

**PIERCE COUNTY
WILDLAND/URBAN INTERFACE FIRE HAZARD**

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Identification Description

Definition

A wildland/urban interface (WUI) area is that geographic area in which structures and other human development meets or intermingles with wildland or vegetative fuels. A WUI fire is a fire located in that geographic area. There are numerous locations within Pierce County where structural developments meet and intermingle with the wildland areas. This condition gives rise to the possibility of WUI fires, especially when weather conditions are dry and fuels are abundant.¹

Types

WUI fires occur naturally (lightning strikes) or are started by people. Secondary events such as erosion, landslides, and flash floods often occur in areas which have been affected by wildland fires.² There are three types of WUI fires, delineated by cause. They are described below.

Naturally Occurring Fires

Naturally occurring interface fires, especially those caused by lightning, are rare in western Washington.³ Wildland fires started by lightning in Washington burn more state-protected acreage than any other cause, an average of 10,866 acres annually.⁴

Manmade Fires

Manmade interface fires, stemming from people's carelessness and lack of fire knowledge, are common causes of interface fires. "West-side" people start 67% of the wildland fires that occur in Eastern Washington.⁵ Major causes include arson, recreational fires that get out of control, smoker's carelessness, debris burning, and children playing with fire. From 1992 to 2001, on average, people caused more than 500 wildland fires each year on state-owned or protected lands; this compares to 135 fires caused by lightning strikes. Human caused fires in Washington burn an average of 4,404 state-protected acres each year.⁶

Controlled Burns

Controlled burns are fires conducted because the fire cycle is an important aspect of management for all ecosystems are controlled burns are not considered hazards unless they get out of control.⁷

