

WILDLAND FIREFIGHTING

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Background

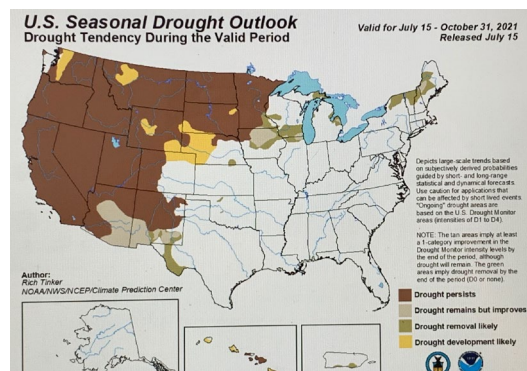
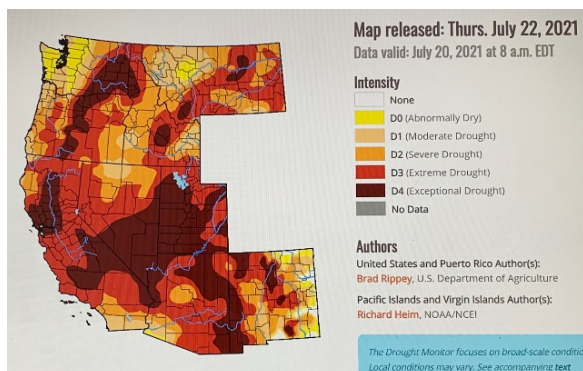
Early this summer, senior Fire Department staff identified the need to add wildland-specific personal protective equipment (PPE) to the ensemble for fire suppression personnel. Presently, only wildland coats are assigned to each seat of the fire apparatus, but they are not sized or issued to individuals. The remainder of the wildland PPE ensemble is missing (helmet, goggles, helmet shroud, head lamp, pants, gloves, boots, radio harness, fire shelter).

Issue

The need to provide a full protective wildland-specific PPE ensemble has been identified in response to the changing conditions that our firefighters are now facing. These are predominantly related to two factors: climate and vegetation (fuel). Both affect the rate-of-spread and intensity of vegetation fires. While topography is fixed, the climate conditions and fuel are changing.

Changing Conditions

Over the past two decades, the 'Fire Season' in the western United States has become year-round in many areas and has moved further north year-by-year. Larger and more serious fires are becoming more common. These fires have now reached Washington and British Columbia. Drought conditions leading to prolonged and never-ending fire seasons are now common throughout the western United States. As described by a group of national partnership agencies, including the National Oceanic and Atmospheric Administration (NOAA) the warming climate is expected to both intensify fire-friendly weather conditions, as well as lengthen the season during which very large fires tend to spread. NOAA predicts that, nationwide, the risk of very large fires will increase by a factor of six (6) by 2050. As described in the most-recent drought report published by NOAA, the area protected by the Redmond Fire Department (RFD) is experiencing abnormally dry climate with drought predicted this year.



Temperatures are also predicted to remain above normal and therefore fuel and soil moisture will be below normal. Fuel moisture is the predominant factor as temperatures rise and fall. These conditions have already become noticeable within RFD's boundaries with dead and stressed vegetation. Mature vegetation in this condition, particularly in dense stands, have the potential to develop into very large fires. This trend of warmer temperatures, drought, and increased fire activity is predicted to continue and worsen in the coming years.

Vegetation is fuel

Within the Redmond area, there are over 80 native and 40 introduced plant species. Trees within the RFD (including Fire District 34) includes mostly cedar, Douglas fir, maple, spruce, and western hemlock. Cedar trees are returning in increasing numbers following logging decades ago. With the exception of maple, these species are all conifers, meaning they have needles. When stressed and dry, these needles easily accept fire, which spreads fire rapidly due to the large collective surface area of the needles. Heavy understories of brush contribute to the fuel load and potentiate the spread of fire into trees.

All vegetation within the RFD reaches some degree of flammability during the dry summer months. In drought years, additional plant material may die, contributing to the fuel load. There will normally be enough dead fuel load that has accumulated in 20 to 30-year old brush to give rates of spread about twice as fast as in a grass fire. Under moderate weather conditions that produce a spread rate of one-half foot per second in grass, a 20- to 30-year old stand of brush may have a rate of fire spread of about one foot per second. Fire spread in old brush (40 years or older) has been measured at eight times faster than grass (4-feet per second). Under extreme weather conditions, the fastest fire spread rate in grass can be 12 feet per second or about eight miles per hour; ember showers in strong winds can spread fire even faster.

