Technical Guide: Mapping Wildfire Hazard to Structures and Other Human Development to Support Implementation of Oregon's 2023 Senate Bill 80

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PURPOSE

This document describes how scientists at Oregon State University (OSU) mapped wildfire hazard in Oregon as required by 2023 Senate Bill 80 (SB 80). The methods, data and figures in this document are updated as of April 18, 2024.

This technical guide is intended as a reference for state agencies and the public. All of OSU's data products, including the statewide hazard map, will be publicly available on the Oregon Wildfire Risk Explorer (https://oregonexplorer.info/wildfirerisk). Questions about this document or any other wildfire risk and hazard data produced by OSU can be directed to osuwildfirerisk@oregonstate.edu.

BACKGROUND

Senate Bill 762, enacted in 2021, was an omnibus bill which advanced a suite of wildfire programs collectively aimed at helping Oregon's communities and landscapes adapt to a changing fire environment. Under Senate Bill 762, OSU is responsible for developing a comprehensive statewide hazard map. Aspects of the directing legislation were subsequently amended in 2023 Senate Bill 80.

Senate Bill 80, Section One (Appendix A) states that the purposes of hazard map are to:

1. **"Educate Oregon residents and property owners about the residents' and property owners' wildfire exposure by providing transparent and science-based information."**
    - To achieve this purpose, Oregon State University was directed to create a hazard map "based on weather, climate, topography, and vegetation." Only those four criteria are to be considered.
    - Each property in Oregon will be assigned to one of three possible hazard classes: low, moderate, or high.
2. **"Assist in prioritizing fire adaptation and mitigation resources for the most vulnerable locations."**
    - To achieve this purpose, state agencies are directed to use the hazard map to "direct resources for wildfire hazard reduction and wildfire resiliency to those most in need; and assist with identifying communities for extensive, targeted engagement and outreach related to wildfire hazard reduction and wildfire resiliency."
3. **"Identify where defensible space standards and home hardening codes will apply."**
    - To achieve this purpose, the Oregon State Fire Marshal and the Department of Business and Consumer Services, Building Codes Division are directed to use the hazard map in conjunction with the wildland-urban interface map to apply defensible space and home hardening codes to structures that are both in the wildland-urban interface *and* classified as high hazard.

Senate Bill 80, Section 1 (4)(b) further specifies that the hazard map be "Based on weather, climate, topography and vegetation" only. Oregon State University coordinated with Pyrologix LLC, the Oregon Dept. of Forestry, and fire and fuels subject matter experts from around the state to create the initial draft wildfire hazard map (released in summer 2022, then called the statewide "risk map"). That hazard map leveraged state of the art wildfire simulation methods, peer-reviewed datasets, and extensive input from on-the-ground fire and fuels professionals. Following the release of that map, OSU and received tremendous feedback and recommendations to review the data, methods and results. That initial map was rescinded in August 2022.

Since then OSU has convened multiple working groups consisting of wildfire risk scientists, fire and fuels professionals, local land managers, planners and others to review the feedback and make appropriate changes. As a result of the feedback, OSU and Pyrologix LLC changed the way that certain types of vegetation were represented in the simulation models and re-calculated hazard. The changes resulted in updated estimates of burn probability and fire intensity, and resulted in lower hazard on over 1.5 million acres, largely in rural and agricultural areas.

Subsequently, the Oregon Dept. of Forestry convened a Rulemaking Advisory Committee (RAC) to make recommendations on specific ways to adjust in the hazard map that reflect hazard mitigating qualities of irrigated agriculture. The RAC recommended that adjustments be made to hazard calculations for any agricultural field which has been irrigated in at least one of the last five years. Those adjustments were incorporated into the updated burn probability and fire intensity data described above, and collectively used to calculate a new draft hazard map.

This technical guide is focused on the methods and data used in development of the statewide hazard map. Researchers at OSU worked collaboratively with the Oregon Dept. of Forestry, stakeholders, fire and fuels professionals, land managers and subject matter experts to develop a science-based, objective approach to characterizing wildfire hazard in Oregon.

Methods for Mapping Statewide Wildfire Risk

Overview

Wildfire hazard is a quantitative, spatial representation of the potential for wildfire to cause social or economic degradation, including injury or death (UNODRR, 2015). Wildfire hazard is a combination of wildfire likelihood (“burn probability) and fire behavior (“fire intensity”).

Wildfire intensity is a measurement of the amount of energy produced by a fire, frequently reported as “flame length.” Fire intensity is driven by several factors including weather, topography, and fuel characteristics. It is an important characteristic of wildfire hazard because varying intensities can lead to different impacts to structures. Sometimes wildfire hazard is expressed only as the condition of wildland fuel (e.g., Hardy, 2005), but this ignores other contributing factors (i.e., climate, weather and topography), and discounts the importance of the likelihood of experiencing a wildfire.

Wildfire likelihood, or burn probability, is the average annual likelihood that a specific location will experience wildfire. Burn probabilities are reported as fractions which can be thought of as the percent chance of fire occurring in any given year. For example, a burn probability of 0.01 indicates that a fire is expected once every hundred years on average, or, alternatively, there is 1% chance of a fire occurring in any given year. These probabilities represent long-term averages and are not forecasts or predictions of where fire is going to occur in a specific year. When combined with information about fire intensity, burn probabilities help communicate which landscapes are more likely to actually experience the hazard.