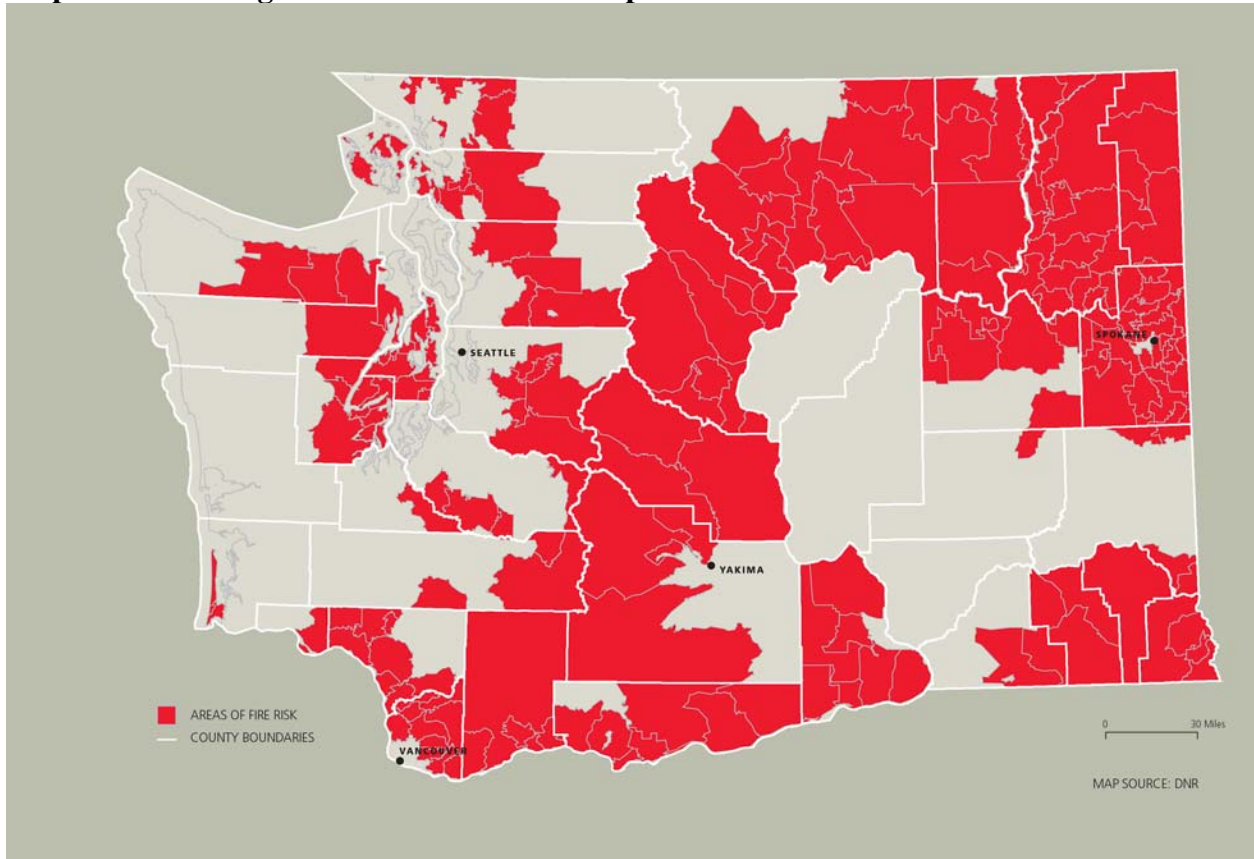
Profile

Location and Extent

Eastern Washington faces the greatest risk of fire, though Western Washington does have areas of risk as well. The Washington Department of Natural Resources and its federal and local partners determined the communities in the state that are at high risk after evaluating them for fire behavior potential, fire protection capability, and risk to social, cultural and community