Wildland Urban Interface: Interface v. Intermix

Interface



16 or more houses per square mile and
<50% covered with wildland vegetation

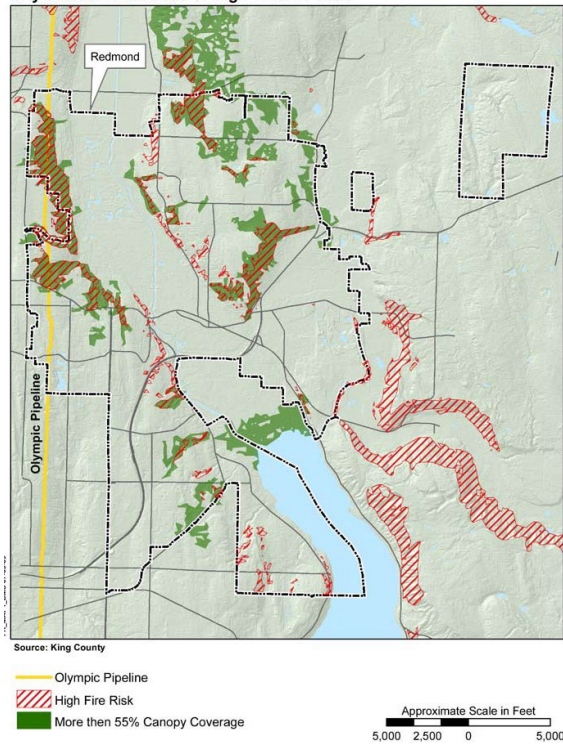
Intermix



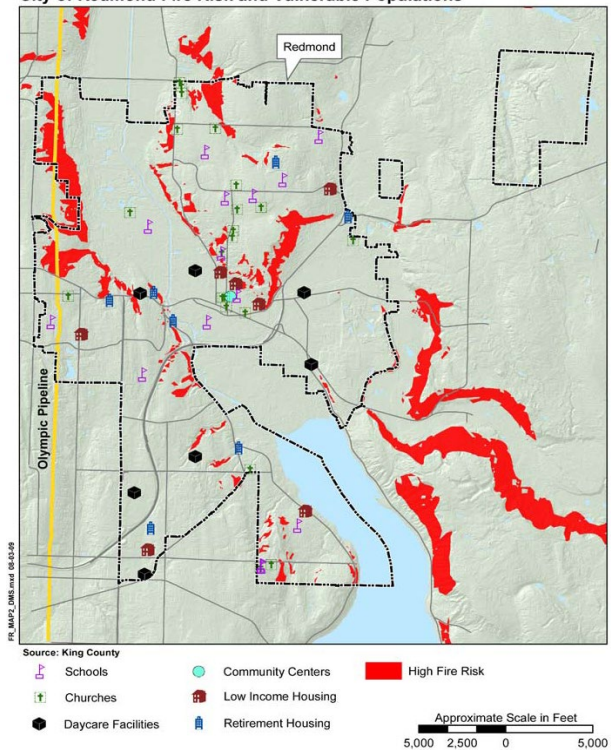
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The ability of firefighters to defend and protect structures within an interface area is much more favorable than in an intermix area. Once dense fuel burns, the opportunity to extinguish the fire and protect structures becomes extremely difficult and dangerous. As seen in the maps below from the 2008 City of Redmond Hazards Mitigation Plan Update, large areas of Redmond have both interface and intermix areas.

