-risk areas and use adaptive planning to mitigate risks to existing and future developments. Cities and counties would not only evaluate wildfire risk and increased firefighting costs for future developments, they would also reevaluate existing developments in the WUI and/or high wildfire risk areas to ensure maximum safety and smart development. Natural hazards, such as wildfires, must be incorporated into every aspect of the Comprehensive Plan and planning efforts at every

level. Goal 7 has the potential to keep Oregonians safe and keep working lands working—if rules are created.

(d) Goal 2 (Land Use Planning Exceptions) Recommendations

For local governments undergoing the exceptions process, alternatives analyses should include consideration of wildfire risk. Governments must show that there is no other location with lower wildfire risk that the proposed development can be placed. Every aspect of wildfire risk should be considered, as well as subsequent increased costs of fire suppression associated with development and the ecological benefits of allowing fire to remain part of the landscape.

(i) Alternatives Analysis

Wildfire risk should be part of alternatives analyses. ORS 197.732(2)(c)(B) establishes when local governments may adopt exceptions.³²⁴ OAR 660-004-0022 outlines reasons necessary to justify in order to adopt an exception.³²⁵ Local governments should be required to demonstrate and justify developing in an area of high wildfire risk.

(e) Goal 14 (Urbanization) Recommendations

Every alternatives analysis should include consideration of wildfire risk. Local governments should be required to show that there is nowhere else with lower wildfire risk that the urban growth boundary can be expanded before it is approved. This should also apply in instances of zoning changes and upzoning inside of urban growth boundaries. While the rules include consideration of slope, slope is only one aspect of wildfire risk. Every aspect of wildfire risk should be taken into account, as well as subsequent increased costs of fire suppression associated with development and the ecological benefits of allowing fire to remain part of the landscape.

(i) Urban Growth Boundary (UGB) Alternatives Analysis

Wildfire risk should be considered in urban growth boundary expansion alternatives analyses. OAR 660-024-0060 outlines requirements for establishing a study area for lands to be included in a UGB expansion for Metro, and OAR 660-024-0065 outlines requirements for establishing a study area for lands to be included in a UGB expansion for cities outside of Metro.³²⁶ Each requires an alternatives analysis. Both 660-024-0060 and ORS 660-024-0065 should be amended to require wildfire risk as a consideration when engaging in an alternatives analysis.

(ii) Simplified Urban Growth Boundary (UGB) Method

Wildfire risk should be considered in simplified urban growth boundary expansion method alternatives analyses. OAR 660-038-0070 requires local governments to adjust residential lands inventories to account for constraints, such as flood hazards.³²⁷ Wildfire risk should also be explicitly considered.³²⁸ Similarly, OAR 660-038-0130 requires local governments to adjust employment buildable land inventories to account for constraints, such as flood hazards.³²⁹ Wildfire risk should also be explicitly considered.³³⁰ OAR 660-038-0160(2)(b)

establishes that cities may exclude land from the preliminary study area for its UGB expansion if the land is subject to significant natural hazards.³³¹ Wildfires should be included on the list of hazards.

(f) Change the Nonfarm Dwelling Standard

When considering the approval of nonfarm dwellings, wildfire risk should be a required consideration. ORS 215.284 establishes the criteria by which nonfarm dwellings are approved.³³² The statute should be amended to include a threshold of wildfire risk and costs permissible. Special attention should be paid to the additional burden on Rural Fire Protection Districts and Rangeland Fire Protection Associations.

(g) Limit Forest Dwellings

Forest dwelling approval criteria should include a maximum threshold of permissible wildfire risk. Additionally, a maximum number of houses permissible should be established. OAR 660-006-0027 establishes criteria for the approval of forest dwellings.³³³

(h) Improve Fire Risk Standards for Destination Resorts

Change the fire risk standard from “Fire Regime Condition Class 3”³³⁴ to a better standard of wildfire risk, based on the map created and/or accepted by LCDC. The Oregon Explorer Wildfire Risk Map is the best data currently available and could be used for purposes of establishing areas with higher levels of wildfire risk.³³⁵ Fire Regime Condition Class describes how far departed an area is from its original fire regime.³³⁶ The classification may not necessarily describe true wildfire risk. For example, an area could be rated three, which means highly departed from its natural fire regime, but as soon as a fire occurs, the rating is lowered to one. Even though the rating is one, that does not signal that risk is no longer present; it only signals that the current fire regime is similar to its natural fire regime. The area’s natural fire regime could mean frequent fires, but that would not be reflected in Fire Regime Condition Class. Wildfire risk is a more appropriate measure of danger.