Modelling Burn Probability and Intensity

Fire modelling was performed by Pyrologix LLC[3], a fire behavior modeling company that has been a leader in wildfire risk analytics for 20 years. The modelling was an iterative process and intermediate results were reviewed by local fire and fuel professionals from around Oregon.

Estimating Burn Probability

Pyrologix modeled burn probability using the large fire simulator, FSim (Finney et al., 2011). FSim is a comprehensive fire occurrence, growth, behavior, and suppression simulation system that uses locally relevant fuel, weather, topography, and historical fire occurrence information to generate 10,000 simulations of plausible fire seasons. Fire seasons were simulated on a modeling landscape that represented 2022 conditions, including historical fuel disturbances (e.g. wildfires, some hazardous fuel treatments, etc.) through 2021. (Finney et al., 2011). FSim has been used in a similar way to support other regional and national wildfire risk prioritization strategies (e.g. Day, 2020; Gilbertson-Day et al., 2018; U.S. Department of Agriculture, Forest Service, 2022).

Pyrologix simulated 10,000 plausible fire seasons at 120-meter resolution. They calculated burn probability by counting the number of times each pixel was intersected by simulated fire and then dividing that count by 10,000. Results were up-sampled to 30-meter resolution (Figure 1).

Estimating Wildfire Intensity

Pyrologix LLC modeled fire intensity using the Wildfire Exposure Simulation Tool (WildEST). WildEST is a simulation system similar to FSim, but specifically designed to simulate wildfire behavior under a range of weather types (wind speed, wind direction, fuel moisture content). These WildEST results were completed on the 2022 current-condition fuelscape (derived from LANDFIRE), which reflects fuelscape conditions for the year 2022 and includes all historical fuel disturbances through 2021. Pyrologix developed 216 weather scenarios based on unique combinations of wind speed, wind direction and fuel moisture sampled from observed weather records.

Wildfire behavior was simulated under each weather scenario, producing fire intensity level probabilities (represented as flame lengths) based on the average flame length from simulations and the relative likelihood of each weather scenario. At any given location, fire intensity may vary based on the weather conditions under which the fire is growing. Accordingly, WildEST results are expressed as the probability that flame lengths will be within a specific Fire Intensity Level (FIL), given that a fire occurs (Figure 2):

- FIL1: 0-2 ft. flame lengths
- FIL2: 2-4 ft. flame lengths
- FIL3: 4-6 ft. flame lengths
- FIL4: 6-8 ft. flame lengths
- FIL5: 8-12 ft. flame lengths
- FIL6: > 12 ft. flame lengths