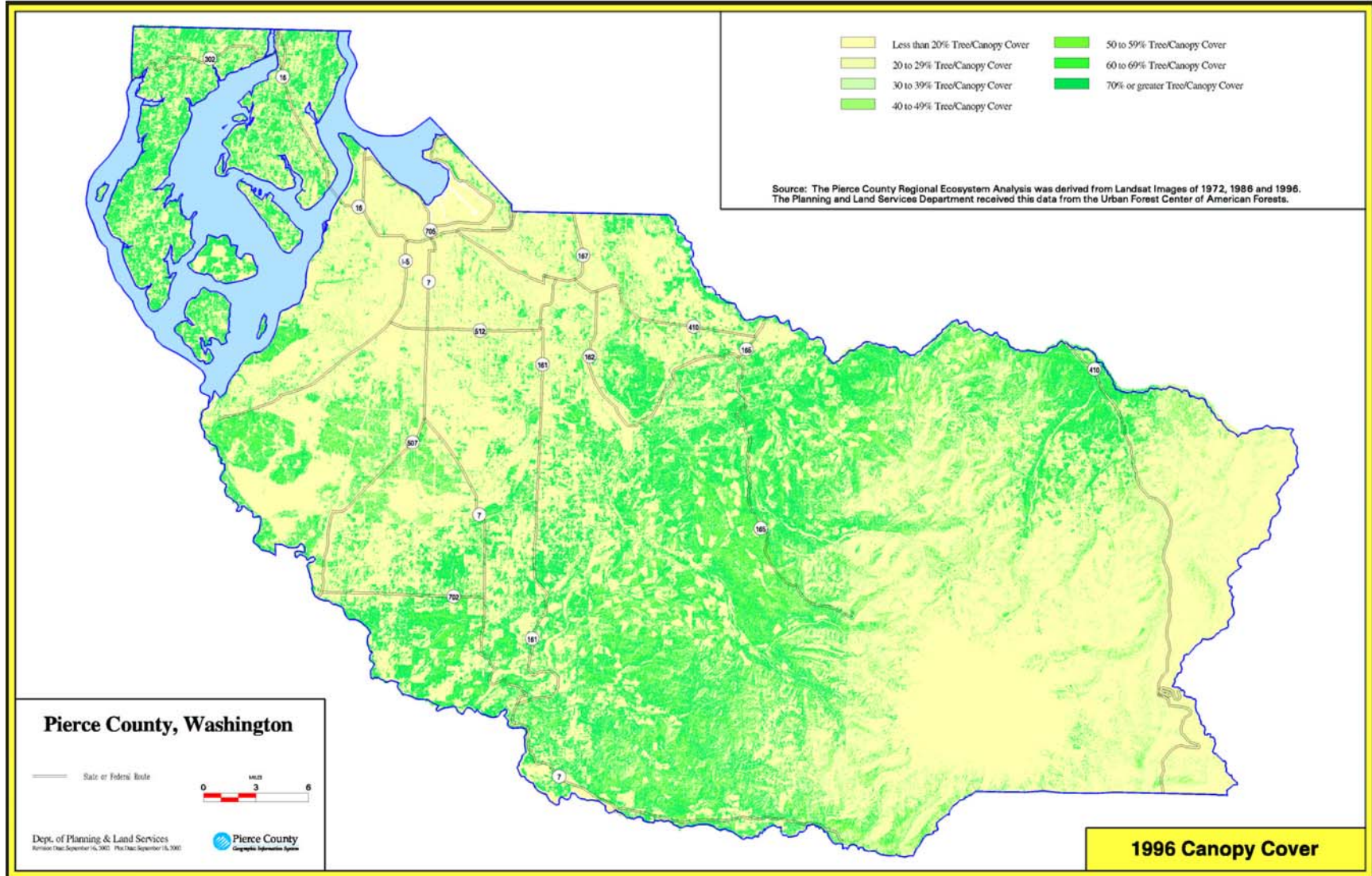
resources.⁸ Map 4.7-1 illustrates the location and extent of these communities for the entire state. The following communities within Pierce County are identified as having a high risk to the WUI fire hazard: Ashford, Elbe, Eatonville, and Roy. Several other communities are identified in neighboring counties that are in close proximity to the Pierce County border.