City of Redmond Areas of High Wildfire Risk

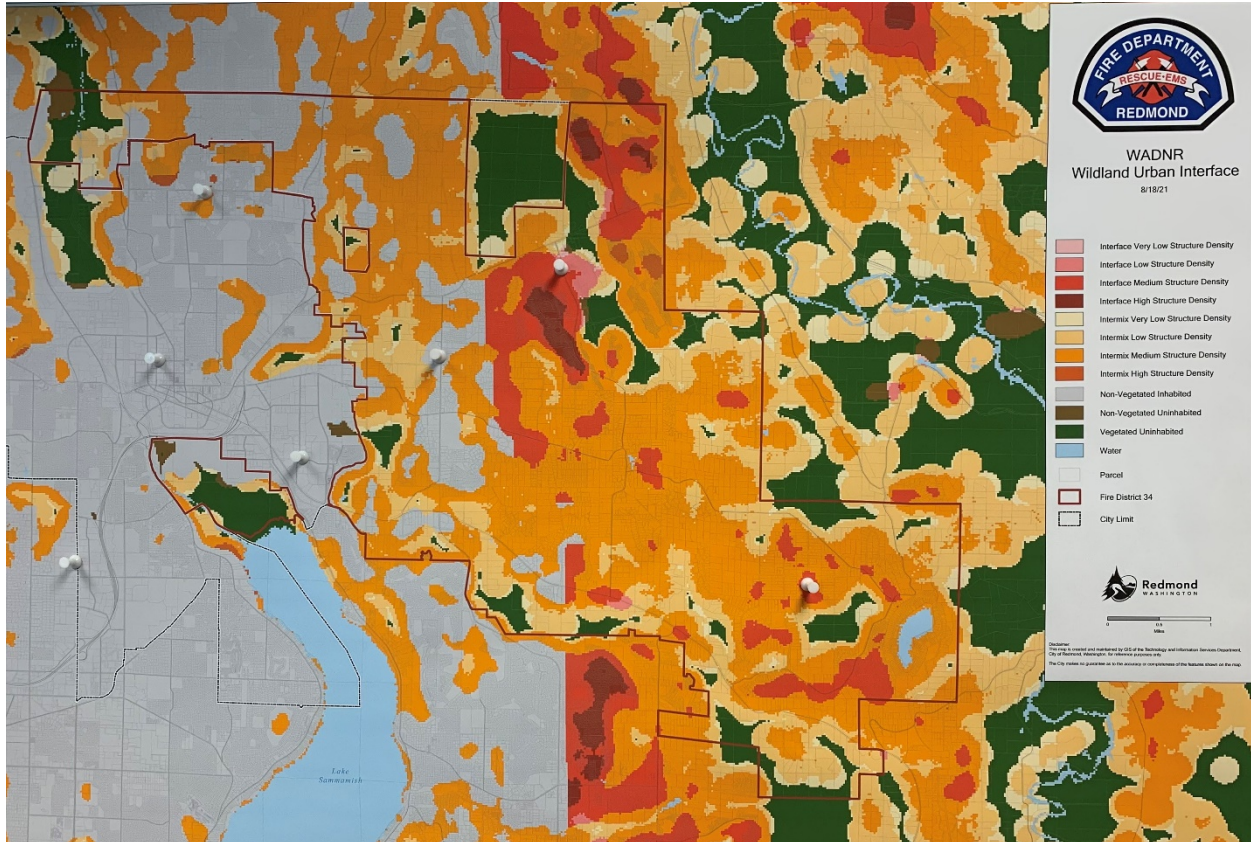


City of Redmond Fire Risk and Vulnerable Populations



As can be seen in the figures above, there are several areas with the City that are classified as intermix. Within Fire District 34, much of the area is intermix. On days when there is a strong east wind is present, a large fire that begins within the District or the east-side of the City, could spread into areas of the City that would support continued fire growth.

In 2021, the Washington State Department of Natural Resources published a statewide map, which also highlights the areas where vegetation is above and below 50% coverage. Together, these maps underscore the volume of fuel and the challenges it will create for firefighters during dry months. Regardless of the 2008 assessment of fire risk and the conclusions that can be drawn from the 2021 map, the volume of fuel will largely remain.



Major Fires

Major fires are becoming more frequent throughout the northwest as temperatures increase and fuel moistures become lower. When strong winds are introduced, these conditions not only lead to rapidly spreading fire in grass and brush, but also have the potential to climb dead tree limbs (ladder fuels) and become established in the tops of trees, becoming a crown fire. This leads to a conflagration. When this happens, only a significant change in weather or a very large natural barrier will stop the fire. The figure below, depicts the types of wildland fires.



Residential structures within the wildland intermix or interface are therefore at greater threat from a wildfire. Protecting these structures poses a great risk to firefighters. Providing the appropriate PPE ensemble will give the firefighters the best chance to successfully defend and protect structures and extinguish the fires without experiencing a heat emergency or other serious injury. Washington State Administrative Code 296-305-07012,7 limits wildland firefighting time in structural firefighting PPE to one hour. RFD has reached the time where fires have and will continue to extend beyond an hour on a more frequent basis.

Summary

With the changes in climate, the RFD now has a need for full wildland PPE. Staff has received quotations from several vendors, but each cannot provide all the necessary equipment. Therefore, the budget proposal includes several vendors, each representing the lowest price for the same equipment.