[3] http://pyrologix.com/

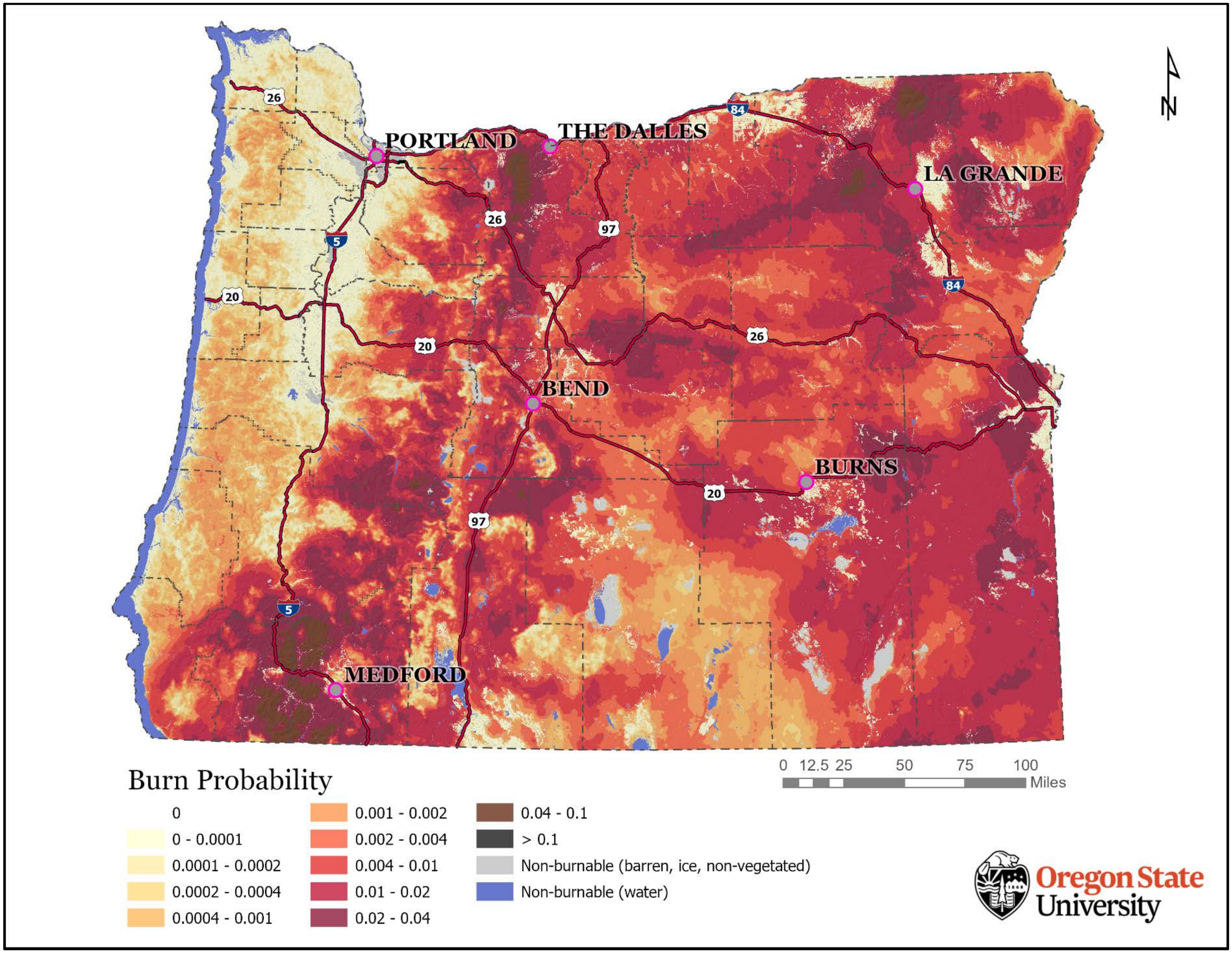

Figure 1. Modeled burn probability across Oregon.

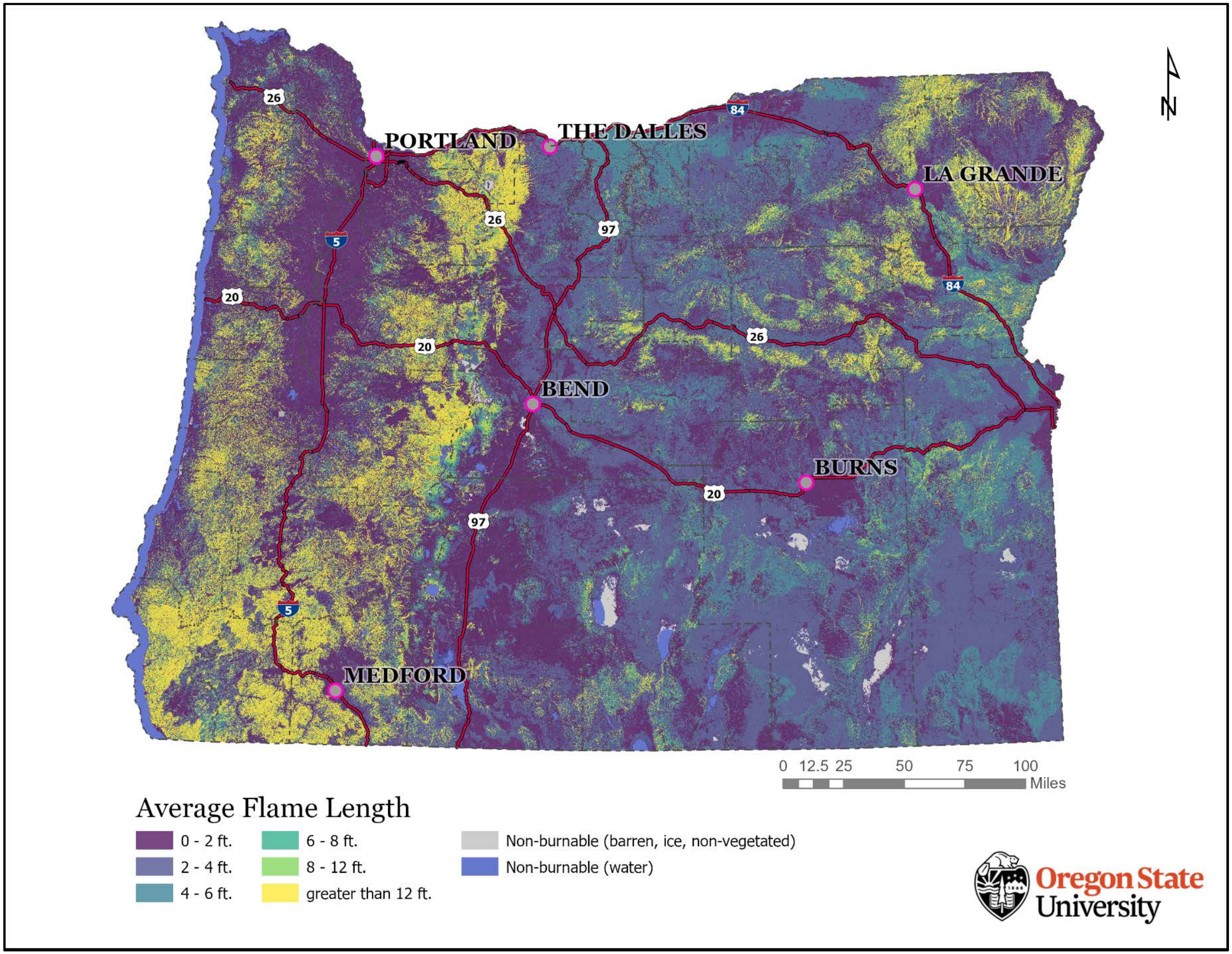

Figure 2. Modeled weighted average flame lengths across Oregon.

