Section 11
Wildfire
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Portland's Urban Forest

While many people think only of street trees when they think of an urban forest, it is actually a complex system of trees and smaller plants, wildlife, associated organisms, soil, water, and air in and around our city. The urban forest includes the trees along our streets, the landscaping around our homes and institutions, the vegetation in commercial and industrial areas, the multi-layered forests in our natural areas, and the plants in our parks.

The urban forest is managed by many agencies for many objectives, specifically for healthy watersheds, prime wildlife habitat, excellent outdoor recreation and exceptional trees. A healthy urban forest is essential to our quality of life and is an increasingly important part of the City's coordinated efforts to restore the quality of its rivers and streams and improve the local environment. Ultimately, a healthy urban forest is an asset that increases in value over time—one that provides beauty as well as essential service. More specifically, the urban forest has become a critical component in Portland's resource management strategy: the City has increasingly used trees and vegetation to reduce the negative environmental impacts of urbanization and to rehabilitate areas with poor water quality and damaged wildlife habitat. The urban forest, or "green infrastructure," has also begun to replace built, or "gray" infrastructure: trees and vegetation can be used in place of pipes and generation plants to absorb stormwater from streets and developed areas. Many bureaus and agencies have recognized these practical benefits: Metro's *Green Streets* guidelines integrate transportation systems with resource protection, and Environmental Services' *Stormwater Management* requirements use vegetation to protect impervious surfaces.

While these regulations protect natural spaces and environmental health, they can also encourage the placement of vegetation too close to structures. During dry wildland fire seasons, this vegetative infill can pose a serious public safety risk. [1]

What are the roles and risks of wildfire in Portland?

Fires are an essential part of Oregon's ecosystem, but they can also endanger life and property in growing communities. Wildfires—a fire occurring on wildlands that requires a suppression response[1] —are most common in the arid eastern and southern sections of the State. However, wildfire risk still exists in Portland's wildland-urban interface

[1] Portland Urban Forestry Management Plan, 2004.

where homes and other structures are built into a densely forested or natural landscape.

If risks are left unchecked, fires in these areas can threaten lives and property.

The City of Portland's History with Wildfire

Portland covers 87,040 acres. Of these, 14,500 are categorized as natural areas and stream corridors and 4,000 are classified as developed parks and open spaces[2] A large proportion of the natural area consists of Forest Park, a 5,100-acre wildland reserve situated in Portland's West Hills. Other natural areas include Portland's East Buttes and the Willamette River's eastside escarpment. These natural areas have been identified as high risk by the Portland Fire and Rescue Wildfire Risk-Mapping Program because high-density commercial and residential development can often be found surrounding the wildland and open spaces.

> "The heightened awareness of the 2000 fire season attracted an unprecedented commitment from Congress to protect communities, watersheds, and species at risk, and will make fire management a top federal priority for years to come."
>
> The Nature Conservancy Magazine -May/June 2001

In the last century, Portland's largest wildland interface fire occurred in 1951; it charred 2,500 acres in and around Forest Park. Between 1998 and 2004, 1,302 incidents classified as natural vegetation fires were logged in Portland Fire & Rescue's incident system. Of these reported incidents, 595 were classified as grass fires, 657 were classified as grass and brush fires, and 50 were classified as forest, or woods, fires. Powell Butte Nature Park has also experienced several fires since 1998, but most have been small. Two 3-alarm fires, however, affected nearly 35 acres of parkland and required more than 70 firefighters—nearly half of the City's on-duty strength—and more than two dozen pieces of firefighting apparatus.

The most recent sizeable wildland fire was the Mocks Crest (or Willamette Bluffs) fire that occurred in August of 2001. The fire started when a two-mile section of grass and brush ignited along the railroad tracks by the Willamette River; the fire grew quickly in the grasses and fuels along the flood plane and heavier fuels along the escarpment—both indigenous brush species and invasive Himalayan blackberry—where quickly engulfed as the fire swept up the bluff. Fire companies set up along Willamette Drive eventually stopped the advancing fire, but the 5-alarm incident ultimately mobilized all off-duty members of Portland Fire & Rescue and mutual aid from five

surrounding departments. Fortunately, the fire caused little structural damage[2]* yet still imposed significant costs:

Fire Suppression: $142,089

Erosion Control, Bureau of Environmental Services: $202,412

Estimated revegetation costs: $63,979

Probability of future Urban Interface Fires within the City of Portland

As Portland's wild areas and vegetative models mature, risks of urban interface wildfire will likely increase, and Portland's loss rate will remain high unless the City increases its mitigation efforts. As City officials begin these efforts, they should examine several important characteristics of wildfire. In order for fire to exist, the three components of the fire triangle—fuel, heat, and oxygen[3]—must be present. Most naturally occurring fires are initiated by lightning strikes, but human-caused fires, both accidental and deliberate, can ignite in a number of ways: campfires, chimneys, torches, matches, fireworks, cigarettes, vehicle fires, military ordnance, and smoldering slash piles can all start fires.[4] In either case, a fire occurring in a natural ecosystem begins at a point of ignition, burns outward into circles and, if it escalates, will spread in the prevailing wind direction.[5] When burning occurs on uneven terrain, the fire spreads upslope to eventually form broad ellipses.[6]

"With more Oregonians than ever living in forests that have grown thicker than ever through decades of strict fire suppression, even modest fires can quickly consume lives, homes, and the millions of dollars it costs to fight them."

The Oregonian, Feb. 26, 2001

Effects of fire on ecosystem resources can include damages, benefits, or some combination of both. Ultimately, a fire's effects depend largely on the characteristics of the fire site, the severity of the fire, the time period of valuation, and the value placed on the resources affected by the fire.[7] The ecosystems of most forests depend upon fire to maintain various functions. Other benefits can include, where appropriate, reduced fuel loads, disposal of slash, thinned tree stands, increased forage plant production, and improved wildlife habitats, hydrologic processes, and aesthetic environments.[8] Despite these potential benefits for ecosystems, fire has been suppressed for years because of its perceived effects on timber harvest and threat to human life. In addition, new development along the wildland-urban interface has necessitated strict fire control.

[2] Direct fire damage was limited to decks, fences, a greenhouse, and scorched siding. The total sum of the private insurance claim was not immediately available.

The Interface

There are three categories of interface fire:[9] the classic wildland-urban interface occurs where well-defined urban and suburban development presses up against open expanses of wildland areas; the mixed wildland-urban interface occurs where isolated homes, subdivisions, and small communities are situated predominantly in wildland settings; and the occluded wildland-urban interface occurs where islands of wildland vegetation occur inside a largely urbanized area. Unlike most other natural hazards, the wildland-interface fire is not designated by geography alone: certain conditions must exist for significant interface fires to occur. The most common are hot, dry, and windy weather; the inability of fire protection forces to contain or suppress the fire; the occurrence of multiple fires that overwhelm committed resources; and a large fuel load (dense vegetation).[10] Once a fire has started, several other conditions—fuel, topography, weather, drought, and development—can also influence its behavior. Combined, these conditions are key indicators of increased wildfire risk: the severity of the wildfire is ultimately affected by the severity of these conditions. For example, if a steep slope (topography) is combined with extremely low humidity, high winds, and highly flammable vegetation, then a high–intensity wildfire may develop.

Many of the natural hazards definitions found in this plan come from existing state resources, including the *Planning for Natural Hazards: Technical Resource Guide,* the *Oregon State Natural Hazards Plan,* and FEMA-adopted local plans. For more information on existing resources for natural hazards and mitigation planning in the state of Oregon, please visit www.OregonShowcase.org.

Since the 1970s, Oregon's growing population has expanded further into traditional resource and forestlands. The interface between urban or suburban areas and the resource lands created by this expansion has significantly increased threats to life and property from fires and has pushed existing fire protection systems beyond their capabilities.[11] Property owners in the interface are often unaware of the problems and threats they face, so many owners have done very little to manage or offset fire hazards or risks on their own property. Furthermore, human activities increase the incidence of fire ignition and potential damage.

Fuel[12]

Fuel is the material that feeds a fire and is a key factor in wildfire behavior. An important factor in evaluating wildfire risk is the availability of diverse types of fuels in the landscape; fuels can include natural vegetation (trees, grasses and shrub species), manmade structures, and other combustible materials. A house surrounded by unmanaged vegetation rather than a fire resistant landscape allows for greater continuity of fuel and increases the fire's ability to spread.

Historically, the Portland area was covered by heavy forests of Douglas fir, western hemlock, and western red cedar intermixed with deciduous bigleaf maples and red alders. Oregon ash, willows, and black cottonwoods grew along wetlands and streams, and lower growing

vegetation included vine maple, western hazel elderberry, dogwood, sedges and rushes.[1] Early European settlers cleared the City, lending to Portland's early nickname, "Stumptown." Groupings of the early vegetative model, however, still exist in open spaces, parks, and private landscapes.

In many cases, immigrants brought seeds and seedlings from their homelands that for the most part flourished in Portland's climate. Some plants, however, displaced the beneficial native plant community: Himalayan blackberry, Scot's broom, wild clematis and English ivy are examples of non-native vegetation that degraded the health of the City's wild areas and could now act to intensify wildfires. After decades of fire suppression, "dog-hair" thickets have also accumulated and could enable high intensity fires to flare and spread rapidly.

Structures that are made of combustible material such as shake roofs and wood siding are especially susceptible to fire. Vegetation near these structures often serve as "ladder fuels:" the vegetation allows a slow moving ground fire to climb onto rooftops and into the crowns of trees. A crown fire is significantly more difficult to suppress than a ground fire and poses a much greater threat to structures in the interface. Wildfire at the upper end of the wildfire intensity spectrum is likely to spread into the tops of the tallest trees in violent and discontinuous surges.[13] At this severe end of the spectrum, fire responds to its own convective winds, and spreads rapidly as sparks from exploding trees ignite other fires many meters away.[14]

Ultimately, the wide variety of fuels found in a wildland interface can frustrate attempts to predict how a fire will react or spread.