(i) Minimize Template Dwellings

Template dwellings should be minimized. Template dwellings are new homes added in areas where homes already exist in forest zones.³³⁷ These dwellings often pose a high wildfire risk and are associated with higher fire suppression costs.

(j) Tackle Enforcement Issues

The state should establish better enforcement infrastructure for fire standards instead of passing the burden to local governments. Counties and cities lack the resources and the staff to ensure that property owners comply with fire siting standards once development is approved.³³⁸ Further, much of the regulatory framework and many of the wildfire preparedness tools are voluntary, not mandatory. As a result, enforcement of best practices and good decision-making is a challenge.

(k) Local Governments Should Share in Firefighting Costs

Local governments should share a larger proportion of wildland firefighting costs. One challenge for wildland firefighting is that local governments share few of the costs of fighting fires in their jurisdiction; therefore, they have little incentive to avoid allowing more structures to be built in high-risk areas.³³⁹ Land use and planning decisions are made at the local level. Local governments may be attracted to short-term gains from the property tax base expansion associated with new development in wildfire-prone areas, but they do not ultimately bear the full costs of fire suppression for the new development.³⁴⁰ Even a small shift in the cost burden could incentivize better land use planning.³⁴¹

Section 8.02 Goals, Rules, Statutes, and Case Law Relating to Wildfires

Oregon's land use system was established by Senate Bill 100 in 1973.³⁴² The Land Conservation and Development Commission (LCDC) was established as the public commission to oversee the program and gather public input, and the Department of Land Conservation and Development was established as implementation staff.³⁴³ In total, there are 19 Goals that serve as the basis of planning for the state.³⁴⁴ Local governments must comply with each Goal by writing a Comprehensive Plan, creating a zoning map, and adopting codes.³⁴⁵ After incorporating all aspects of the land use program, the Plan is "acknowledged," or approved, by the LCDC.³⁴⁶ If a local government would like to amend its Comprehensive Plan, zoning map, or codes, the government must undergo a separate post-acknowledge process through the LCDC.³⁴⁷ These plans must also be updated periodically.³⁴⁸ If a local government's decision is inconsistent with their Comprehensive Plan, it can be appealed.³⁴⁹ The petitioner must first participate in local proceedings; then, the petitioner can appeal to the Land Use Board of Appeals (LUBA), which operates as an appellate review tribunal.³⁵⁰ LUBA decisions can be brought before the Oregon Court of Appeals, and ultimately the Oregon Supreme Court.³⁵¹

DLCD's administrative rules can be found in Oregon Administrative Rules Chapter 660.³⁵² The primary relevant statutes are Oregon Revised Statutes Chapters 197 (various requirements), 215 (county planning, exclusive farm use and forest zones), 227 (city planning), and 92 (land divisions).³⁵³ Ultimately, rules and statutes provide regulatory ability and clarity to the DLCD, local governments, and LUBA.

Wildfire risk has been on the minds of Oregonians for a long time. This section details existing legal requirements from the land use system, from courts, from legislation, and from other statutes and rules that attempt to address wildfire risk in the state. These existing requirements lay the groundwork for the next section, which includes policy recommendations that improve upon current laws.

(a) Statewide Planning Goal 2: Land Use Planning and Exceptions

Statewide Planning Goal 2 establishes criteria for local governments to adopt an exception to a Goal.³⁵⁴ As part of the exceptions process, local governments are required to perform an alternatives analysis, which requires justification for placing development in an area

not zoned for development. There is currently no consideration of wildfire required in the alternatives analysis.³⁵⁵

(b) Statewide Planning Goal 3: Agricultural Lands

Statewide Planning Goal 3 was established to protect farmlands. Goal 3 requires the identification of farmlands;³⁵⁶ the creation of Exclusive Farm Use (EFU) zones;³⁵⁷ and that farmlands remain working agricultural lands, not subdivisions.³⁵⁸ These statutes and rules also establish minimum lot sizes and protocol for divisions.³⁵⁹ While there are opportunities to build dwellings on less productive agricultural lands, structures on the state's most productive lands are largely prohibited.³⁶⁰ For dwellings, ORS 215.615(1) requires that fire protection services be available, but not consideration of wildfire risks.³⁶¹ There is otherwise little consideration of wildfire risk on farm and rangelands.