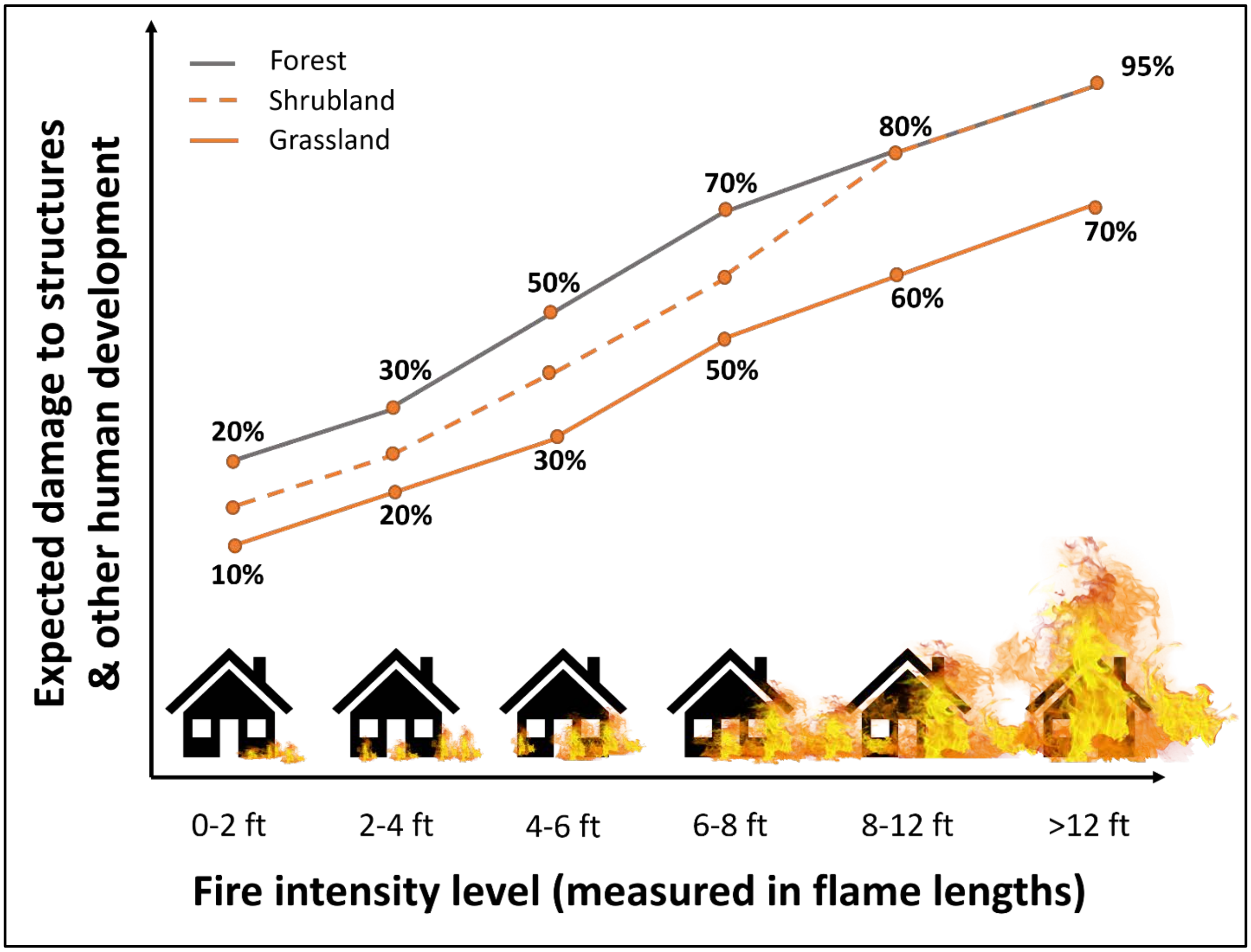

Figure 3. Fire Intensity Modifiers used to translate flame lengths into a value that is multiplied with burn probability to calculate hazard. The Fire Intensity Modifiers represent the ways in which fire intensity across different fuel types impacts the level of potential damage and opportunities to effectively mitigate (i.e., suppress) the hazard when a fire occurs.

Before calculating wildfire hazard, fire intensities were transformed to fire intensity modifiers (Figure 3). Fire intensity modifiers are a way of expressing fire intensity on a scale 0 – 100 and accounting for differences in hazard resulting from different fuel types (i.e. grass, shrub, timber). At each location, Pyrologix calculated the weighted average flame length using the six FIL outputs, and then assigned a corresponding fire intensity modifier based on the relationships represented in Figure 3.

Adjusting for Irrigated Agriculture

During development of the statewide wildfire hazard map, there was a strong sentiment that the map would be improved if it accounted for mitigating effects of irrigated agriculture. The issue of whether and how to account for irrigated agriculture was the primary subject of A Rulemaking Advisory Committee (RAC) which met three times in March and April of 2024. Representation on the RAC included county commissioners, county planning directors, members of the Wildfire Programs Advisory Council and others. Special guest from the Oregon Farm Bureau and Cattleman’s Association participated as well. The RAC recommended that any location in Oregon which was identified as irrigated in at least one of the most recent five years' data ought to be considered irrigated and the corresponding hazard components should be adjusted.

We identified irrigated fields using IrrMapper data (Ketchum et al., 2020). IrrMapper uses over 130 different climate, weather, and vegetation variables to estimate the distribution of irrigated crop fields for every year from 1986 to 2021 across the western United States. Using data from 2017 – 2021 we selected all locations that were irrigated in at least one of those years and then clipped the irrigated selection to mapped crop fields provided by the Oregon Water Resources Department. The result was spatial mask (30-meter resolution) that delineated the extent of agricultural fields in Oregon which had been irrigated in at least one of five years.