Topography[15]

Topography influences the movement of air and thereby directs a fire's course. If the percentage of uphill slope doubles, for example, the rate of spread in wildfire will likely double as well. Gulches and canyons such as Portland's Sullivan's Gulch, Balch Canyon, and upper Tanner Creek can funnel air and act as chimneys that intensify fire behavior and cause the fire to spread faster. Solar heating of dry, south-facing slopes such as the Willamette River's eastside escarpment produces upslope drafts that can complicate fire behavior. Unfortunately, hillsides with hazardous topographic characteristics are also desirable residential areas in many communities. Given these conditions, hazard mitigation and education efforts should increase in these interface areas.

Weather[16]

Weather patterns, combined with certain geographic locations, can create a favorable climate for wildfire activity. Areas where annual precipitation is less than 30 inches are extremely fire susceptible.[17] While Portland averages just over 36 inches of yearly rainfall, its close proximity to the Columbia River Gorge makes late-summer weather patterns highly dangerous. Western Oregon's fire season typically lasts from the last week in July through the end of September. During that season, hot, dry winds from Eastern Oregon often sweep down the

Columbia Gorge and empty into the Portland area. The dry winds significantly reduce fuel moisture levels and can fan sparks into a full-blown wildland fire.

Drought

The term *drought* refers to a period in which an unusual scarcity of rain causes a serious hydrological imbalance. Unusually dry winters or significantly decreased rainfall can lead to relatively drier conditions and leave reservoirs and water tables lower. As it can also limit irrigation, drought can further contribute to fires and can make firefighting difficult. However, most fuel types (except grasses) require two or three years of drought to become dangerously dry. Overall, the patterns of drought and rainy seasons determine the frequency and intensity of fires: a February 2001 Oregonian article reported that:

> *…favorable weather last year helped the Northwest emerge largely unscathed from a fire season that scorched other parts of the West. But the forests remain thick with timber and with homes. And this winter has brought the Northwest far less snow and rain than usual, which could give a greater foothold to the flames that are sure to come.*[18]

This prediction proved accurate.

Development

Rapid growth and development in forested regions is increasing the number of human-caused wildfires in Oregon's interface areas. Wildfire has an effect on development, yet development can also influence wildfire. While naturally occurring wildfires have a distinct role in Oregon, homes in the interface can unduly increase the risk of human-ignited fires. Heavy development can also make firefighting efforts difficult: homeowners often prefer private, scenic lots with heavy vegetation and limited driveway access, all conditions that can make evacuation and firefighting difficult. The scenic views found along mountain ridges can also invite topographical risks, and the natural vegetation that provides scenic beauty may also provide a ready trail of fuel leading a fire directly to the combustible fuels of the home itself. [19]

Overall, the increase in human development and activity in the interface and the high content of fuels remaining from years of fire suppression can create a lethal combination.

Community Wildfire Issues

Characteristics of Growth and Development in the Interface

People living in or near Portland's wildland settings are vulnerable to the threat of wildfire. Portland is situated at the confluence of two major rivers, the Willamette and the Columbia, and a great expanse of the City is built upon the historic flood formed by these rivers. Portions of those flood plains—including Johnson Creek, Beggars Tick, Oaks Bottom, and Smith and Bybee Lake—still exist in their natural state. The natural grasses and low brush in these areas are susceptible to

drought conditions, and limited access can complicate firefighting efforts.

Restoring natural vegetation to the banks of Portland's rivers and steams has been the focus of major work by the City and numerous community groups. Riparian and upland enhancement programs have replaced invasive vegetation with natural species to provide better shade and cooler water temperature for spawning fish and improved habitat for other wildlife. Generally, the riparian areas along the major rivers have good firefighting access from land and from Portland's fireboats. Firefighting access to streams and tributaries, however, is somewhat more limited.

Furthermore, grassy areas and oak savannas increase the risk of fast moving wildland fires. Powell Butte and Mocks Crest are examples of this vegetative model; fortunately, the homes adjacent to these areas have good firefighting water supply through hydrant systems and generally acceptable emergency access and egress through gridded city streets.

The southeastern and western edges of Portland are rimmed with hills. Steep topography, narrow roads with few connecting streets, marginal water supply (in some areas), high population, and the heavy fuel loads associated with dense forestland form Portland's greatest wildland urban interface challenge.

The vegetation in these interface areas consists of an assortment of grasses, shrubs, and deciduous and coniferous trees. Steep slopes are also a consideration in determining wildfire prone areas in the City. Interface neighborhoods are characterized by a diverse mixture of varying housing structures, development patterns, ornamental and natural vegetation, and natural fuels. Where past wildland fires have caused damage in interface areas, several factors have allowed for increased destruction:[20]

- Combustible roofing material;
- Wood construction;
- Structures with no defensible space;
- Fire departments with poor access to structures;
- Subdivisions surrounded by heavy natural fuel types;
- Structures located on steep slopes covered with flammable vegetation;
- Limited water supply; and
- Winds over 30 miles per hour.

Road Access

Of particular concern to firefighters are older developments built upon what are presently considered substandard widths, grades, and

connecting routes. Should the need for mass evacuation arise, sub-standard access routes can lead to dangerous bottlenecks. Current fire code mandates larger width of driving surface, lesser grades, turnarounds at the end of dead ends, and fire sprinklers in single-family developments with more than 18 units and one point of access. The Portland zoning code calls for greater connectivity where appropriate and practicable; street grids are often difficult to achieve on steeper slopes and therefore connectivity is not required.

Water Supply

Water supply is a critical factor in the ability to fight wildland fires. Developments lacking adequate water supply and hydrant taps create additional challenges for firefighting personnel. New developments in Portland's wildfire interface have hydrants every 500 feet. These hydrants are engineered to flow at least 1750 gallons per minute, but hydrants within older developments can be found at much greater spacing and often provide lesser flow rate capacity.

Wildfire Hazard Assessment

In a pilot program for the Federal Emergency Management Agency's (FEMA) loss estimation software HAZUS – (Multi Hazard) MH, the City of Portland has developed a method of analysis that will prove beneficial as the area's density reaches 2040 levels. The software program can superimpose demographic information and building stock levels over hazardous or forested areas and then calculate potential loss. The following chart profiles the wildland fire hazard; as the report indicates, 27,100 households are at risk, 7,500 of the people in the households are over 65, and 8,700 have an income of less than $20K. The program also calculates that a wildfire touching the exposed building stock could place $7,833.3M worth of structures at risk.

Over time, additional data added to the HAZUS-MH program will allow greater analysis of cost-benefit ratios, adjustments to water supply, and improved access and egress configurations or building and landscape guidelines. Overall, the analysis of the information can lead to a greater success in mitigation efforts.

Hazard Risk Gauge
Initial Profile Ranking

Interface is used to describe areas where homes and other structures have been built on or adjacent to forest and range lands. It is an intermingling of structures with natural cover at various degrees of growth and complexity.

Multnomah County Hazard Analysis		Summary of Risk Factors	
Severity Score	High	**Period of occurrence:**	Any time, particularly summer or fall
History (2)	12	**Probability of event(s):**	Highly likely
Vulnerability (5)	35	**Warning time:**	0 to 3 hours
Maximum Threat (10)	100	**Major contributor(s):**	Lightning or human activities resulting in fire, fuel type and condition, vegetation, and slope
Probability (7)	56	**Cause injuries?**	Yes, and risk of death
Total Score	203	**Potential facilities shutdown?**	14 days or more

WILDLAND FIRE PROFILE

Background and Local Conditions

Fire is a natural part of the ecosystem and plays an important role in shaping the environment. Wildland fires generally occur heavily wooded areas but can also impact metropolitan areas; for example, these fires occur at the interface of wooded and brush areas and developed areas. These fires can be triggered by fires in the home, fires resulting from industrial activities, fires resulting from natural hazards (for example, fires associated with lightning strikes), and other events. This hazard profile considers wildland fires in the Portland study area.

Historic Frequency and Probability of Occurrence

Wildland fires can occur at any time of the year but are especially likely during hot, arid periods. The probability of occurrence is high, with an occurrence probable each year. Specific historic or probable frequency data are not available for the Portland wildland fire hazard.

Severity

The risk of impact of major wildland interface fires can be high. Wildland fire events can cause multiple deaths, completely shut down facilities, and cause more than 25 percent of affected properties to be destroyed or suffer major damage.

Historic Losses and Impacts

To date, there have been no major losses due to wildland fires in the Portland study area since records have been kept. Thus, while the area has been spared the impacts of fires, it is prudent to expect that such a fire represents a threat and could occur in the Portland area (Metro 1999). While no specific events have impacted Portland a number of significant wildfires occurred during 2002 and 2003 in the national forests (Deschutes and Ochoco) west and south of Portland. These necessitated road closures on Highway 20. The recent severe wildland fires and subsequent landslides in Southern California (2003) illustrate the danger that is associated with this hazard.

Designated Hazard Areas

Residences have long occupied the heavily forested hillsides around Portland, and the trend of locating near undeveloped land continues to increase interface areas that in turn intensify the potential impacts of wildland fires and may increase ignition sources. Structures built in interface areas may be more vulnerable to wildland fires. Approximately 30 square miles of the 145 total square miles in the Portland study area (or 20 percent) is at risk from the wildland fire hazard. Figure 3-5 shows the at-risk regions within the Portland study area. These areas are considered to be at risk because of fuel types, vegetation, and slope characteristics. The figure shows that the western and southwestern regions of the Portland study area are at greatest risk from wildland fires.