(c) Statewide Planning Goal 4: Forestlands

Statewide Planning Goal 4 focuses on the preservation of forests. The Goal was primarily meant to ensure that logging operations continue on forestlands,³⁶² but additional permissible activities include other forestry-related activities, conservation of wildlife and fish, environmental quality protection, recreation, and agriculture.³⁶³

(i) Dwellings in Forest Zones (OAR 660-006-0027)³⁶⁴

Dwellings in forest zones inhibit forest conservation and interfere with forest activities. Less carbon can be sequestered, less timber is available for harvest, and less recreation is possible. Further, as discussed above, dwellings in forest zones increase the likelihood of fire; exacerbate the risk to humans, structures, and trees; and cause significantly higher costs of fire suppression. Nonetheless, under certain circumstances, some dwellings are permitted in forest zones. One example of a permissible forest dwelling is a template dwelling, which is a home sited in an area where other structures already exist.³⁶⁵

(ii) Uses Authorized in Forest Zones (OAR 660-006-0025)³⁶⁶

To engage in certain uses on forestlands, such as building permanent logging equipment repair facilities, constructing log weigh stations, or creating campsites, certain standards must be met.³⁶⁷ One of the requirements is that “the proposed use will not significantly increase fire hazard or significantly increase fire suppression costs or significantly increase risks to fire suppression personnel.”³⁶⁸ While it is unclear what threshold a use must meet to “significantly increase” fire hazard, suppression costs, or risk to fire personnel, this statute does address wildfire planning.

(iii) Fire-Siting Standards for Dwellings and Structures (ORS 215.730, OAR 660-006-0035)³⁶⁹

For new dwellings and structures in forest zones or forest-agricultural zones, there are standards that must be met. The standards require that the land is part of a rural fire protection district or is demonstrably able to be protected via other means, that there is adequate road

access, that there is a fuel break, that dwellings have a fire-retardant roof, that there is no slope greater than 40 percent, and that chimneys have spark arresters.³⁷⁰ While it is best to avoid dwellings in the forest altogether, these standards require some safety measures. Notably, however, these standards are often neglected after permit approval due to lack of enforcement.³⁷¹

(iv) Fire Safety Design Standards for Roads (OAR 660-006-0040)³⁷²

Governing bodies must establish road standards so that public roads, bridges, private roads, and driveways in forest zones must be constructed such that there is ease of access for firefighting equipment.

(v) Litigation

1) *Tennant v. Polk County*

Tennant v. Polk County, 56 Or LUBA 455 (2007),³⁷³ clarified several relevant questions regarding Goal 4,³⁷⁴ but this section will focus on the court's rulings related to wildfire. The petitioner argued that the county did not adequately address the issue of wildfire. Polk County Zoning Ordinance (PCZO) 177.050(B) addresses fire hazards, fire suppression costs, and risks to fire suppression personnel. The court found that the county failed to comply with PCZO 177.050(B). The court ruled that there might "be ways to address and adequately minimize petitioner's concerns, but if so, the county needs to explain what those minimization or mitigation measures are and take appropriate steps to ensure that they are carried out."

2) *Sisters Forest Planning Committee v. Deschutes County*

Sisters Forest Planning Committee v. Deschutes County, 48 Or LUBA 78 (2004),³⁷⁵ dealt with dwelling locations that minimize fire risks. LUBA found it "appropriate to evaluate the impacts of the proposed dwelling on those forest practices that are most prevalent currently and in the recent past—i.e., selective harvesting of trees, log hauling, slash and prescribed burning, and some chemical spraying."