Using that irrigated agricultural mask, we adjusted burn probability and fire intensity modifier values at the corresponding locations. We decreased burn probability to 0.0001 and set the fire intensity modifier value to 10. All other burn probability and fire intensity modifier values outside the mask were not adjusted.

Calculating Hazard

We first calculated hazard for each pixel before summarizing hazard across tax lots. In ArcPro, we calculated pixel-level hazard by multiplying burn probability times the spatially coincident fire intensity modifier. Then, using the 'zonal statistics as table tool' we calculated the average hazard value across all pixels in each tax lot. We attributed each tax lot with the average hazard value. Where tax lots were too small or did not include a pixel center, the 'zonal statistics as table tool' failed. In that case, we used the 'feature to point' tool to convert tax lot centroids to points and then used 'extract values to point' to find the underlying hazard value and attributed that as the tax lot hazard value.

We assigned each tax lot to a hazard zone based on the average hazard value and the following hazard value thresholds:

- High Wildfire Risk: hazard value ≥ 0.137872. This range of values represents approximately the 90th percentile and above of hazard values within the wildland-urban interface.
- Moderate Wildfire Risk: hazard value ≥ 0.001911 - 0.137872. This range of values represents approximately the 40th – 90th percentile of hazard values within the wildland-urban interface.
- Low Wildfire Risk: hazard value < 0.001911. This range of values represents hazard values at the 40th percentile and below of hazard values within the wildland-urban interface.

Summary

The draft wildfire hazard map designates 159,314 tax lots as high hazard. However, just 100,284 of those are partially or wholly within the WUI. In other words, just 5.5% of all tax lots in Oregon meet the dual criteria of being high hazard and at least partially in the WUI and therefore could be subject to defensible space or fire hardening codes.

Ongoing Work

OSU continues to work with counties and the public to identify anomalies in the data and work towards finalizing the map.

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Frequently Asked Questions

Why is OSU making a wildfire hazard map?

In 2021 and 2023, the Oregon legislature passed a series of bipartisan bills to help people living in Oregon improve their wildfire preparedness. As a trusted, non-biased source of wildfire risk information, OSU was directed to develop a map of wildfire hazard for each property across the state using four criteria: climate, weather, topography, and vegetation.

Where can I find the statewide wildfire hazard map?

The statewide wildfire hazard map will be publicly available on Oregon Explorer, which serves as a place for individuals, agencies, Tribes, and organizations to access mapping tools and resources relevant to natural resources decision making. Since 2007, the Oregon Explorer, a program of the Institute of Natural Resources at Oregon State University and OSU Libraries and Press, has been a public source of geospatial data and wildfire risk information used in state, regional and local risk management applications.

What's the difference between this wildfire hazard map and other hazard and risk maps in Oregon?

Oregon is fortunate to have an abundance of wildfire risk-related planning data and assessments, but it's important to remember that each assessment and dataset was developed to meet a specific objective. In other words, all risk assessments are a little different and the differences matter.

Oregon's statewide wildfire hazard map was specifically designed to meet the requirements and needs described in Senate Bill 762 (2021) and Senate Bill 80 (2023). These bills provide direction and investment to multiple state agencies to help improve wildfire preparedness across the state. As part of Senate Bill 762, Oregon State University was directed to create a wildfire risk map based on rule adopted by the Board of Forestry and four environmental criteria: climate, weather, topography, and vegetation. In 2023, Senate Bill 80 adjusted the direction on some of the statewide wildfire mitigation measures in SB 762, including the development of a statewide wildfire hazard map (rather than a wildfire risk map) with revised hazard zone classifications. While Senate Bill 762 described the development of a wildfire risk map, in reality the map has always technically been a wildfire hazard map because of the four criteria required to make it. Senate Bill 80 made this correction in wording.

Oregon state agencies will refer to the statewide wildfire hazard map and the WUI map when fulfilling their responsibilities in Senate Bill 80. The data and methods used by OSU scientists were carefully selected to meet the needs of state agencies based on current available data, peer-reviewed science, and guidance from Rulemaking Advisory Committees (RACs) organized by Oregon Department of Forestry (ODF). Other hazard maps that exist were likely developed for different objectives and therefore used different data and methods. In most cases, it would not be appropriate to directly compare results from one hazard map to another unless the same specific methods were used in both.

What is wildfire hazard?

Wildfire hazard is the combination of how likely a wildfire is to occur in a specific location (burn probability) and how much heat energy the fire gives off ("fire intensity"). For more details on wildfire hazard, visit Understand the Map.

How is burn probability determined?

Burn probability represents the annual probability of a wildfire occurring at a specific location, and, along with fire intensity, burn probability is included in the wildfire hazard calculation.

Burn probability was evaluated using best available science, state of the art wildfire simulation models and expert knowledge from local fire and fuel professionals. The simulation models incorporate spatial data about climate, weather, topography, vegetation, and characteristics of historical fire occurrence. A simulation model is a computer representation of objects, systems, or events that can be used as a tool to help explain or predict the behavior of real systems. Scientists ran 10,000 simulations of plausible fire seasons to capture the enormous variation in where and when fires could ignite and how they could spread across the landscape. Burn probability was calculated by counting the number of times a given location was impacted by simulated fires and dividing that count by the total number of simulated seasons (i.e. 10,000).

Burn probabilities are represented as decimals. For instance, a burn probability of 0.005 is equivalent to saying that in any given year there is a 0.5% chance of wildfire occurring in that location. Burn probabilities are not forecasts of where wildfires will occur in any specific year but are instead long-term average probabilities. Those long-term averages help scientists and managers prioritize mitigation work in landscapes and communities that are most likely to experience a wildfire.