Wildfire Hazard Identification

Portland has developed maps of the City's wildland fire hazard zones. As required by ORS 93.270, the Oregon Department of Forestry developed the criteria for determining wildfire hazard zones. The following four sets of "hazard factors" determine the hazard zone:

- Weather
- Topography
- Natural vegetative fuels
- Natural vegetative fuel distribution

Each hazard factor is assigned a value per geographic area, and an overall wildfire hazard rating is determined for certain parts of Portland. This map was adopted in 2003 by City Council, ordinance 24.51.030 (the map can be accessed at www.portlandonline.com). The immediate impact of the adopted map is a stricter standard for roofing materials. Entire structures and neighborhoods in the wildfire hazard zone can be hazard rated by one of several national standards. Generally, hazard identification rating systems are based on weighted factors of fuels, weather, and topography.

Mitigation Plan Goals and Existing Activities

The mitigation plan goals and action items are derived from a review of city, county, regional, state, and national natural hazard mitigation plans and planning literature and guidance from the Portland Natural Hazards Mitigation Steering Committee. The plan has five goals:

1. Identify risk levels and evaluate Portland's vulnerability to natural hazards.
2. Implement activities to protect human life, property and natural systems.
3. Promote public awareness, engage public participation, and enhance partnerships through education, outreach, and coordination of a diverse and representative group of the City's population.
4. Establish a disaster resilient economy.
5. Build and support the capacity and commitment to continuously become less vulnerable to hazards.

Existing Mitigation Activities by City Bureau

Portland Fire & Rescue/Fire Marshal Office

Passed in 1993, ORS 93.27 asked jurisdictions to voluntarily establish Wildfire Hazard Zones and set standards for identifying these zones that relate to weather, topography vegetative fuel hazards, and fuel distribution. A multi-governmental effort was undertaken to map the

City based on these criteria, and in 2003, Portland City Council adopted the Wildfire Hazard Zones. Structures within the wildfire zones are required to meet the additional building requirements in the Uniform Building Code related to Appendix Chapter 5: Class A or B roofing and addressing visible from the public right of way. (see UBC. The International Residential Code requires class C roofing—fire-resistant wood shakes—or better.) The Uniform Fire Code and FMO Policy B1 set standards for water supply and emergency access in the City of Portland, but there are no current differentials between urban areas and wildland interface areas in these codes. FMO Policy B1 requires:

- Fire hydrants within 500 feet of any portion of a structure and 600 feet from a structure with sprinklers. Fire access is required within 150 feet of any door of a structure and within 250 feet for structures with sprinklers.
- Fire access is a substantially built roadway, 20 feet wide, 13. 5 feet high with provisions for turnarounds on dead ends longer than 300 feet. Access width can be reduced to 12 feet for roads servicing 2 or fewer single-family dwellings.
- Access roads can be on grades no higher than 15 percent for roads accessing single-family dwellings and 12 percent for all others.
- Residential developments with more than 18 single-family dwellings shall have two or more means of access.

Residential lots and developments that do not meet the standards of FMO Policy B1 sometimes appeal specific requirements and generally offer Standard 13D residential fire sprinklers in return. Residential fire sprinklers reduce wildfire hazard by helping contain fires in the room of origin to reduce the chance that a fire can break outside the structure and possibly igniting surrounding vegetation. Other agencies also provide rules and guidelines that help residential lots meet the appropriate standards:

- The Public Education section of the Fire Marshal's office has a City of Portland-specific wildfire safety brochure. The brochure covers items such as defensible space, fire resistive plants, wildfire hazard zones, structure maintenance, and emergency planning.
- The Department of Environment Quality (DEQ) prohibits outdoor debris burning within Portland's city limits. Portland Fire and Rescue administers these rules with a few exceptions: the Fire Marshal's Office does allow some outdoor burning activities including barbecues, ceremonial fires (by permit from the FMO), and recreational fires (campfires). In the case of adverse weather conditions (high winds/temperature, low humidity) the Fire Chief has the authority to ban all outdoor fires. Furthermore, any Fire Bureau officer or fire inspector has the authority to order an unsafe fire extinguished.

State law restricts the sale and use of fireworks that produce a loud report or travel more than 6 feet from the point of ignition. Inside the City, the Fire Marshal's Office administers those rules. Fireworks vendors are required to have a permit, and Fire Inspectors visit each fireworks stand.

Portland Fire & Rescue/Fire Suppression Companies

Fire Station 3 on NW Johnson, Station 16 at Highway 26 and Skyline, and Station 22 near the east end of the St. John's Bridge make fire patrols in Forest Park. These patrols continue through the fire season (which is determined by the C shift Deputy Chief) and are made on Tuesdays and Fridays. The patrols cover all the vehicular roads in the park to assess current fire danger and mitigate unsafe acts or activities that may contribute to the fire danger in the Park.

Bureau of Development Services

The Bureau of Development Services requires that areas under common ownership be subject to maintenance agreements that assign homeowners' responsibilities. Such responsibilities may involve vegetation management that includes removal of dead plants, reintroduction of native species, invasive plant species removal, and enforced watering schedules. Certain developments—Forest Heights and some sites on very steep slopes—have included conditions directly related to wildfire prevention. As part of the Land Use Review process, 2 wildland sprinkler systems were installed in the Forest Heights area beginning in 1998 and were completed in 2004. These systems consist of underground piping laid along the swales with risers spaced every 75 feet to fixed 50 GMP nozzles. In case of fire, these systems are activated when fire hoses link hydrants and streetside sprinkler connections.

Office of Neighborhood Involvement

Portland Housing Code, Title 29, (specifically 29.20) requires that property be kept in a safe manner that allows emergency ingress and egress and the removal of trash, debris, and vegetation that may increase fire danger. Portions of this code require that all vegetation within 10 feet of the house and 10 feet of the property line be removed; the code also requires that the lawn be kept shorter than 10 inches.

Bureau of Planning

The Portland Zoning code requires that rights-of-way and water supply are sufficient to support proposed development (e.g., land divisions). Provisions that pertain indirectly to wildfire mitigation include emergency development allowances and restrictions on bulk use of hazardous materials in environmental zones.

The Water Bureau

The Water Bureau tests all hydrants within the City on an annual basis and repairs any recognized deficiencies. Under Fire Bureau advisory, the Water Bureau designs new water supply systems within the Wildfire Hazard Zone that increase minimum flow to 1750 gallons per minute.

Urban Forestry

The Urban Forestry Plan requires permits to prune, plant, or remove trees in the public right of way. Generally, the Urban Forestry Division seeks to preserve and protect the City's trees.

Bureau of Environmental Services

The BES Watershed Revegetation Program works with public and private landowners to actively manage vegetation in natural areas. Vegetation management reduces the risk of catastrophic wildfire by replacing high fuel loads of non-native, invasive vegetation with lower fuel loads of native plant species. BES also partners with several community groups in the Naturescaping program, an organized effort to promote indigenous species in local landscapes.

Portland Parks and Recreation

The Forest Park Natural Resource Management Plan (February 1995) identifies existing and potential risks and hazards including fire. Pages 47–48 and 101-102 of the NRMP discuss fire hazard; while the Plan states that wildfire hazard is generally low, it makes several important observations. The hardwood stands in the park actually accomplish many of the same functions as a shaded fuel break: fires are unlikely to reach tree crowns, and ground fires will generally be of low intensity. Thus, most of the objectives of a shaded fuel break will be met by the present conditions in hardwood stands. Although conifer stands are somewhat more susceptible to wildfire, there is generally a low fire risk at present, and fuel breaks are not recommended. These conditions should be reassessed periodically for change on the same 10-year schedule recommended for monitoring vegetative change in the Park. The Forest Park NRMP, M-5, also asks that Parks continue to work with the Fire Bureau on their training exercises.

Much of the City's wildland area are administered and maintained by Portland Parks and Recreation. The following is a synopsis of Portland Parks' yearly fire control maintenance plan:

Forest Park Annual (May through July) Firelane and Powerline ROW maintenance tasks:

- Mow herbaceous vegetation [grasses, etc.] on edge of firelanes
- Control flammable invasive vegetation [e.g. Himalayan blackberry, Scot's broom, Reed canary grass, etc.]
- Prescribed Burns for Hazard Reduction, Vegetation Management and Habitat Enhancement on PP&R Natural Areas sites

Elk Rock Island Natural Area, Fall 1992 Objectives and Guidelines

- Control invasive plants and enhance Oak/Madrone woodland habitat
- Natural Resource Management Plan: see Mark G. Wilson
- Fire Plan: specified in Management Plan

- Partners: PP&R Natural Resource staff, Portland Fire Bureau, City of Milwaukie Fire Bureau

Oaks Bottom Wildlife Refuge, September 1993 Objectives and Guidelines

- Control invasive, non-native grasses and prepare side for seeding
- Natural Resource Management Plan: available from Mark G. Wilson
- Fire Plan: N/A
- Partners: PP&R Natural Resource staff, USFS, Portland Fire Bureau

Oaks Bottom Wildlife Refuge, September 1998 Objectives and Guidelines

- Control woody plants and invasive, non-native grasses before re-vegetating
- Natural Resource Management Plan: available from Mark G. Wilson
- Fire Plan: available from Mark G. Wilson
- Partners: PP&R Natural Resource staff, USFS, Portland Fire Bureau

Powell Butte Nature Park, September 1995 Objectives and Guideline

- Control invasive woody & herbaceous plants before re-seeding with native grasses
- Powell Butte Master Plan: available from Mark G. Wilson
- Fire Plan: available from Mark G. Wilson
- Partners: PP&R Natural Resource staff, USFS, Portland Fire Bureau

Regional Programs

Metro

State goals address natural hazards generally, but Metro's goals specifically include Wildland/Urban Interface Fire prevention. Metro's goal calls for collaboration with other agencies to evaluate risk and encourages local governments to adopt a range of appropriate mitigation measures (see Regional Framework Plan policy 5.5 and 5.5.1). Portland's Comprehensive Plan addresses Emergency Response through Transportation Goal 6 and controls development density through Environment Goal 8, policy 8.13.

Building Codes

City, county, state, and local jurisdictions work together to define and implement building codes. These codes apply to new development, dwellings and structures, retrofitting, and siding. The process begins with the establishment of code at the state level, and codes are then implemented locally.