Map 4.7-1 Washington State Fire Hazard Map⁹



As the map illustrates the areas of greatest risk in unincorporated Pierce County include the Greenwater area northeast of Mt. Rainier—which includes the Crystal Mountain resort area—and the southern portion of the County extending from the Eatonville area to the Roy area. The Forest Canopy Map 4.7-2 provides further detail regarding the location and extent of fuel and areas of WUI. The map confirms that the areas of greatest risk due to WUI fires are those identified in Map 4.7-1 and illustrates that other areas of the Cascade foothills may also be at risk.

Map 4.7-2 Pierce County Forest Canopy

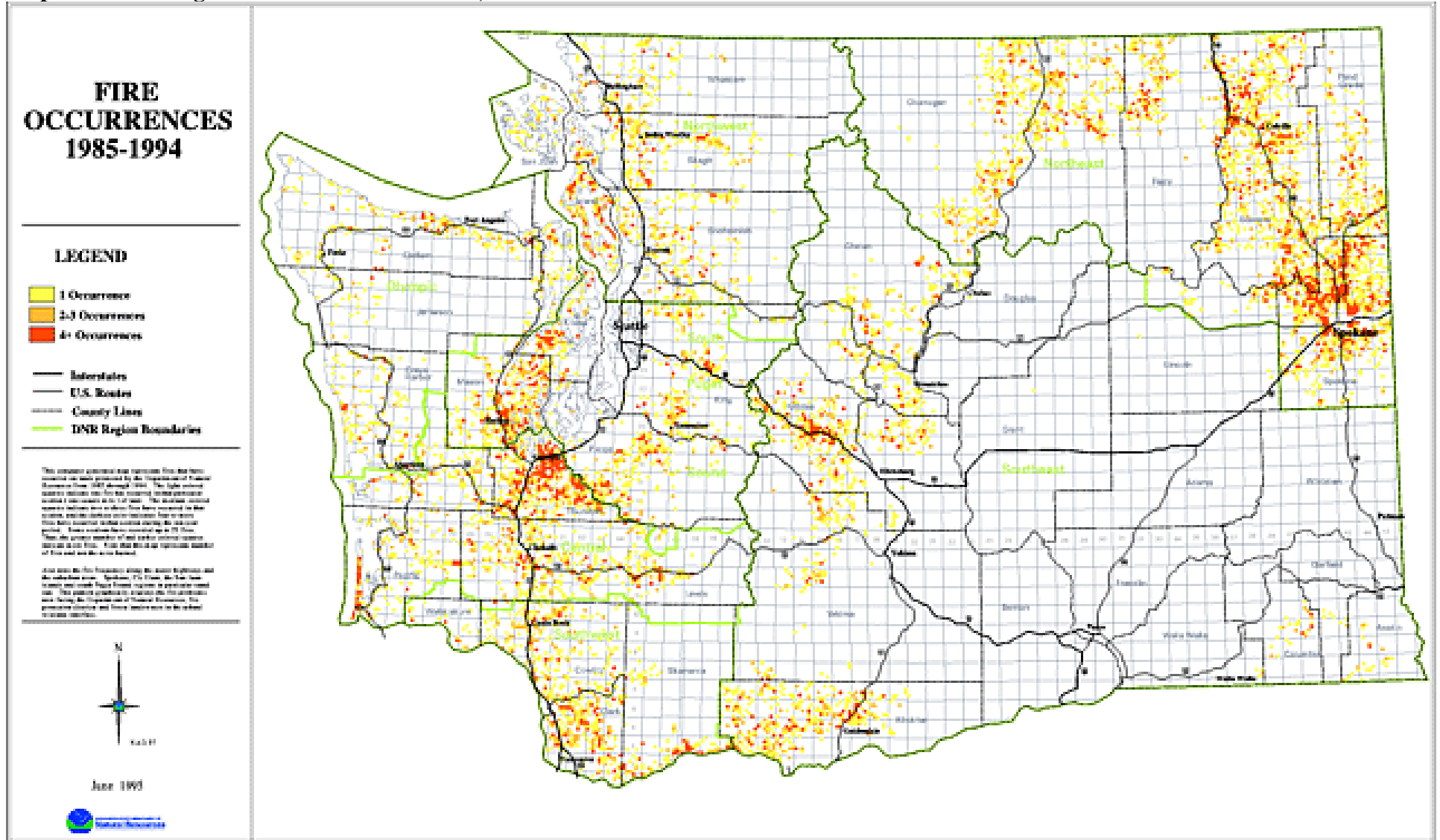


Occurrences

Historically wildland fires were not considered a hazard. Fire is a normal part of most forest and range ecosystems in temperate regions of the world. Fires historically burn on a fairly regular cycle, recycling carbon and nutrients stored in the ecosystem, and strongly affecting the species within the ecosystem. The burning cycle in western Washington is every 100 – 150 years.

The best available information at this time indicates that fires have occurred in or near the locations identified above in the location and extent description. Map 4.7-3 illustrates fire occurrences on DNR land from 1985-1994. While these are not technically WUI fires, their relatively frequent occurrence indicates a risk to the WUI fire hazard near populated areas of Pierce County.

Map 4.7-3 Washington State Fire Occurrences, 1985-1994



The Planning Team determined the probability of recurrence for the WUI fire hazard in Pierce County to be an “unknown but rare occurrence”. This is based on information from past fire occurrences, information from local hazard experts, and in conjunction with Mitigation 20/20 tools.

Vulnerability

The probability of an interface fire in any one locality on a particular day depends on the time of year, fuel conditions, the past and present weather conditions, topography, and the activities (debris burning, land clearing, camping, etc.) which are, or will be, taking place.¹⁰ Vulnerability to the WUI fire hazard stems from the above factors as well as the increase in development in certain areas of Pierce County. These factors are discussed below.