How is fire intensity determined?

Wildfire intensity represents the amount of heat produced by a wildfire and, along with burn probability, is included in the wildfire hazard calculation. Wildfire intensity is an essential component of hazard because varying intensities can lead to different impacts to structures and therefore different levels of hazard.

Similar to burn probability, wildfire intensity is evaluated using best available science, state of the art wildfire simulation models, and expert knowledge from local fire and fuel professionals. The models incorporate spatial data describing climate, weather, topography, vegetation, and characteristics of historical fire occurrence. A simulation model is a computer representation of objects, systems, or events that can be used as a tool to help explain or predict the behavior of real systems. Scientists simulated wildfire behavior under 200 different weather scenarios to capture the range of fire intensities and their relative likelihood at all locations in Oregon. Any location could experience varying fire intensities because all locations experience a range weather severity throughout fire season. So, fire intensity at any given location is calculated as the average fire intensity experienced at that location across all simulations.

Fire intensity is represented as flame lengths. The greater the flame lengths, the greater the intensity and the more opportunity for damage to structures.

What data sets are used to determine burn probability and fire intensity?

Burn probability and fire intensity were both modeled using best available science and data describing climate, weather, topography, and vegetation. To model burn probability and fire intensity, researchers used a collection of spatial datasets that characterize Oregon’s vegetation during the 2022 fire season and how those vegetation characteristics might affect fire behavior. The models consider the amount and type (e.g. timber, grass, shrub) of vegetation as well relevant characteristics like the amount of litter, canopy density, canopy height and other factors that influence fire behavior. These spatial datasets are generally available from LANDFIRE, but were modified based on the input of more than 50 fire and fuels specialists from across Oregon to more accurately reflect conditions on the ground.

Within the simulation models, scientists used observed weather data (2007 – 2021) collected from Remote Automated Weather Stations around Oregon.

How will a recent wildfire impact wildfire hazard values?

Recent wildfires will have variable impacts on property-level hazard values according to the proximity of the fires to the property in question, how long ago they happened, in what kind of vegetation the fires burned and where in the state they occurred. On one hand, a recent wildfire can reduce the amount of fuel available to future fires in the same area, thereby reducing intensity. Reduced intensity can lead to a lower hazard rating. Similarly, where a previous fire burned (called a "fire footprint") can affect fire spread and may result in fewer fires reaching the property in question, again resulting in a lower modeled risk. On the other hand, as a burned area re-vegetates and recovers the new vegetation may actually be more flammable, leading to more fires, faster spread, and higher intensity, with an overall increase in hazard.

Importantly, the modeled reduction in fire intensity and fire spread in recently burned areas does not last forever. The hazard map will be updated at least every five years, and each time the landscape will be updated to account for changes in vegetation, including vegetation that may have regrown in historic fire footprints.

How is a property-level wildfire hazard rating calculated?

Wildfire hazard is the combination of how likely a wildfire is to occur in a specific location (burn probability) and how much heat energy the fire gives off ("fire intensity"). Researchers at OSU worked with the nation's leading fire modeling experts as well as local fire experts to model and map burn probability and fire intensity all across Oregon. A simulation model is a computer representation of objects, systems, or events that can be used as a tool to help explain or predict the behavior of real systems. Burn probability and fire intensity are first modeled on 30-meter rasters across all of Oregon. Rasters are a way of representing spatial data in a uniform grid. In this case, all of Oregon is represented by a grid comprised of cells (called "pixels") that are each 30 x 30 meters. Burn probability and fire intensity were calculated at each pixel and then combined to calculate hazard at each pixel. To calculate property-level hazard values, researchers averaged all the pixel-level hazard values from pixels within each property. Based on the property-level average hazard value, each property was assigned to one of three zones: Low, Moderate or High Hazard.

For details on how wildfire hazard was mapped, visit Understand the Map.

Why does my property have a different hazard rating than my neighbor's?

Property hazard values might differ among neighbors for many reasons, some of which are observable on the ground. Differences in the amount and type of combustible vegetation on and around the property can affect fire hazard calculations. For instance, the fuels adjacent to one neighbor's structure may be more timbered than the fuels adjacent to another neighbor's structure, resulting in higher modeled fire intensity and therefore higher hazard. Or, neighboring tax lots might be in different hazard classes because one tax lot is situated closer to an adjacent large area of flammable vegetation, elevating the burn probability compared to the other tax lot.

However, property hazard values are also affected by landscape-level processes which are not observable when looking at the property itself. For instance, landscape features like ridges and hillsides might shelter one property more than another from local winds – and therefore when fires occur they are pushed away from the sheltered property and towards its neighbor more often than not. These kinds of features are not always visually obvious, but over the course of 10,000 simulations the result is that the sheltered property has a lower burn probability than its neighbor and could have a lower hazard value as well. Topography, landscape features (e.g. water bodies), and vegetation can all interact in ways that are not immediately visible from a single property, but which create local conditions (i.e. microclimates) that either raise or lower burn probability and fire intensity.

Does a property's hazard rating account for the creation and maintenance of defensible space?