The April of 2003 adoption of Portland's Wildfire Hazard Zone established specific requirements for roofing: the Plan requires Class A or B roofing on commercial structures (appendix chapter 5, UBC) and class C or better on residential structures (section R328, International Residential Code.)

State Programs

Oregon Revised Statute 215.730 (Additional Criteria for Forestland Dwellings) provides guidelines for approving dwellings located on lands zoned for forest and mixed agriculture/forest use. Under its provisions, county governments require that single-family dwellings on lands zoned as forestland meet specific requirements for approval.

States must have an approved hazard mitigation plan in place to receive either a Fire Suppression Assistance Grant or a Hazard Mitigation Grant.

Oregon Revised Statute 477.015-061

Provisions in ORS 477.015-061 (Urban Interface Fire Protection) were established through the efforts of the Oregon Department of Forestry, the Office of the State Fire Marshal, fire service agencies from across the State, and the Commissioners of Deschutes, Jefferson, and Jackson Counties. This innovative legislation addresses the expanding interface wildfire problem within Oregon Department of Forestry Fire Protection Districts. Full implementation of the statute will occur on or after January 1, 2002.

Senate Bill 360

Passed in 1997, Senate Bill 360 also addresses the growing wildland/urban interface problem. The bill has three purposes:

1. To provide an interface fire protection system in Oregon that minimizes cost and risk and maximizes effectiveness and efficiency;
2. To promote and encourage property owners' efforts to minimize and mitigate fire hazards and risks; and
3. To promote and encourage involvement of all levels of government and the private sector in interface solutions.[21]

The bill has a five-year implementation plan that includes public education and outreach and the development of rules, standards, and guidelines that address landowner and agency responsibilities. The success of Senate Bill 360 depends upon the cooperation of local and regional fire departments, fire prevention cooperatives, and the Oregon Department of Forestry. This cooperation is important in all aspects of wildland firefighting as resources and funding are often limited, and no

single agency has enough resources to tackle a tough fire season alone. The introductory language of Senate Bill 360 states "…the fire protection needs of the interface must be satisfied if we are to meet the basic policy of the protection of human life, natural resources, and personal property. This protection must be provided in an efficient and effective manner, and in a cooperative partnership approach between property owners, local citizens, government leaders, and fire protection agencies."

Oregon Department of Forestry

ODF is involved with local fire chiefs and local fire departments to provide training. Local firefighters can get a range of experience from exposure to wildland firefighting. Local firefighters can also obtain their red card (wildland fire training documentation) and attend extensive workshops that combine elements of structural and wildland firefighting, structural defense, and operations experience. [22]

ODF has also been involved with emergency managers to provide support during non-fire events. Furthermore, ODF has worked with industrial partners (specifically large timber companies) to share equipment in the case of extremely large fires. [23]

Federal Programs

The proposed role of Federal land management agencies—the U.S. Forest Service and the Bureau of Land Management—in the wildland/urban interface is diverse. Their roles include reduction of fuel hazards on the lands they administer; cooperation in prevention and education programs; provision of technical and financial assistance; and development of agreements, partnerships, and relationships with property owners, local protection agencies, states, and other stakeholders in wildland/urban interface areas. These relationships promote action before a fire occurs and render structures and communities safer and better able to survive a fire occurrence. [24]

Federal Emergency Management Agency Programs

The Federal Emergency Management Agency (FEMA) is directly responsible for providing fire suppression assistance grants and, in certain cases, major disaster assistance and hazard mitigation grants in response to fires. The role of FEMA in the wildland/urban interface is to encourage comprehensive disaster preparedness plans and programs, increase the capability of state and local governments, and provide for a greater understanding of FEMA's programs at the federal, state, and local levels.[25]

Fire Suppression Assistance Grants

Fire Suppression Assistance Grants may be provided to a state with an approved hazard mitigation plan for the suppression of a forest or grassland fire that could threaten public or private lands. These grants are provided to protect life and improved property, encourage the development and implementation of viable multi-hazard mitigation measures, and provide training to clarify FEMA's programs. The grant

may include funds for equipment, supplies, and personnel. A Fire Suppression Assistance Grant is the form of assistance most often provided by FEMA to a state for a fire, and the grants are cost-shared with states. Once the federal grant money is provided to a state, the state passes funds to local jurisdictions. Finally, FEMA's US Fire Administration (USFA) provides public education materials addressing wildland/urban interface issues, and the USFA's National Fire Academy provides training programs.[26]

Hazard Mitigation Grant Program

Following a major disaster declaration, the FEMA Hazard Mitigation Grant Program provides funding for long-term hazard mitigation projects and efforts to reduce the damages and costs associated with possible fire hazards.

National Wildland/Urban Interface Fire Protection Program

Federal agencies can use the National Wildland/Urban Interface Fire Protection Program to focus on wildland/urban interface fire protection issues and actions. The Western Governors' Association (WGA) can effectively involve state agencies, as well as local and private stakeholders, in the development of a uniform, integrated approach to hazard and risk assessment and fire prevention and protection in the wildland/urban interface. The program helps states develop viable and comprehensive wildland fire mitigation plans and performance-based partnerships.

US Forest Service

The US Forest Service (USFS) is involved in a fuel-loading program designed to assess fuels and reduce hazardous buildup on US forestlands. The USFS is a cooperating agency and, while it does not have jurisdiction in Portland city limits, it still has an interest in preventing fires in the interface as fires often burn up the hills and into higher elevation US forestlands.

"New data from National Forest Service fire ecologists shows that for every dollar spent on prescribed burning, forest thinning and the training of fire-management personnel, seven dollars worth of savings are realized in the costs of having to extinguish big fires. When that ratio is placed in the context of an average $1 billion spent annually over the past decade on fire suppression, the implications of foresighted fire management are profound."

The Nature Conservancy Magazine – May/June 2001

Other Mitigation Programs and Activities

Prescribed Burning

The health and condition of a forest will determine the magnitude of a wildfire. If fuels—slash, dry or dead vegetation, and fallen limbs and branches—are allowed to accumulate over long periods of time without intentional clearing, a fire can move more quickly and destroy everything in its path. Ultimately, the impacts are far more catastrophic than if the fuels are periodically eliminated. Prescribed burning is the most efficient method to get rid of

these fuels. In 1998, 3,000 prescribed fires were used to burn approximately 163,000 acres statewide.[27]

Firewise

Firewise is a program developed within the National Wildland/ Urban Interface Fire Protection Program. Firewise is the primary Federal program addressing interface fire; the National Wildfire Coordinating Group administers the program and overseas its goal of empowering planners and decision makers at the local level. Through conferences and information dissemination, Firewise increases support for interface wildfire mitigation by educating professionals and the general public about hazard evaluation and policy implementation techniques. Firewise offers online wildfire protection information and checklists as well as listings of other publications, videos, and conferences. The interactive home page allows users to ask fire protection experts questions and helps them register for new information as it becomes available.

Wildfire Action Items

The wildfire mitigation action items provide direction on specific activities that organizations and residents in the City of Portland can undertake to reduce risk and prevent loss from wildfire events. Each action item includes an estimate of the timeline for implementation. *Short-term action items* (ST) are activities that state agencies may implement with existing resources and authorities. *Long-term action items* (LT) require new or additional resources and/or authorities.

Short-term Action Items

ST-WF#1: Consolidate unassigned and/or unmanaged vegetated areas owned by the City of Portland under a single land management umbrella.

Key Issues Addressed

- Many City owned natural areas are assigned to Portland's Bureau of General Services with no funds to manage vegetation. The management of other City-owned lands has not been assigned to any bureau portfolios.

Ideas for Implementation

- Map out all City-owned natural areas and clarify individual bureau responsibilities for management.

General Comments

- Funding is needed to bring this issue, which may be a high priority, forward.

Coordinating Organization:	Parks, Bureau of Environmental Services
Internal Partners:	Water, Portland Office of Transportation, Bureau of General Services
External Partners:	none
Level of Immediate Capability:	Low
Estimated Timeline:	1-2 years
Plan Goals Addressed:	Build and support the capacity and commitment to continuously become less vulnerable to hazards.

ST-WF#2: Procure funding for management of vegetated natural areas with high wildfire danger, including public and private properties.

Key Issues Addressed

- Many City owned and some privately owned lands are dominated by invasive plant communities and are at high risk for wildfire. Some homeowners in the interface may wish to manage vegetation but cannot afford it.

Ideas for Implementation

- Apply for FEMA grant to pay for vegetation management services that can utilize the services of the City's Watershed Revegetation Program and Portland Parks Natural Resources.
- Convene technical committee to identify vehicle for rating and ranking hazardous unmanaged land tracts. Look for State and Federal funds that may be available for low-income homeowners.

General Comments

- Will require outside sources of funding

Coordinating Organization:	Fire, Portland Parks and Recreation, Bureau of Environmental Services
Internal Partners:	Bureau of Planning, Portland Office of Transportation, Bureau of General Services
External Partners:	none
Level of Immediate Capability:	Medium
Estimated Timeline:	1-3 years
Plan Goals Addressed:	Build and support the capacity and commitment to continuously become less vulnerable to hazards.

ST-WF#3: Review and index existing maps with pertinent wildfire information. Identify parameters and methods for new maps as needed to meet wildfire mitigation goals.

Key Issues Addressed

- The current wildfire hazard map is not accurate at a small scale and would be difficult to use for code enforcement. Overlaying vegetation and topographic maps would provide improved accuracy.

Ideas for Implementation

- Refine the existing map and ground truth it. Portland Parks and Recreation and Bureau of Environmental Services have staff that can highlight areas of the map that need refining.

General Comments

- Different mitigation goals and codes may require maps of more or less specificity; HAZUS-MH may be a good mapping tool to add to other City databases.

Coordinating Organization:	Fire, Bureau of Development Services,Corporate GIS
Internal Partners:	BIT, Planning, Parks, Bureau of Environmental Services, Bureau of Water
External Partners:	none
Level of Immediate Capability:	Medium
Estimated Timeline:	1-3 years
Plan Goals Addressed:	Identify risk level and evaluate Portland's vulnerability to natural hazards.