Fire Seasons

Washington State’s fire season usually runs from mid-May through October, although wildland fires have occurred in every month of the year. Drought, snow pack, and local weather conditions can expand the length of the fire season. The early and late shoulders of the fire season usually are associated with human-caused fires, with the peak period of July, August and early September related to thunderstorms and lightning strikes.¹¹

Western Washington’s fire season typically is shorter than Eastern Washington’s for a number of reasons:

- Western Washington receives more rainfall. The Cascade Range tends to squeeze most of the rain from weather systems before they pass into the eastern half of the state.
- Western Washington has spring seasons that are wetter and cooler than the Eastern Washington. Much of the precipitation received in the east is snow that falls during winter months. Heavier snow packs keep fuels moist longer, while lighter snow packs allow fuels to dry out earlier in the year.
- Western Washington is more urbanized and has less timber, cropland and rangeland available for fuel than Eastern Washington.

Fuel

A fire needs three elements in the right combination to start and grow—a heat source, fuel, and oxygen. How a fire behaves depends on the characteristics of available fuel as well as weather conditions and terrain. Below is a description of the types of fuels and the consequent fire characteristics.

- Lighter fuels such as grasses, leaves and needles quickly expel moisture and burn rapidly, while heavier fuels such as tree branches, logs and trunks take longer to warm and ignite.
- Snags and hazard trees – those that are diseased, dying, or dead – are larger west of the Cascades, but more prolific east of the Cascades. In 2002, about 1.8 million acres of the

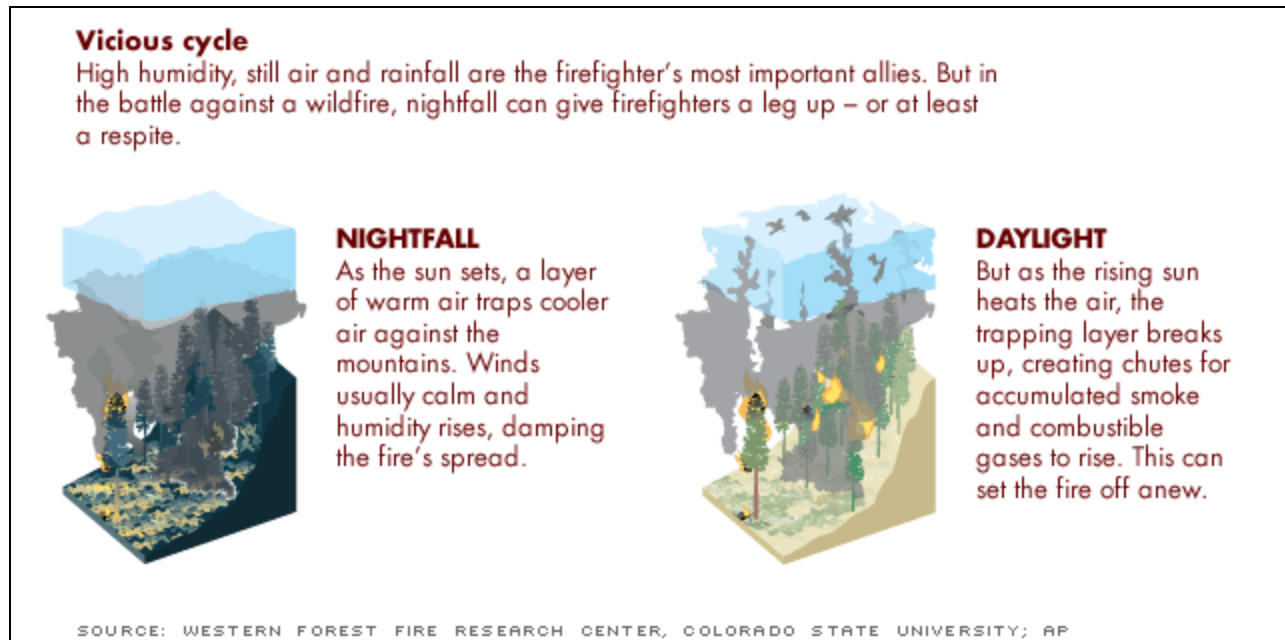
state's 21 million acres of forestland contains trees killed or defoliated by forest insects and diseases.¹² The west-side vegetation has the potential for tremendous energy release when it burns. It is a heavier and denser fuel source than the vegetation found on the east-side.¹³