Defensible space is the buffer that can be created between a structure and the grass, trees, shrubs, or any wildland area that surrounds it. The statewide wildfire hazard map does not incorporate the status of defensible space on a property—in other words, any work that has been done to create a buffer around a structure when determining the property-level hazard rating. This is because Senate Bill 80 specifically directs OSU to consider only four criteria: climate, weather topography and vegetation. Further, there is no adequate statewide spatial dataset that documents unique defensible space characteristics of each and every structure in Oregon.

Does a property's hazard rating account for fire hardening?

The statewide wildfire hazard map does not consider fire hardening characteristics when determining the property-level hazard rating. Fire hardening refers to using building materials and practices that can reduce the hazard of a structure becoming ignited by embers from wildfires. The primary reason that pre-existing fire hardening is not considered when determining property-level hazard is that Senate Bill 80 specifically directs OSU to consider only four criteria: climate, weather topography and vegetation. Fire hardening conditions do not fit into those four criteria. Further, there is no adequate statewide spatial dataset which might be used to consider the unique fire hardened characteristics of each and every structure in Oregon.

Is it possible to reproduce my property's hazard value with the information available on the Oregon Explorer?

No. Working with the hazard input data and calculating property-level hazard values requires access to and knowledge of how to use specialized spatial analysis software.

Although the Oregon Explorer presents property-level average hazard values, hazard can vary across a single tax lot. In fact, depending on the size of the property, where it's located and how the property is managed, hazard can vary tremendously from one part of the property to another. That's why researchers at OSU calculate hazard at a very fine scale using a 100' by 100' grid across all of Oregon before determining property-level average hazard values. In other words, all of Oregon is divided into uniform cells ("pixels") that are each approximately 100' by 100'. Researchers generate estimates of burn probability and fire intensity for each pixel and then calculate hazard for each pixel. Property-level hazard values represent the average of all the pixel-level hazard values from pixels within the property boundaries.

Depending on the size of the property, there could be hundreds or thousands of pixels representing variation in hazard across a single property. Reproducing property-level hazard values requires that those many pixel-level hazard values be averaged within a specific tax lot boundary using spatial analysis software.

Where can I find my property's wildfire hazard rating?

A map of wildfire hazard across the entire state will be publicly available on the Oregon Explorer once an updated map is produced in 2024. Future updates to the map will continue to be available on the Oregon Explorer.

Glossary

Building Footprint: A digital representation of a structure or other human development derived from satellite images.

Burn Probability: The probability that a wildfire will burn a specific location over a specified period of time. The SB762 risk map presents annual burn probability. Burn probability is usually expressed as a value between 0 and 1.

Fire Intensity: The amount of energy produced at the flaming front of a fire. Fire intensity is frequently expressed as flame length, where longer flame lengths indicate greater intensity.

Flame Length: The length of the flame measured at the front of the fire. Flame length is used as a measurement of intensity and is estimated from wildfire behavior models.

Fuel: anything that can burn and provide energy to a wildland fire, including live or dead vegetation and human-made materials. Fire behavior is affected by the type, amount, and arrangement of fuels. For the purposes of fire modeling, vegetation is usually represented as fuels to characterize how the existing vegetation might actually influence fire behavior.

Fuel Model: A general description of combustible vegetation that allows for a realistic estimate of wildfire behavior. Fuel models can be defined in the field and have also been incorporated into nation-wide map with a 30m resolution. Fuel models are useful tools for planning prescribed fuel treatments.

Other Human Developments: Essential facilities (ORS 455.447) that support community functions, public communication, energy and transportation in excess in size 400 square feet.

Structure: A permitted building on a lot that is used as a place where one or more people sleep.

Topography: the physical features of the landscape. Usually represented by slope, elevation and aspect (direction that a slope faces). Topography influences fire occurrence and behavior in many ways. For instance, topography influences microclimates which might be more or less susceptible to fire. And, elevation and slope have a strong influence on wind speed and direction.

Vegetation: Live plant matter, often described in terms of dominant species – e.g. white oak woodlands, or ponderosa pine forest. Vegetation is closely linked to fuel, but unlike fuel, the term vegetation does not usually represent the ways in which plant matter might influence fire behavior.

Wildfire Hazard: the potential for harm or damage to resources and assets. Wildfire hazard at any single location is calculated by multiplying burn probability and fire intensity.

Appendix A

82nd OREGON LEGISLATIVE ASSEMBLY--2023 Regular Session

Enrolled
Senate Bill 80

Printed pursuant to Senate Interim Rule 213.28 by order of the President of the Senate in conformance with presession filing rules, indicating neither advocacy nor opposition on the part of the President (at the request of Senate Interim Committee on Natural Resources and Wildfire Recovery)

CHAPTER ....

AN ACT

Relating to wildfire; creating new provisions; amending ORS 215.495, 431A.410, 431A.412, 455.612, 476.392, 476.396, 476.690, 477.027, 477.490, 477.748 and 526.360 and sections 11 and 12d, chapter 592, Oregon Laws 2021; and declaring an emergency.

Be It Enacted by the People of the State of Oregon:

STATEWIDE WILDFIRE HAZARD MAP

SECTION 1. ORS 477.490 is amended to read:

477.490. (1) The State Forestry Department shall oversee the development and maintenance of a comprehensive [*statewide map of wildfire risk*] **statewide wildfire hazard map** that displays the wildfire [*risk classes*] **hazard zones** described in subsection [*(4)*] **(5)** of this section and populates the Oregon Wildfire Risk Explorer.

(2) The purposes of the map are to:

(a) Educate Oregon residents and property owners about the residents' and property owners' wildfire exposure by providing transparent and science-based information.