3) *Sisters Forest Planning Committee v. Deschutes County*

Sisters Forest Planning Committee v. Deschutes County, 198 Or App 311 (2005),³⁷⁶ dealt with county conditions of approval for fire prevention, fire-resistant building materials, and lack of clarity and specificity in fire siting standards.

4) *Central Oregon LandWatch v. Deschutes County*

Central Oregon LandWatch v. Deschutes County, 53 Or LUBA 290 (2007),³⁷⁷ found that showing a dwelling will not significantly increase fire hazards in a forest zone is not necessarily adequate to also show that the dwelling will not significantly increase fire suppression costs or risks to firefighters.

5) *Citizens for Responsibility vs. Lane County*

Citizens for Responsibility vs. Lane County, 54 Or LUBA 1 (2005),³⁷⁸ resulted in several findings, but there is one finding relevant to wildfires. Evidence was presented that an existing

firearms training facility in a forest zone was a fire hazard and posed increased costs and risks of fire suppression, but the court ruled that this was not sufficient to undermine a contrary finding.

(d) Statewide Planning Goal 7: Areas Subject to Natural Hazards and Disasters

While some statewide planning Goals, such as Goals 3 and 4, have associated rules and statutes, and have an extensive paper trail left by litigation, Goal 7 remains largely without much litigation and without relevant rules and statutes. For wildfires, the pool of relevant litigation is even smaller. In essence, Goal 7 requires that Comprehensive Plans be created to “reduce the risk to people and property from natural hazards,” where the natural hazards outlined by the Goal are floods, earthquakes, tsunamis, coastal erosions, and—notably—wildfires.³⁷⁹ The Goal further states that local governments should consider the “benefits of maintaining natural hazard areas as open space, recreation, and other low density uses; the beneficial effects that natural hazards can have on natural resources and the environment; and the effects of development and mitigation measures in identified hazard areas on the management of natural resources.”³⁸⁰ The Goal also establishes how local governments should respond to new hazard information.³⁸¹ Finally, the Goal says that local governments should “require site-specific reports, appropriate for the level and type of hazard” when considering “development requests in high hazard areas.”³⁸² It is not clear that local governments currently meet this Goal to its fullest extent.

(i) Litigation

1) *Johnson v. Jefferson County*

Johnson v. Jefferson County, 56 Or LUBA 25 (2008),³⁸³ found that “a county could reasonably conclude that numerous standards that it adopted to reduce the fire risk associated with constructing dwellings on forested lands are sufficient to comply with Goal 7, even though the focus of those standards is on protecting dwellings from forest fires, where some of the standards are to reduce the fire risk to forests from such dwellings.”

(e) Statewide Planning Goal 14: Urbanization

The purpose of Goal 14 is “to provide for an orderly and efficient transition from rural to urban land use, to accommodate urban population and urban employment inside urban growth boundaries, to ensure efficient use of land, and to provide for livable communities.”³⁸⁴ While local governments are supposed to take other Goals into account when considering an urban growth boundary (UGB) expansion, the lack of rules or statutes for Goal 7 make it such that Goal 7 is frequently not incorporated to its fullest extent.³⁸⁵

(i) Simplified Urban Growth Boundary Method³⁸⁶

The simplified urban growth boundary method allows cities outside Metro to evaluate and amend their urban growth boundaries using straightforward methodology at lower costs, in less time, and with less complexity.³⁸⁷ The methodology does not explicitly consider wildfire hazards, but there is some consideration of related risks.

1) Adjust Residential Lands Inventory to Account for Constrained Lands (OAR 660-038-0070)³⁸⁸

OAR 660-038-0070(1)(d) requires cities to identify slopes greater than 25 percent on lands categorized as vacant or partially vacant.³⁸⁹ Slopes greater than 25 percent must be reduced by 100 percent.³⁹⁰ This is relevant because the steeper the slope, the more quickly and intensely a wildfire will climb and burn.³⁹¹

2) Adjust Employment Buildable Land Inventory to Account for Constrained Lands (OAR 660-038-0130)³⁹²