Weather

Any prolonged period of lack of precipitation presents a potentially dangerous problem. Prolonged periods of strong winds can also create dry conditions. Thunderstorm activity, which typically begins in June with wet storms, turns dry with little or no precipitation reaching the ground as the season progresses into July and August.

West of the Cascades, strong, dry east winds in late summer and early fall produce extreme fire conditions. East wind events can persist up to 48 hours with wind speed reaching 60 miles per hour; these winds generally reach peak velocities during the night and early morning hours.¹⁴

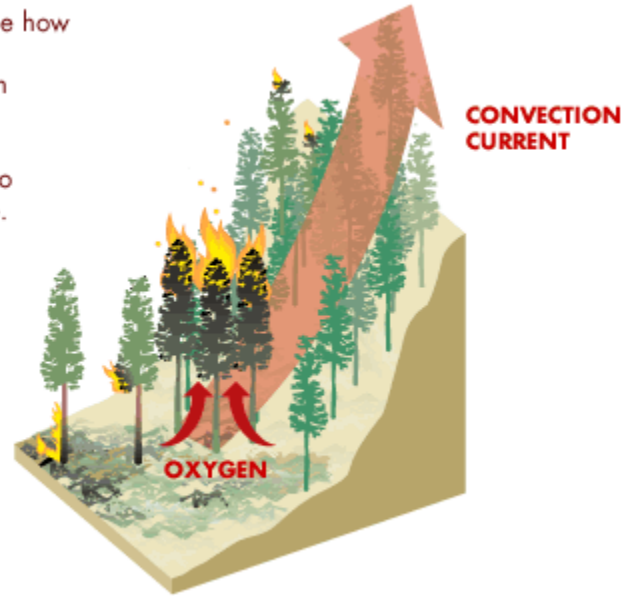
Peak burning period of a fire generally is between 1 p.m. and 6 p.m., with local factors greatly influencing this.¹⁵



Topography

Topography of a region or a local area influences the extent of fires. Topography can present potential barriers to fire spread, such as highways and lakes, and elevation and slope of land forms can dictate the speed and extent of fire spread (i.e., fire spreads more easily as it moves uphill than downhill). A slope of 55% enables fire to spread four times faster than flat terrain.¹⁶

- Weather, topography and fuel supply determine how destructive a wildfire will be. A fire burns in a patchwork of intensity. As it spreads, it can even create its own weather patterns.
- Fire in the foliage on the forest floor can climb to lower tree branches. This is called a ladder fire.
- Spreading into the crown of the tree, the fire nourishes itself with oxygen drawn from below like a chimney.
- Hurlled by the convective drafts, floating embers can ignite dry fuel far from the fire.
- Hot gases rising in a column from the inferno prime foliage above for ignition.



SOURCE: WESTERN FOREST FIRE RESEARCH CENTER, COLORADO STATE UNIVERSITY; AP

The topography of the Cascade foothills creates a seasonal event commonly called the “east winds.” These high winds are an attempt to equalize off-coast low pressures with the higher pressured air funneling off the mountains. Winds exacerbate the speed in which fire spreads. The foothill and eastern valley communities of Pierce County are prone to these high winds, while the slopes in areas of the Cascade foothills and valleys further increase the vulnerability to a quickly spreading fire.¹⁷

Development

As communities expand farther and farther into forested lands, and the desire to maintain the wilderness ambiance, interface fires are becoming a significant hazard, having the potential for loss of life and destruction of property.