ST-WF#4: Provide wildfire management training for City staff.

Key Issues Addressed

- Facilitate better coordination and partnerships between the city bureau staff who may respond to wildfire, use prescribed burning for vegetation management, or are responsible for managing natural areas.

Ideas for Implementation

- Have S190 and S130 courses held by Portland Fire and Rescue with multi-bureau staff participants.

General Comments

- This would be especially helpful for setting up prescribed burning operations and post wildfire incidents when members from city bureaus other than Portland Fire and Rescue are involved.
- Fire and Rescue is currently well-positioned to lead additional personnel training.

Coordinating Organization:	Portland Fire and Rescue
Internal Partners:	Parks and Recreation, Bureau of Environmental Services, Bureau of Water, Bureau of Maintenance
External Partners:	none
Level of Immediate Capability:	High
Estimated Timeline:	1-3 years
Plan Goals Addressed:	Build and support the capacity and commitment to continuously become less vulnerable to hazards.

ST-WF#5: Amend the Portland Plant List and other related City plant lists and landscaping guides to include/identify fire resistant native plants, and planting strategies that could be encouraged or required in local landscaping.

Key Issues Addressed

- This action will assist property owners in reducing wildfire risks. Additionally, it will improve consistency between multiple City plant lists (Portland Plant Lists, Title 10 Erosion Control, Stormwater Management Manual, Tree and landscaping standards) and enhance ability of specific public programs to meet multiple objectives (e.g., habitat conservation and wildfire risk management).

Ideas for Implementation

- Link implementation of this action to the upcoming Environmental Code Improvement projects, updates to Title 10, and the Stormwater Management Manual.
- Coordinate with Metro to update regional plant list(s).

General Comments

- Title updates can be amended to include this work.
- This is a key piece for many of the identified mitigation strategies. Funding/resources will be needed to 1) research plant list for species that could prove beneficial in fire prone areas; 2) develop recommendations for fire resistive landscaping designs.

Coordinating Organization:	Bureau of Planning
Internal Partners:	DS, Fire and Rescue, Parks and Recreation, Bureau of Environmental Services, Portland Office of Transportation
External Partners:	none
Level of Immediate Capability:	Medium
Estimated Timeline:	1-3 years
Plan Goals Addressed:	Build and support the capacity and commitment to continuously become less vulnerable to hazards.

ST-WF#6: Integrate, as appropriate, fire prevention goals and provisions into City policies, plans, and codes. Identify and address ambiguities or conflicts among city requirements.

Key Issues Addressed

- This project will enhance the ability of City programs meet multiple objectives and increase the efficiency of land use reviews and project permitting processes.

Ideas for Implementation

- This should occur during updates to the City's comprehensive plan, environmental zoning and Willamette Greenway programs, and other code titles.
- Identify provisions that could reduce fire risk while meeting other City goals (e.g., protecting important natural resources).
- Address building materials, pruning/thinning, removal of ladder fuels, planting requirements, tree removal, revegetation after a fire, incorporation of fuel breaks, and storage of hazardous materials.
- Include in upcoming policy packages and environmental code improvement.

General Comments

- Portions of this Action Item are in current Bureau of Planning work plans.
- Need resources to update natural resource management plans and Plan Districts Address issues such as street width requirements for transportation and fire access and provisions that new rights-of-way must minimize disturbance of natural resource areas in environmental zones.

Coordinating Organization:	Bureau of Planning
Internal Partners:	Bureau of Development Services, Fire and Rescue, Parks and Recreation, Bureau of Environmental Services, Portland Office of Transportation
External Partners:	none
Level of Immediate Capability:	Medium
Estimated Timeline:	1-3 years
Plan Goals Addressed:	Build and support the capacity and commitment to continuously become less vulnerable to hazards.

ST-WF#7: Identify conditions of approval and mitigation strategies that could be applied to new development or redevelopment in high fire risk areas.

Key Issues Addressed

- This action would provide a flexible tool to incorporate wildfire risk management measures into site and building design, taking into account site-specific characteristics.

Ideas for Implementation

- Develop a boiler set of conditions of approval and mitigation measures to use in land use reviews for development proposals in wildfire areas. This would create consistency in requirements that apply to landowners in these areas, and assist staff in identifying potential requirements at pre-application conferences that would apply to development proposals in wildfire areas.

General Comments

- This is currently used on a case by case basis by Bureau of Development Services.

Coordinating Organization:	Bureau of Development Services
Internal Partners:	Bureau of Planning, Fire and Rescue, Parks and Recreation, Bureau of Environmental Services, and Portland Office of Transportation
External Partners:	none
Level of Immediate Capability:	High
Estimated Timeline:	1-3 years
Plan Goals Addressed:	Implement activities to protect human life, property and natural systems.

ST-WF#8: Integrate wild land fire risk educational opportunities into existing City stewardship programs. Provide education for both internal and external partners.

Key Issues Addressed

- This action would assist property owners in reducing risk of wildfire, and would also enhance ability of existing programs to meet multiple objectives (e.g., habitat conservation and wildfire risk reduction).

Ideas for Implementation

- Identify and incorporate wildland fire risk reduction measures into City programs including Naturescaping for Clean Rivers, Water Conservation Landscape workshops, and Watershed Revegetation.
- Convene an ad hoc committee to generate proposed program/class update concepts and specifics.

General Comments

- Classes and symposiums are already in place for programs like Naturscaping and Clean Rivers that could provide a model.
- Implementation would depend on the ability to develop fire resistant plant list and design recommendations.

Coordinating Organization:	Bureau of Environmental Services
Internal Partners:	Fire and Rescue, Bureau of Water, Bureau of Planning, Bureau of Development Services, Parks and Recreation, Portland Office of Transportation, Portland Office of Emergency Management, Office of Neighborhood Involvement
External Partners:	none
Level of Immediate Capability:	High
Estimated Timeline:	1-2 years
Plan Goals Addressed:	Promote public awareness, engage public participation, and enhance partnerships through education, outreach and coordination of a diverse and representative group of the City's population.

ST-WF#9: Improve the system for identifying new construction in areas subject to wildfires and communicating this information to the affected land owners.

Key Issues Addressed

- While requirements for new construction in wildfire hazard areas exist, that information is not always effectively communicated during the permitting process. More effective use of two existing software programs, GARTH and TRACS[3], would place the required information into the hands of the plan reviewers who are tasked with calling out the strengthened building requirements in wildfire hazard areas.

Ideas for Implementation

- Integrate the Wildfire Hazard Map into the GARTH program; link the map to TRACS to automatically call out wildfire specific construction.

[3] TRACS and GARTH are computer programs used in the Building Department (BDS). TRACS (tracking review and construction system) documents building permits by address, the permit status , the reviewers/inspectors, notes, comments, and requirements about each building permit are archived here. GARTH is a planning department tool, which is also associated with the Building Department. GARTH is a GIS based computer program. Planners and plan reviewers can select specific locations in the city and chose among dozens of map overlays which are broken into five main categories: boundaries, environmental, land use reviews, code overlays, and transit overlays.

- Train Planning and Zoning/DSC staff to inform development applicants at the counter when their site is within a Wildfire Hazard Zone.
- Convene an ad hoc committee of City bureau staff to develop a training seminar outline and implementation schedule.

Coordinating Organization:	Bureau of Development Services,
Internal Partners:	Fire and Rescue; Bureau of Water, Portland Office of Transportation, Office of Neighborhood Involvement, Bureau of Planning
External Partners:	none
Level of Immediate Capability:	High
Estimated Timeline:	1-2 years
Plan Goals Addressed:	Build and support the capacity and commitment to continuously become less vulnerable to hazards; Promote public awareness, engage public participation, and enhance partnerships through education, outreach and coordination of a diverse and representative group of the City's population.

ST-WF#10: Conduct systematic reviews of Portland's large, publicly owned, wildland tracts regarding fire safety and ecological health to inform land management decisions.

Key Issues Addressed

- As Portland's ecosystems evolve, occasional reviews are necessary to determine if and how changing conditions affect fire risk and mitigation opportunities/needs.

Ideas for Implementation

- Assess the condition of publicly managed natural areas on a five to 10 year basis. This assessment may include computerized fire modeling.

General Comments

- Portland Park and Recreation is currently working on natural area ecosystem management plans.
- Currently, reports are reviewed by internal partners; however, there is a need for more resources to implement the land review process.

Coordinating Organization:	Portland Parks and Recreation
Internal Partners:	Bureau of Environmental Services, Fire and Rescue, Bureau of Water, Bureau of Planning, Portland Office of Transportation, Office of Neighborhood Involvement
External Partners:	none
Level of Immediate Capability:	Medium
Estimated Timeline:	1-3 years
Plan Goals Addressed:	Identify risk level and evaluate Portland's vulnerability to natural hazards.

ST-WF#11: Adopt the national "Fire Danger Rating System" and install the signs at key points in the City.

Key Issues Addressed

- This rating system is designed to remind citizens to be extra cautious during critical points in the fire season.

Ideas for Implementation

- Partner with State foresters for current readings on fire danger severity.
- Install signs at fire stations near interface areas.

Coordinating Organization:	Fire and Rescue
Internal Partners:	Office of Neighborhood Involvement
External Partners:	none
Level of Immediate Capability:	Medium
Estimated Timeline:	1-3 years
Plan Goals Addressed:	Promote public awareness, engage public participation, and enhance partnerships through education, outreach and coordination of a diverse and representative group of the City's population

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ST-WF#12: Implement a neighborhood wildland interface disaster planning program.

Key Issues Addressed

- The neighbors surrounding wildland interface areas are key partners in loss prevention. This program would involve them directly in disaster planning.