OAR 660-038-0130(1)(d) requires cities to identify slopes greater than 25 percent on lands zoned for commercial use and covering more than one acre.³⁹³ OAR 660-038-0130(1)(e) requires cities to identify slopes greater than 10 percent on industrial lands larger than one acre.³⁹⁴ For lands zoned for commercial use, a 100 percent reduction in slope is required for lands with slopes greater than 25 percent.³⁹⁵ For lands zoned for industrial use, lands of more than one acre with a slope greater than 10 percent must have a 100 percent reduction in slope.³⁹⁶ Similarly to OAR 660-038-0070, this is relevant because steeper slopes allow wildfires to climb more quickly and with more intensity.³⁹⁷

3) Establishment of Study Area to Evaluate for Inclusion in the UGB (OAR 660-038-0160)³⁹⁸

The city is allowed to exclude land from its preliminary study area if it meets certain criteria. OAR 660-038-0160(2)(b) allows lands to be excluded if the lands are subject to “significant development hazards” as a result of risk of landslides, flooding, or tsunamis.³⁹⁹ Wildfire hazard is not mentioned.

4) Serviceability (OAR 660-038-0200)⁴⁰⁰

This rule requires that cities have adequate sewer, water, and transportation capacity to serve seven years or more of planned urban development.⁴⁰¹ OAR 660-038-0200(4)(b)(C) establishes that “sewer, water and transportation capacity for planned urban development” includes “water storage capacity, including system reserves needed for fire suppression.”⁴⁰²

(f) ORS 197.455: Siting of Destination Resorts⁴⁰³

ORS 197.455 establishes standards for siting destination resorts. A destination resort is defined as “a self-contained development that provides for visitor-oriented accommodations and developed recreational facilities in a setting with high natural amenities.”⁴⁰⁴ ORS 197.455(1)(f) prohibits destination resorts “on a site in which the lands are predominantly classified as being in Fire Regime Condition Class 3, unless the county approves a wildfire protection plan that demonstrates the site can be developed without being at a high overall risk of fire.”⁴⁰⁵

(i) Litigation

1) *Central Oregon LandWatch v. Deschutes County*

Central Oregon Landwatch v. Deschutes County, 63 Or LUBA 123 (2011),⁴⁰⁶ was a case that challenged the location of destination resorts on the grounds that their placement was on lands classified as Fire Regime Condition Class 3, denoting high wildfire risk. The county originally found that ORS 197.455(1)(f) was satisfied because these lands were already included in the areas that were part of the county's seven community wildfire protection plans. The petitioner argued that the community wildfire protection plans were adopted in 2007 and not intended to meet the criteria established in ORS 197.455(1)(f), that the plan includes no recommendations specific to destination resorts, and that the plan broadly addresses a large capture area instead of the specific destination resort sites. LUBA ultimately ruled in favor of the county.

(g) Senate Bill 360: Oregon Forestland-Urban Interface Act⁴⁰⁷

The Oregon Forestland-Urban Interface Act, or Senate Bill 360, was passed in 1997 to encourage property owners in wildfire-prone areas to do their part to reduce risk through fuels reduction.⁴⁰⁸ The Act asks counties to identify forestland-urban interface areas, classify those areas in accordance with their level of risk, and engage property owners in risk-reduction measures. Counties are not required to participate; currently, there are 17 participating counties (out of 36 in Oregon).⁴⁰⁹ There are no penalties or fines associated with not participating. If a fire begins or encroaches on lands where the owner has not mailed in a self-certification form, and the cause is linked to failure to adhere to standards outlined in the Act, property owners may be held liable for up to \$100,000 worth of fire-suppression costs.⁴¹⁰ To date, no property owner has been fined.

(h) ORS 215.791: Review of Nonresource Lands for Ecological Significance⁴¹¹

ORS 215.700 establishes standards for dwellings on resource lands. Under this statute, dwellings may be permitted on less productive lands whereas the most productive resource lands remain protected.⁴¹² In addition to other considerations, counties are required to consider fire risk and fire costs. ORS 215.791(3)(a)(C)(v) requires that, under certain circumstances, if a county amends its comprehensive plan or land use regulation zoning, then the county must ensure that "the amount, type, location and pattern of development on lands redesignated as nonresource lands...will not lead to significant adverse effects including, but not limited to, adverse effects on...the risk of wildland fire or the cost of fire suppression."⁴¹³ This statutory provision has never been utilized, so it is unclear how effective it is at requiring a county to undertake meaningful planning, but it could be a useful tool.