Home building in and near forested lands creates the interface and therefore increases the risk of interface fires. There is a trend for families to move into more rural and forested areas. Often, structures have been built and maintained with minimal consideration given to the need for protection from exterior fire starts, or to the need to minimize interior fires from spreading to forested lands. Many homes are built with an effort to maintain the scenic aspects of the surrounding area. Frequently there is little clearance of vegetation resulting in a lack of defensible space.

Narrow access roads frequently found in these areas interfere with fire suppression efforts. Frequently, roads are so narrow that standard sized fire apparatus cannot adequately turn around. More diverse fire apparatus such as brush rigs and smaller engines are needed. Rural communities may not be able to financially support these additional requirements. More isolated homes may not have any fire services available.

The islands within Pierce County have an additional risk due to their isolation and lack of easy access. The islands have few, if any, firefighting resources with access being primarily by ferry. The delay in arrival of resources resulting from this situation causes increased vulnerability to WUI fires. More cooperative fire response effort among the island communities may alleviate some of this risk.¹⁸

Other Factors

Naturally occurring fires, which eliminated understory, thinned trees and regularly burned with low intensity, were rapidly extinguished. The result is 800-1000 trees per acre where 100 years ago the forest density would have been 50-100 trees per acre. The dense forests, thick with underbrush to which we have become accustomed, are not the same forests that were maintained by nature.¹⁹ In short, decades of aggressive fire suppression have drastically changed the look and fire behavior of Western US forests and rangelands. In addition, the composition of Washington forests have changed from more fire-resistant tree species to non-fire resistant species such as grand fir, Douglas fir, and subalpine fir. As a result, studies show that today's wildfires typically burn hotter, faster, and higher than those of the past.²⁰

WUI fires can take on a life of their own when there is plenty of heat and fuel. They can create their own winds and weather, generating hurricane force winds of up to 120 miles per hour. Fires also can heat fuels in their path, making fuels easier to ignite and burn.²¹

The effects of WUI fires vary with intensity, area, and time of year. Short-term losses include the complete destruction of valuable resources such as ground cover, forests, salmon and fish habitat, recreation areas, and watersheds. There is an immediate increase in vulnerability to flooding due to the destruction of all or parts of the watershed. Severe fires producing high soil temperatures create a water-repellant layer below the soil surface. The soil above this layer becomes highly prone to erosion, often resulting in mudslides.

Long-term effects are loss of life and property, reduced amounts of timber for commercial purposes, the reduction of travel and recreational activities in the affected area, and loss of wildlife habitat. Other secondary hazards may include the closure of highways or roads near the affected area.²²

The Planning Team determined that Pierce County has a low vulnerability to the WUI fire hazard because of the following factors: fire seasons, fuel types, a regional temperate climate, local topography, and development patterns.

Resource Directory

Regional

- **Pierce County Department of Emergency Management**
<http://www.co.pierce.wa.us/PC/Abtus/ourorg/dem/abtusdem.htm>
- **State of Washington Department of Natural Resources**
<http://www.wadnr.gov>
<http://www.dnr.wa.gov/htdocs/adm/comm/fireinfo.html>
<http://www.dnr.wa.gov/htdocs/rp/prevent.htm>

National

- **Firewise Communities**
<http://www.firewise.gov>
- **Forest Service, United States Department of Agriculture**
<http://www.fs.fed.us>
- **Bureau of Land Management, United States Department of the Interior**
<http://www.fire.blm.gov/>
- **National Park Service, U.S. Department of the Interior**
<http://data2.itc.nps.gov/fire/index.cfm>
- **Fish and Wildlife Service, U. S. Department of the Interior**
<http://fire.fws.gov/>
- **Bureau of Indian Affairs, U.S. Department of the Interior**
<http://www.doi.gov/bureau-indian-affairs.html>
- **National Fire Plan**
<http://www.fireplan.gov/content/home/>