Ideas for Implementation

- Involve the existing Neighborhood Emergency Team[4] (NET) Coordinator in conducting wildland interface specific training along with further outreach to the homeowner's association.
- Recruit members of interface neighborhoods to act as block wardens, training them in the essentials of alerting the public, assisting neighbors with special needs, and commencing an orderly evacuation.

General Comments

- NET teams are presently in place trained to handle a number of wide ranging crisis situations. NET teams do not presently train on wildfire specific topics.
- NET team volunteers could possibly be used in a wide variety of wildfire mitigation measures, from educational outreach to vegetation management functions.

[4] Neighborhood Emergency Teams are composed of civilian volunteers who are trained to provide basic level disaster services in the event of an incident that outstrips the capacities of government agencies.

Coordinating Organization:	Portland Office of Emergency Management, Neighborhood Emergency Team, Office of Neighborhood Involvement
Internal Partners:	Fire and Rescue, Police
External Partners:	none
Level of Immediate Capability:	High
Estimated Timeline:	1-3 years
Plan Goals Addressed:	Promote public awareness, engage public participation, and enhance partnerships through education, outreach and coordination of a diverse and representative group of the City's population.

ST-WF#13: Review and potentially refine City contract specifications for machinery operations during "Red Flag" weather conditions.

Key Issues Addressed

- This action would reduce the fire risk associated with City sponsored projects.

Ideas for Implementation

- Review City contract specifications and provide guidance for contractors to halt the use of identified machinery during high fire danger weather conditions.
- Determine how bureau contractors could be alerted to high fire risk conditions.
- Review State and Federal guidelines for use of mechanized equipment inside of wild land areas during high danger periods of the fire season and determine if/how they might be applied in Portland.

Coordinating Organization:	Fire and Rescue
Internal Partners:	Bureau of Environmental Services, Portland Parks and Recreation, Water, Bureau of Maintenance
External Partners:	none
Level of Immediate Capability:	High
Estimated Timeline:	1-3 years
Plan Goals Addressed:	Implement activities to protect human life, property and natural systems.

ST-WF#14: Convene a standing wildland interface fire technical group.

Key Issues Addressed

- This technical group would provide an ongoing forum platform to discuss and coordinate implementation of wildfire mitigation actions across City bureaus, and ensure that such actions are reasonably and equitably applied.

Ideas for Implementation

- Key bureau representatives would convene on a regular basis to pursue priority actions such as those relating to management of City-owned lands, vegetation management policy and codes, mapping, education and training, and funding.

Coordinating Organization:	Fire and Rescue
Internal Partners:	Portland Parks and Recreation, Bureau of Environmental Services, Portland Office of Emergency Management, Bureau of Water, Portland Office of Transportation, Bureau of Development Services, Bureau of Planning
External Partners:	Multnomah County, the Oregon Department of Forestry, US Forest Service, Oregon Department of Fish and Wildlife, the US Fish and Wildlife Service, State Parks
Level of Immediate Capability:	Medium
Estimated Timeline:	1-3 years
Plan Goals Addressed:	Build and support the capacity and commitment to continuously become less vulnerable to hazards.

ST-WF#15: Index City wildfire mitigation plans and activities.

Key Issues Addressed

- Tracking current activities will help direct limited resources toward key priorities, eliminate program redundancy, and identify gaps that need to be addressed.
- Improving program efficiencies would show long term cost savings for a minimal initial investment in staff time.

Ideas for Implementation

- Index to be compiled and regularly reviewed by Wildfire Technical Group.

Coordinating Organization:	Fire and Rescue
Internal Partners:	Portland Parks and Recreation, Bureau of Environmental Services, Portland Office of Emergency Management, Portland Office of Transportation, Metro, Bureau of Development Services, Bureau of Planning
External Partners:	none
Level of Immediate Capability:	Medium
Estimated Timeline:	1-3 years
Plan Goals Addressed:	Build and support the capacity and commitment to continuously become less vulnerable to hazards.

ST-WF#16: Identify water grid engineering requirements for firefighting in wildfire areas.

Key Issues Addressed

- Presently, hydrants in new developments in the wildfire area are built to flow a minimum of 1750 gallons per minute. A large fire could cover an area that would encompass several hydrants; there is a need to identify grid-wide fire flow requirements.

Ideas for Implementation

- Representatives from the Bureau of fire should meet with Water Bureau representatives to identify State and Federal criterion/standards.

Coordinating Organization:	Bureau of Fire, Bureau of Water
Internal Partners:	none
External Partners:	none
Level of Immediate Capability:	High
Estimated Timeline:	1-3 years
Plan Goals Addressed:	Implement activities to protect human life, property and natural systems.

Long-term Action Items

LT-WF#17: Improve public education and understanding about wildfire occurrence, risk, and prevention.

Key Issues Addressed

- The public is an important partner in fire resistance and protection; as such, it is important that they are knowledgeable about fire prevention and response.

Ideas for Implementation

- Create a website using easy to understand graphics.
- Along with current building maintenance, construction upgrades, and evacuation information, update Portland Fire and Rescue brochure with technical information regarding suggested plant species and vegetation structure and tree pruning specifications for reducing the risk of wildfire damage to structures.
- Update website and brochure periodically with new information

General Comments

- This action is currently in the workplan for Portland Fire and Rescue.

Coordinating Organization:	Portland Fire and Rescue
Internal Partners:	Parks, Bureau of Environmental Service, Portland Office of Transportation, Bureau of Planning
External Partners:	none
Level of Immediate Capability:	High
Estimated Timeline:	long term
Plan Goals Addressed:	Promote public awareness, engage public participation, and enhance partnerships through education, outreach and coordination of a diverse and representative group of the City's population.

LT-WF#18: Review the feasibility of adopting portions of nationally recognized wildfire interface codes to strengthen building standards in wildfire risk areas.

Key Issues Addressed

- The wildfire interface codes are a model for requiring stricter building standards for new structures in interface areas; application of these codes to Portland might reduce fire risk.

Ideas for Implementation

- Convene a multi-bureau committee to review documents such as the Urban Wildland Hazard Zone Report & Proposal, the Urban Wildland Interface Code, and other urban wildfire management approaches to identify creative management approaches for Portland.

General Comments

- This action would require local ordinance change to state building codes through the State Building Board

Coordinating Organization:	Portland Fire & Rescue, Bureau of Development Services
Internal Partners:	none
External Partners:	none
Level of Immediate Capability:	Medium
Estimated Timeline:	3-5 years
Plan Goals Addressed:	Implement activities to protect human life, property and natural systems.

LT-WF#19: Design and conduct a study to determine the effectiveness of maintenance agreements that are established when new land divisions are approved to manage vegetation in open space tracts.

Key Issues Addressed

- This action would allow the City to determine if current maintenance agreement requirements that serve to reduce wildfire risk (e.g., vegetation management) are being implemented effectively.

Ideas for Implementation

- Consider partnership with Portland State University to conduct the study.
- Use information to update maintenance agreement specifications.

Coordinating Organization:	Bureau of Development Services, Fire and Rescue
Internal Partners:	Bureau of Planning, Parks and Recreation, Bureau of Environmental Services, Portland Office of Transportation, and the Office of Neighborhood Involvement
External Partners:	none
Level of Immediate Capability:	Medium
Estimated Timeline:	3-5 years
Plan Goals Addressed:	Identify risk level and evaluate Portland's vulnerability to natural hazards.

LT-WF#20: Complete an assessment to characterize high priority wildfire risk areas and recommend specific mitigation strategies.

Key Issues Addressed

- This action will provide information to help determine which wildfire mitigation activities will have the most beneficial impact.

Ideas for Implementation

- Develop a scope of work for the assessment and a list of mitigation activities to be evaluated including but not limited to vegetation management, construction materials, prescribed burning, etc.
- Identify potential funding sources.

Coordinating Organization:	Fire and Rescue
Internal Partners:	Parks and Recreation, Bureau of Environmental Services, Bureau of Planning, Bureau of Development Services, Bureau of Water, Portland Office of Transportation
External Partners:	none
Level of Immediate Capability:	Low
Estimated Timeline:	3-5 years
Plan Goals Addressed:	Identify risk level and evaluate Portland's vulnerability to natural hazards.

LT-WF#21: Explore avenues for funding interface home construction upgrades to low income homeowners.

Key Issues Addressed

- Several Fire Districts pay a flat fee per acre to property owners to thin and prune to guideline standards. While this is important, it is possible that upgrading the fire resistance of structures in the interface area could be as or more cost effective over the long term than paying for vegetation upkeep. Plants grow back, but construction upgrades remain.

Ideas for Implementation

- Seek information from FEMA, HUD, etc. to support program development.
- Possibly tap into funding other parts of the state receive for low income assistance for vegetation management in the wildfire interface.

Coordinating Organization:	Fire and Rescue
Internal Partners:	Bureau of Development Services, Office of Neighborhood Involvement
External Partners:	none
Level of Immediate Capability:	Low
Estimated Timeline:	3-5 years
Plan Goals Addressed:	Build and support the capacity and commitment to continuously become less vulnerable to hazards.

Wildfire Resource Directory

City Resources

Portland Fire & Rescue

PF&R provides emergency services to the City that include wildland firefighting. Coordinated efforts have helped maintain Portland's historically low incidence of urban interface fires. The Public Education Office has developed a Portland specific wildfire safety pamphlet. Wildfire safety tips, including links to related wildfire sites, are also available on PF&R's website. Finally, the Oregon Department of Forestry and the Portland City Council developed and adopted a Portland wildfire hazard map that outlines strict building requirements in hazard zones. This map can be viewed at www.portlandmaps.com.

Contact: Chief Assigned to Wildfire Issues
Fire Inspector Assigned to Wildfire Issues
Address: 55 SW Ash, Portland, OR 97204
Phone: (503) 823-3700

Urban Forestry

Title 20.40 of City code requires a permit for any tree pruning or removal of trees on any City property or right-of-way. These permits are free and available from Portland Parks & Recreation Urban Forestry Division. Other code requirements may apply to trees on other properties.