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³²⁴ Or. Rev. Stat. § 197.732(2)(c)(B).

³²⁵ Or. Admin. R. 660-004-0022.

³²⁶ Or. Admin. R. 660-024-0060; Or. Admin. R. 660-024-0065.

³²⁷ Or. Admin. R. 660-038-0070.

³²⁸ *Ibid.* Currently, slope is considered but wildfire is not an explicit consideration. Flood hazard–related requirements provide a useful framework for taking wildfire hazard into account.

³²⁹ Or. Admin. R. 660-038-0130.

³³⁰ *Ibid.* Slope is considered in this rule but wildfire is not explicitly taken into account.

³³¹ Or. Admin. R. 660-038-0160(2)(b).

³³² Or. Rev. Stat. § 215.284.

³³³ Or. Admin. R. 660-006-0027.

³³⁴ Or. Rev. Stat. § 197.455(1)(f).

³³⁵ “Advanced Oregon Wildfire Risk Explorer.”

³³⁶ “Fire Regime Condition Class Definition,” National Interagency Fire Center, June 20, 2003. https://www.nifc.gov/prevEdu/comm_guide/appendix/2BACKGROUND_FrccDefinitionsFinal.pdf

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- ³³⁷ Or. Admin. R. 660-006-0027(3), (4); Or. Rev. Stat. § 15.750.
- ³³⁸ John Tokarczyk (Oregon Department of Forestry), interviewed by Ashlee Fox, Portland, OR, July 2018; Smith, interviewed by Ashlee Fox. The challenges of enforcement were discussed by both Smith and Tokarczyk.
- ³³⁹ Rasker, “Resolving the Increasing Risk from Wildfires in the American West.”
- ³⁴⁰ Rasker, “The Rising Cost of Wildfire Protection,” 1.
- ³⁴¹ Rasker, “Resolving the Increasing Risk from Wildfires in the American West.”
- ³⁴² Liberty, “Oregon’s Comprehensive Growth Management Program: An Implementation Review and Lessons for Other States,” 10368.
- ³⁴³ Ibid.
- ³⁴⁴ Ibid., 2–13.
- ³⁴⁵ Ibid., 10370.
- ³⁴⁶ Ibid.
- ³⁴⁷ Ibid., 10371.
- ³⁴⁸ Ibid.
- ³⁴⁹ Ibid., 10373.
- ³⁵⁰ Ibid.
- ³⁵¹ Ibid., 10374.
- ³⁵² “Administrative Rules,” Oregon Department of Land Conservation and Development. <https://www.oregon.gov/LCD/Pages/adminrules.aspx>.
- ³⁵³ “Planning the Oregon Way: Planning 101 for Planners and Permit Technicians” (publication, 2015), 9–13.
- ³⁵⁴ Or. Admin. R. 660-015-0000(2).
- ³⁵⁵ Or. Rev. Stat. § 197.732(c)(B); Or. Admin. R. 660-004-0022.
- ³⁵⁶ “2014–2015 Oregon Farm and Forest Report,” 2.
- ³⁵⁷ Or. Rev. Stat. § 215.
- ³⁵⁸ Or. Admin. R. 660-033-0000.
- ³⁵⁹ “2014–2015 Oregon Farm and Forest Report,” 2.
- ³⁶⁰ Ibid., 3.
- ³⁶¹ Or. Rev. Stat. § 215.615.
- ³⁶² “Forest Land Protection Program,” Oregon Department of Land Conservation and Development. <https://www.oregon.gov/LCD/pages/forlandprot.aspx>.
- ³⁶³ “Oregon Statewide Planning Program” (report, Salem, OR), 5.
- ³⁶⁴ Or. Admin. R. 660-006-0027.
- ³⁶⁵ Ibid., (2)–(5).
- ³⁶⁶ Or. Admin. R. 660-006-0025.
- ³⁶⁷ Ibid., (4).
- ³⁶⁸ Ibid., (5).
- ³⁶⁹ Or. Rev. Stat. § 215.730; Or. Admin. R. 660-006-0035.
- ³⁷⁰ Or. Admin. R. 660-006-0035(1)–(6).
- ³⁷¹ Tokarczyk, interviewed by Ashlee Fox.
- ³⁷² Or. Admin. R. 660-006-0040.
- ³⁷³ *Tennant v. Polk County*, 56 Or LUBA 455 (2007).
- ³⁷⁴ Ibid. The court’s primary findings regarding Goal 4 were threefold. First, when a nonforest use is proposed on land zoned for forest use, the county must address adverse impacts to nearby lands used for agricultural purposes, if the petitioner argues that there will be adverse impacts on the farm use parcel. Second, if a private park is approved in accordance with OAR 660-006-0025, the park must be both “a public recreational use” and suitable for the forest environment. Finally, the noise level of a paintball operation on forestland does not deem it unsuitable for the forest environment.
- ³⁷⁵ *Sisters Forest Planning Committee v. Deschutes County*, 48 Or LUBA 78 (2004).
- ³⁷⁶ *Sisters Forest Planning Committee v. Deschutes County*, 198 Or App 311 (2005).
- ³⁷⁷ *Central Oregon LandWatch v. Deschutes County*, 53 Or LUBA 290 (2007).
- ³⁷⁸ *Citizens For Responsibility, Philip Ziebert, Adam Novick and Maureen Hudson v. Lane County*, 54 Or LUBA 1 (2005).
- ³⁷⁹ “Oregon’s Statewide Planning Goals and Guidelines—Goal 7: Areas Subject to Natural Hazards,” Department of Land Conservation and Development, 2001. <https://www.oregon.gov/LCD/docs/goals/goal7.pdf>.
- ³⁸⁰ Ibid.
- ³⁸¹ Ibid.