(b) Assist in prioritizing fire adaptation and mitigation resources for the most vulnerable locations.

(c) Identify where defensible space standards and home hardening codes will apply.

[*(2)*] **(3)** The Oregon Wildfire Risk Explorer must be the official wildfire planning and [*risk*] **hazard** classification mapping tool for the State of Oregon.

[*(3)*] **(4)** The State Board of Forestry shall establish by rule criteria by which the map must be developed and maintained, including criteria concerning the use of the most current wildfire assessments.

[*(4)*] **(5)** In consultation with Oregon State University, the department shall establish [*five*] **three** statewide wildfire [*risk classes of*] **hazard zones that are titled** [*extreme,*] high, moderate[,] **and** low [*and no risk*] **hazard zones**. The [*classes*] **zones** must be:

(a) Consistent with ORS 477.027.

(b) Based on weather, climate, topography and vegetation.

[*(5)*] **(6)** The department shall enter into an agreement with the university that provides that the university will develop and maintain the map and make the map publicly available in electronic form through the Oregon Wildfire Risk Explorer.

[*(6)*] **(7)** The board shall adopt rules that:

(a) Provide opportunities for public input into the assignment of properties to the wildfire [*risk classes*] **hazard zones** described in subsection [*(4)*] **(5)** of this section.

(b) Require the department to provide notice and information **to a property owner whose property is assigned to the high hazard zone within the wildland-urban interface, as defined pursuant to ORS 477.027, about the fact that the property has been assigned to the high hazard zone, the effects of the assignment and** [*about*] how [*a*] **the** property owner may appeal [*an*] **the** assignment of the property owner's property to the [*extreme or*] high [*wildfire risk class*] **hazard zone**.

(c) Allow affected property owners and local governments to appeal the assignment of properties to the wildfire [*risk classes*] **hazard zones** after the map is developed, after any updates to the map and within a reasonable time after delivery of the notice and information described in paragraph (b) of this subsection.

[*(d) Establish a specific process for appeals through which a requested change in assignment is assessed based on:*]

[*(A) Whether the assignment is consistent with the criteria described in subsection (3) of this section;*]

[*(B) Any pertinent facts that may justify a change in the assignment; and*]

[*(C) Any error in the data the department used to determine the assignment, if the error justifies a change in the assignment.*]

(d) Provide that assignments of properties to the high hazard zone may be appealed as a contested case as described in ORS chapter 183.

(8) Before sending notices described in subsection (7)(b) of this section, the department shall seek review of the notices by the Wildfire Programs Advisory Council to receive council recommendations concerning tone, clarity of language and presentation of information.

[*(7)*] **(9)** The map must:

(a) Be based on the wildfire [*risk classes*] **hazard zones**.

(b) Be sufficiently detailed to allow the assessment of wildfire [*risk*] **hazard** at the property ownership level.

(c) Include the boundaries of the wildland-urban interface, as defined in ORS 477.015, consistent with national standards.

(d) Include a layer that geospatially displays the locations of socially and economically vulnerable communities.

(e) Be completed and released expeditiously, following the collaboration described in subsection (10) of this section.

[*(8)*] **(10)** To develop and maintain the map, **the department and** the university shall collaborate with [*the department,*] the State Fire Marshal, other state agencies, local governments, federally recognized Indian tribes in this state, other public bodies and any other information sources that the university deems appropriate.

(11) In implementing subsections (7)(a) and (10) of this section, the department and the university shall provide for robust community engagement through a process that:

(a) Ensures, through the use of clear language, graphics, visuals and examples, that the underlying criteria for assigning hazard zones are publicly available and comprehensible to a public audience.

(b) Is interactive and does not consist solely of delivering information in a top-down manner.

(c) Is coordinated with local partners, including counties, relevant state agencies and the Wildfire Programs Advisory Council.

(12) In addition to the community engagement described in subsection (11) of this section, to ensure that local characteristics in each area of this state are considered in the mapping process and before the draft map is released, the department shall meet with county commissioners and the county commissioners' staff in eight in-person meetings throughout this

state.

(13) When the draft map is released but before final publication of the map occurs:

(a) The department shall accept public comment on the map.

(b) After the meetings described in subsection (12) of this section, county commissioners, upon request by the county commissioners, must have one additional opportunity, arranged and scheduled by the Association of Oregon Counties, with either in-person attendance or a hybrid of in-person and remote attendance, to discuss concerns about the map and potential changes to the map.

[*(9)*] **(14)** In maintaining the map, the university shall make technical adjustments as needed and update the map consistent with the results of appeals described in subsection [*(6)(b)*] **(7)(b)** of this section.

[*(10)*] **(15)** The university shall provide technical assistance to representatives of state and local government, and to landowners, that use the map.

(16) Agencies of this state shall, as appropriate, use the map layer described in subsection (9)(d) of this section to:

(a) Direct resources for wildfire hazard reduction and wildfire resiliency to those most in need; and

(b) Assist with identifying communities for extensive, targeted engagement and outreach related to wildfire hazard reduction and wildfire resiliency.

(17) Agencies that use the map layer described in subsection (9)(d) of this section shall conduct outreach:

(a) In partnership with community leaders and community-based organizations;

(b) By using different media;

(c) By disseminating information through local schools, stores, faith-based organizations and medical offices; and

(d) By offering all information in the languages spoken in the relevant community, as practicable.