Endnotes

- ¹ Modified from PC HIVA (DRAFT), WUI Fire Section, September 5, 2002. p. 31.
<http://www.co.pierce.wa.us/pc/abtus/ourorg/dem/EMDiv/HIVA/EQS.pdf>
- ² “Is Montana at Risk? Identified Hazards for The State of Montana.” Montana Disaster and Emergency Services.
<http://www.state.mt.us/dma/DES/Fires.htm> [Internet Accessed December, 2003].
- ³ Modified from PC HIVA (DRAFT), WUI Fire Section, September 5, 2002. p. 31.
<http://www.co.pierce.wa.us/pc/abtus/ourorg/dem/EMDiv/HIVA/EQS.pdf>
- ⁴ Modified from Washington State Natural Hazard Mitigation Plan (DRAFT), WUI Fire Section. Washington State Emergency Management Division. September 5, 2002.
- ⁵ Modified from PC HIVA (DRAFT), WUI Fire Section, September 5, 2002. p. 31.
<http://www.co.pierce.wa.us/pc/abtus/ourorg/dem/EMDiv/HIVA/EQS.pdf>
- ⁶ Modified from Washington State Natural Hazard Mitigation Plan (DRAFT), WUI Fire Section. Washington State Emergency Management Division. September 5, 2002.
- ⁷ *Ibid.*
- ⁸ Risk factors included area fire history, type and density of vegetative fuels, extreme weather conditions, topography, number and density of structures and their distance from fuels, location of municipal watershed, and likely loss of housing or business. The evaluation used the criteria in the wildfire hazard severity analysis of the National Fire Protection Association’s NFPA 299 Standard for Protection of Life and Property from Wildfire, 1997 Edition.
Modified from Washington State Natural Hazard Mitigation Plan (DRAFT), WUI Fire Section. Washington State Emergency Management Division. September 5, 2002.
- ⁹ Graphic from A Progress Report on the National Fire Plan in Washington State, Department of Natural Resources, September 2002.
- ¹⁰ Modified from PC HIVA (DRAFT), WUI Fire Section, September 5, 2002. p. 31.
<http://www.co.pierce.wa.us/pc/abtus/ourorg/dem/EMDiv/HIVA/EQS.pdf>
- ¹¹ *Ibid.*
- ¹² Modified from Washington State Natural Hazard Mitigation Plan (DRAFT), WUI Fire Section. Washington State Emergency Management Division. September 5, 2002.
- ¹³ Modified from PC HIVA (DRAFT), WUI Fire Section, September 5, 2002, p. 32.
<http://www.co.pierce.wa.us/pc/abtus/ourorg/dem/EMDiv/HIVA/EQS.pdf>
- ¹⁴ *Ibid.*
- ¹⁵ *Ibid.*
- ¹⁶ Modified from Washington State Natural Hazard Mitigation Plan (DRAFT), WUI Fire Section. Washington State Emergency Management Division. September 5, 2002.
- ¹⁷ Modified from PC HIVA (DRAFT), WUI Fire Section, September 5, 2002, p. 32.
<http://www.co.pierce.wa.us/pc/abtus/ourorg/dem/EMDiv/HIVA/EQS.pdf>
- ¹⁸ *Ibid.*
- ¹⁹ *Ibid.*
- ²⁰ “Managing the Impact of Wildfires on Communities and the Environment: A Report to the President” In Response to the Wildfires of 2000. September 8, 2000. <http://www.nwfireplan.gov/> [Internet Accessed January, 2004.]
- ²¹ Modified from Washington State Natural Hazard Mitigation Plan (DRAFT), WUI Fire Section. Washington State Emergency Management Division. September 5, 2002.
- ²² Modified from PC HIVA (DRAFT), WUI Fire Section, September 5, 2002, p. 33.
<http://www.co.pierce.wa.us/pc/abtus/ourorg/dem/EMDiv/HIVA/EQS.pdf>