³⁸² Ibid.

³⁸³ *Johnson v. Jefferson County*, 56 Or LUBA 25 (2008).

³⁸⁴ “Oregon Statewide Planning Goals and Guidelines—Goal 14: Urbanization,” Department of Land Conservation and Development, <https://www.oregon.gov/LCD/docs/goals/goal14.pdf>. See also OAR 660-015-0000(14).

³⁸⁵ Or. Admin. R. 660-024-0060; 660-024-0020.

³⁸⁶ Or. Admin. R. 660-038-0000.

³⁸⁷ Ibid.

³⁸⁸ Or. Admin. R. 660-038-0070.

³⁸⁹ Ibid., (1)(d).

³⁹⁰ Ibid., (2)(d).

³⁹¹ “Topography's Effect on Fire Behavior,” Auburn University. http://www.auburn.edu/academic/forestry_wildlife/fire/topos_effect.htm.

³⁹² Or. Admin. R. 660-038-0130.

³⁹³ Ibid., (1)(d).

³⁹⁴ Ibid., (1)(e).

³⁹⁵ Ibid., (2)(d).

³⁹⁶ Ibid., (2)(e).

³⁹⁷ “Topography's Effect on Fire Behavior.”

³⁹⁸ Or. Admin. R. 660-038-0160.

³⁹⁹ Ibid., (2)(b).

⁴⁰⁰ Or. Admin. R. 660-038-0200.

⁴⁰¹ Ibid., (2).

⁴⁰² Ibid., (4)(b)(C).

⁴⁰³ Or. Rev. Stat. § 197.455.

⁴⁰⁴ Ibid.

⁴⁰⁵ Ibid., (1)(f).

⁴⁰⁶ *Central Oregon LandWatch v. Deschutes County*, 63 Or LUBA 123 (2011).

⁴⁰⁷ Or. Rev. Stat. § 477.015 through 477.06; Or. Admin. R. 629-044-1000 through 629-044-1110.

⁴⁰⁷ “6 Steps to Wildfire Protection,” Oregon Department of Forestry, <https://www.oregon.gov/ODF/Documents/Fire/UrbanInterface/extreme.pdf>.

⁴⁰⁸ Ibid.

⁴⁰⁹ Nelson, interviewed by Ashlee Fox.

⁴¹⁰ Ibid.

⁴¹¹ Or. Rev. Stat. § 215.791(3)(a)(C)(v).

⁴¹² Or. Rev. Stat. § 215.700(1), (2).

⁴¹³ Or. Rev. Stat. § 215.791(3)(a)(C)(v).