Contact: Portland Parks & Recreation, Urban Forestry Division
Address: 10910 N Denver, Portland, OR 97217
Phone: (503) 823-4489

Bureau of Development Services

BDS promotes safety, livability, and economic vitality through efficient and collaborative application of building and development codes. BDS oversees new development within the City by ensuring that adequate fire equipment access and water supplies are planned for all new subdivisions. Further, BDS ensures compliance with specific building construction requirements within Wildfire Hazard Zones. The Bureau also administers zoning requirements including tree and vegetation protection within environmental zones typically associated with wildlland/ urban interface areas.

Phone: (503) 823-7310

Bureau of Environmental Services

The Bureau of Environmental Services serves the Portland community by protecting public health, water quality, and the environment. BES protects the water quality of surface and ground waters and oversees efforts to promote healthy ecosystems in our watersheds. BES provides sewage and stormwater collection and treatment services to accommodate Portland's current and future needs.

BES Wildfire Interface Mitigation

Through its Watershed Revegetation Program (WRP), the Bureau of Environmental Services addresses wildfire interface areas by minimizing wildland fire risk as an ancillary benefit on projects identified to improve watershed health. The WRP restores function to natural areas on both public and privately-owned revegetation projects throughout the Portland Metro area.

Contact: Watershed Revegetation Program Manager (currently vacant)
Watershed Revegetation Program Supervisor (Andi Curtis)
Phone: (503) 823-7740

Portland Office of Transportation

P.D.O.T. is responsible for providing guidance and oversight for the construction and maintenance of streets to accepted standards. The standards provide for widths, grades, and other features that will allow those streets to be used as ingress and egress routes for fire suppression activities.

Portland Bureau of Maintenance

The Bureau of Maintenance is responsible for providing Portland Fire and Rescue with Water Tenders to support fire suppression activities. BOM fulfills this requirement through six 4,000-gallon tankers that are primarily assigned to street cleaning activities. In the event of a callout from BOEC dispatch, these vehicles are equipped to provide water supply to fire apparatus. In addition, the vehicles have pump and roll capacity and can be tasked to distribute AFFF fire fighting foam.

Contact: Bureau of Maintenance
Address: 2929 N Kirby Ave, Portland, OR 97227
Phone: (503) 823-1700 (24 hour service)

Contact2: Public Works Supervisor II
Phone: (503) 823-1710

City of Portland Bureau of Planning

The Bureau of Planning sets goals and creates long range plans and strategies to guide Portland's future. The bureau is responsible for maintaining and coordinating the implementation of Portland's Comprehensive Plan. The Bureau works on citywide and area-specific projects that address a range of topics such as housing, urban design, industrial and economic development, natural resource conservation, and other issues of concern to Portland. The bureau also maintains and updates Portland's Zoning Code to ensure that development regulations support the City's goals and policies. The Bureau works in close collaboration with neighborhoods, businesses, community based organizations, other city bureaus, and regional partners.

Current Comprehensive Plan goals and policies and portions of the Zoning Code directly affect factors relating to wildfire. These include

policies and codes that guide the protection of natural resources such as trees and vegetation, landscaping for new development and redevelopment projects, and provision of infrastructure such as water supply and road access when new lots are created. Future updates to the Comprehensive Plan and Zoning Code should address wildfire related issues when striving to meet multiple goals and objectives.

Contact: Environmental Division Manager
Address: 1900 SW Fourth Ave, Room 4100, Portland, OR 97201-5350
Phone: (503) 823-7700
Fax: (503) 823-7800
Website: www.planning.ci.portland.or.us

County Resources

Multnomah County Emergency Management

Multnomah County Emergency Management is the central contact point for county resources prior to and during a disaster. Multnomah County Emergency Management is responsible for the coordination of resources within the unincorporated county and the cities of Gresham, Fairview, Troutdale and Wood Village. This also includes public health, county justice system and certain road networks. The City of Portland reports to Multnomah County in a disaster through the disaster declaration process and works to coordinate programs as much as feasibly possible.

Contact 1: Director, MCEM
Address: 501 SE Hawthorne Bldv, Room 600
Phone: (503) 988-4233
Fax: (503) 988-3093
Website: http://www.comultnomah.or.us/dbcs/emergnecy_mgmt

Regional Resources

Metro Regional Government

Metro is the directly elected regional government that serves more than 1.3 million residents in Clackamas, Multnomah, and Washington counties and 24 cities in the Portland metropolitan area. Chapter 5 of Metro's Regional Framework Plan addresses natural hazards. Metro's Natural Hazards Program is a service of the Growth Management Services Department's Data Resource Center. Their web pages describe natural hazards that may impact the Portland metropolitan area and offer tools for reducing potential damages before disaster strikes. Metro produced the *Regional Hazard Mitigation Policy and Planning Guide* in 1999 to assist local governments in planning for future natural hazard events.

Contact 1: Metro Regional Government
Address: 600 NE Grand Ave, Portland, OR 97232-2736
Phone: (503) 797-1839
Fax: (503) 797-1911
Website: http://www.metro.dst.or.us/metro/growth/gms.html
Email: 2040@metro-region.org

Contact 2: Metro Data Resource Center
Website: http://storefront.metro.dst.or.us/drc/nathaz/nathaz.cfm
Email: drc@metro.dst.or.us

State Resources

Department of Land Conservation and Development (DLCD)

DLCD administers the State's Land Use Planning Program. The program is based on 19 Statewide Planning Goals including Goal 7, a standard related to natural hazards, specifically floods. DLCD serves as the federally designated agency to coordinate floodplain management in Oregon. They also conduct various landslide-related mitigation activities. In order to help local governments address natural hazards effectively, DLCD provides technical assistance and conducts workshops, reviews local land use plan amendments, and works interactively with other agencies.

Contact: Natural Hazards Program Manager, DLCD
Address: 635 Capitol St. NE, Suite 200, Salem, OR 97301-2540
Phone: (503) 373-0050
Fax: (503) 378-6033
Website: http://www.lcd.state.or.us/hazards.html

Oregon Department of Consumer and Business Services

The Building Codes Division of Oregon's Department of Consumer and Business Services is responsible for administering statewide building codes. Its responsibilities include adoption of statewide construction standards that help create buildings designed to resist flood, wildfire, wind, foundation stability, and seismic hazards. Information about wildfire-related building codes is found through this department.

Contact: Building Codes Division
Address: 1535 Edgewater St. NW, P.O. Box 14470, Salem, OR 97309
Phone: (503) 373-4133
Fax: (503) 378-2322
Website: http://www.cbs.state.or.us/external/bcd

Oregon Department of Forestry (ODF)

ODF's Fire Prevention Unit is involved in interface wildfire mitigation and provides information about Oregon's Wildfire Hazard Zones. The Protection From Fire section of the ODF website includes Oregon-specific fire protection resources. Wildfire condition reports can be accessed on the website as well. ODF's Protection from Fire Program works to do the following:

- Clarify roles of ODF, landowners, and other agencies in relation to wildland fire protection in Oregon;
- Strengthen the role of forest landowners and the forest industry in the protection system;

- Understand and respond to needs for improving forest health conditions and the role/use of prescribed fire in relation to mixed ownerships, forest fuels and insects and disease; and
- Understand and respond to needs for improving the wildland/urban interface situation.

Contact: Oregon Department of Forestry, Fire Prevention Unit
Address: 2600 State Street, Salem, Oregon 97310
Phone: (503) 945-7440
Website: http://www.odf.state.or.us/fireprot.htm

Oregon State Police (OSP)-Office of Emergency Management (OEM)

The purpose of OEM is to execute the Governor's responsibility to maintain an emergency service system as prescribed in Oregon Revised Statutes Chapter 401. These responsibilities essentially require planning, preparing, and providing for the prevention, mitigation, and management of emergencies or disasters that present a threat to the lives and property of citizens of and visitors to the state of Oregon.

Contact: Office of Emergency Management
Address: 595 Cottage Street NE, Salem, OR 97310
Phone: (503) 378-2911
Fax: (503) 588-1378
Website: http://www.osp.state.or.us/oem/

Office of the State Fire Marshal (OSFM)

The Prevention Unit of Oregon's Office of the State Fire Marshal contains 19 Deputy State Fire Marshals located in various regions. The responsibilities of these deputies include public education for local fire districts and inspection of businesses, as well as public education through schools, daycare centers, and adult foster homes. The State Fire Marshal's Community Education Services unit works to keep Oregonians safe from fires and injury by providing them with the knowledge they need to protect themselves and their property.

Contact: Oregon State Fire Marshal
Address: 4760 Portland Road NE, Salem, Oregon 97305-1760
Phone: (503) 378-3473
Fax: (503) 373-1825
Website: http://159.121.82.250/ Oregon Laws on Fire Protection: http://159.121.82.250/SFM_Admin/firelaws.htm
Email: Oregon.sfm@state.or.us

Federal Resources and Programs

Federal Emergency Management Agency (FEMA)

FEMA's mission is "to reduce loss of life and property and protect our nation's critical infrastructure from all types of hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response and recovery." FEMA Region X serves the northwestern states of Alaska, Idaho, Oregon, and Washington.

Contact: FEMA, Federal Regional Center, Region 10

Address: 130-228th St. SW, Bothell, WA 98021-9796
Phone: (425) 487-4678
Website: http://www.fema.gov/Reg-X/index.htm

Federal Wildland Fire Policy, Wildland/Urban Interface Protection

This is a report describing federal policy and interface fire. Areas of needed improvement are identified and addressed through recommended goals and actions.

Website: http://www.fs.fed.us/land/wdfire7c.thm

National Fire Protection Association (NFPA)

NFPA is the principal federal agency involved in the National Wildland/Urban Interface Fire Protection Initiative. The Association has information on the Initiative's programs and documents. Other members of the initiative include: the National Association of State Foresters, the US Department of Agriculture Forest Service, the US Department of the Interior, and the United States Fire Administration.

Contact: Public Fire Protection Division
Address: 1 Battery March Park, P.O. Box 9101, Quincy, MA 02269-9101
Phone: (617) 770-3000

National Interagency Fire Center (NIFC)

The NIFC in Boise, Idaho is the nation's support center for wildland firefighting. Seven federal agencies work together to coordinate and support wildland fire and disaster operations. These agencies include the Bureau of Indian Affairs, Bureau of Land Management, Forest Service, Fish and Wildlife Service, National Park Service, National Weather Service, and Office of Aircraft Services.

Contact: National Interagency Fire Center
Address: 3833 S. Development Avenue, Boise, Idaho 83705-5354
Phone: (208) 387-5512
Website: http://www.nifc.gov/

United States Fire Administration (USFA) of the Federal Emergency Management Agency (FEMA)

As an entity of the Federal Emergency Management Agency, the mission of the USFA is to reduce life and economic losses due to fire and related emergencies through leadership, advocacy, coordination, and support.

Contact: USFA, Planning Branch, Mitigation Directorate
Address: 16825 S. Seton Ave., Emmitsburg, MD 21727
Phone: (301) 447-1000
Website: http://www.fema.gov/mit/wfmit.htm - Wildfire Mitigation Planning
http://www.usfa.fema.gov/index.htm - USFA Homepage
http://www.usfa.fema.gov/wildfire/- USFA Resources on Wildfire

United States Forest Service (USFS)

The USFS is a federal land management organization established to manage the nation's federally owned forests. As part of the Department of Agriculture, it provides timber for people; forage for cattle and

wildlife; habitat for fish, plants, and animals; and recreation lands throughout the country. The USFS offers a possible link from local jurisdictions to federal grant programs.

Contact: USDA Forest Service - Pacific Northwest Region
Address: 333 SW First Avenue, Portland, Oregon 97204-3440;
P.O. Box 3623, Portland, OR 97208-3623
Phone: 503-808-2468
Webstite: http://www.fs.fed.us/r6/welcome.htm

Additional Resources

American Red Cross

The American Red Cross is a volunteer-led humanitarian organization that provides relief to victims of disasters and helps people prevent, prepare for, and respond to emergencies. The Oregon Trail Chapter was chartered as a Red Cross unit in 1917. The Chapter serves the residents of Clackamas, Columbia, Multnomah, Washington, Yamhill, and Tillamook counties. The Oregon Trail Chapter provides a variety of community services which are consistent with the Red Cross mission and meet the specific needs of this area including disaster planning, preparedness, and education.

Contact: American Red Cross, Oregon Trail Chapter
Address: P.O. Box 3200, Portland, OR 97208-3200
Phone: (503) 284-1234
Fax: (503) 284-4247
Email: info@redcross-pdx.org
Website: http://www.redcross-pdx.org
http://www.redcross.org/services/disaster/keepsafe/volcano.html

Institute for Business & Home Safety (IBHS)

IBHS was created by insurance industry to reduce damage and losses caused by natural disasters. This website provides educational resources and on-line publications for insurers, businesses, and homeowners who are interested in taking the initiative to minimize future damages and losses.

Contact: Institute for Business and Home Safety
Address: 1408 North Westshore Boulevard - Suite 208 - Tampa, FL 33607
Phone: (813) 286-3400
Fax: (813) 286-9960
E-mail: info@ibhs.org
Website: http://www.ibhs.org/ibhs2

FireFree Program to Promote Home Safety

In a pioneering effort to address wildfire danger in Bend, Oregon, four local agencies and a Fortune 500 corporation joined together to create "FireFree! Get In The Zone," a public education campaign designed to increase resident participation in wildfire safety and mitigate losses. Spearheaded by SAFECO Corporation, the partnership includes the Bend Fire Department, Deschutes County Rural Fire Protection District #2, Bend City Planning, and The Deschutes National Forest.

The Oregon Department of Forestry and a number of local government agencies and businesses have joined the program.

Contact: FireFree
Address: 63377 Jamison St., Bend, OR 97701
Phone: (541) 318-0459
E-mail: dcrfpd2@dcrfpd2.com
Website: http://www.firefree.org

Firewise – The National Wildland/Urban Interface Fire program

Firewise maintains a website designed for people who live in wildfire-prone areas, but it also can be of use to local planners and decision makers. The site offers online wildfire protection information and checklists, as well as listings of other publications, videos, and conferences.

Contact: Firewise
Address: PO Box 9101, Quincy, MA 02269-9101
Phone: (617) 984-7056
E-mail: firewise@firewise.org
Website: http://www.firewise.org/

Publications

National Fire Protection Association Standard 299: Protection of Life and Property from Wildfire. National Wildland/Urban Interface Fire Protection Program, (1991). National Fire Protection Association, Washington, D.C.

This document, developed by the NFPA Forest and Rural Fire Protection Committee, provides criteria for fire agencies, land use planners, architects, developers, and local governments to use in the development of areas that may be threatened by wildfire.

Contact: National Fire Protection Association Publications
Phone: (800) 344-3555
Website: http://www.nfpa.org or http://www.firewise.org

An International Collection of Wildland-Urban Interface Resource Materials (Information Report NOR-X-344). Hirsch, K., Pinedo, M., & Greenlee, J. (1996). Edmonton, Alberta: Canadian Forest Service.

This is a comprehensive bibliography of interface wildfire materials. Over 2,000 resources are grouped under the categories of general and technical reports, newspaper articles, and public education materials. The citation format allows the reader to obtain most items through a library or directly from the publisher. The bibliography is available in hard copy or diskette at no cost and is also available in downloadable PDF form.

Contact: Canadian Forest Service, Northern Forestry Centre, I-Zone Series
Phone: (780) 435-7210
Website: http://www.prefire.ucfpl.ucop.edu/uwibib.htm

Wildland/Urban Interface Fire Hazard Assessment Methodology. National Wildland/Urban Interface Fire Protection Program, (1998), NFPA, Washington, D.C.

Contact: Firewise (NFPA Public Fire Protection Division)
Phone: (617) 984-7486
Website: http://www.firewise.org

Fire Protection in the Wildland/Urban Interface: Everyone's Responsibility. National Wildland/Urban Interface Fire Protection Program. (1998). Washington, D.C.: Author.

Contact: Firewise (NFPA Public Fire Protection Division)
Phone: (617) 984-7486
Website: http://www.firewise.org

Planning for Natural Hazards: The Oregon Technical Resource Guide, Department of Land Conservation and Development (July 2000).

Produced by the Community Planning Workshop for the Department of Land Conservation and Development, this is a natural hazards planning and mitigation resource for Oregon cities and counties. It provides hazard-specific resources and plan evaluation tools. The document was written for local staffs and officials. The Technical Resource Guide includes a natural hazards comprehensive plan review, a hazard mitigation legal issues guide, and five hazard-specific technical resource guides. The guides cover flooding, wildfires, landslides, coastal hazards, and earthquakes. This document is available online. You can also write, call, or fax to obtain this document:

Contact: Natural Hazards Program Manager
Address: 635 Capitol St. NE, Suite 200, Salem, OR 97301-2540
Phone: (503) 373-0050
Fax: (503) 378-6033
Website: http://www.lcd.state.or.us/hazards.html

Burning Questions. A Social Science Research Plan for Federal Wildland Fire Management, Machlis, G., Kaplan, A., Tuler, S., Bagby, K., and McKendry, J. (2002) National Wildfire Coordinating Group.

The plan covers a wide range of topics and questions related to the human dimensions of federal wildland fire management. Both the beneficial and harmful affects of wildland fire are considered. The plan includes research in the social sciences or anthropology, economics, geography, psychology, political science, and sociology, as well as interdisciplinary fields of research. The plan is national in scale but recognizes the importance of regional variation in wildland fire issues.

Contact: Cooperative Park Studies Unit
Address: 635 Capitol St. NE, Suite 200, Salem, OR 97301-2540
Phone: (208) 885-7054
Fax: (503) 378-6033
Website: http://www.lcd.state.or.us/hazards.html

[1]Wildfire Endnotes

1 Colorado State Forest Service, (July 2001), http://205.169.13.227/depts/emmgmt/wildfireproblem.htm.

2 Portland Urban Forestry Management Plan 2004, page 55.

3 DeBano, Leonard; Neary, Daniel; Ffolliott, Peter, Fire's Effects on Ecosystems, 1998, pg. 21

4 Ibid 22

5 Ibid 22

6 Ibid 49

7 Ibid. pg. 304

8 Ibid

9 Planning for Natural Hazards: The Oregon Technical Resource Guide, (July 2000), Department of Land Conservation and Development, Ch. 7.

10 Robert Olson Associates, Metro Regional Hazard Mitigation Policy and Planning Guide, (June 1999), Metro.

11 Introductory language in Senate Bill 360, (July 2001), ODF website, http://www.odf.state.or.us/fireprot/sb360.html.

12 Planning for Natural Hazards: The Oregon Technical Resource Guide, (July 2000), Department of Land Conservation and Development, Ch. 7.

13 DeBano, Leonard; Neary, Daniel; Ffolliott, Peter, Fire's Effects on Ecosystems, 1998, pg. 59.

14 Ibid

15 Planning for Natural Hazards: The Oregon Technical Resource Guide, (July 2000), Department of Land Conservation and Development, Ch. 7.

16 Ibid.

17 Ibid.

18 The Oregonian, Feb. 25, 2001.

19 Planning for Natural Hazards: The Oregon Technical Resource Guide, (July 2000), Department of Land Conservation and Development, Ch. 7.

20 Colorado State Forest Service, (July 2001), http://205.169.13.227/depts/emmgmt/wildfireproblem.htm.

21 Oregon Department of Forestry, (1999) Oregon Forests Report.

22 Personal Interview. Jim Wolf, Oregon Department of Forestry, February 28, 2001.

23 Ibid.

24 Federal Wildland Fire Policy, (July 2001), http://www.fs.fed.us/land/wdfire7c.htm.

25 Ibid.

26 Ibid.

27 Ibid.