May 6, 2025

We write in support of SB 83, which repeals the State wildfire hazard map and associated regulations. The map was poorly designed and results in arbitrary outcomes that treat landowners unevenly. It is time to cast the map aside and focus on more productive ways to mitigate wildfire risk in Oregon.

Our experience in mapping forest vegetation and land use, developing GIS datasets, and analyzing spatial relationships gives us particular insight into the problematic methodology used by the State to develop the wildfire hazard map. We are troubled by many aspects of the process, from the reliance on theoretical models for imposing regulations on homeowners to obvious spatial and thematic errors in the model output.

In creating the wildfire hazard map the State used individual tax lots as hazard zones rather than developing hazard zones organically from the wildfire hazard data layer itself. Wildfire behavior is influenced by a variety of environmental factors, but it is not affected by survey lines. While the size and shape of tax lots has no impact on fire potential or behavior it does have a major complicating influence on the outcome of the Map.

Senate Bill 80 directed that the wildfire hazard map be based only on "weather, climate, topography and vegetation." [i]By using individual tax lots to develop fire hazard ratings the developers of the map introduced a fifth criteria that can have an outsized influence on outcomes. The incorporation of tax lots in the mapping methodology results in a skewed and arbitrary classification of fire hazard and creates a situation where individual homeowners are treated unevenly.

Tax lots are extremely variable in size. In our county of Hood River, for example, individual tax lots vary in size from less than one quarter of an acre to well over 10,000 acres. Forcing a single wildfire hazard score into arbitrary units of such variable size is nonsensical.

The OSU developers of the wildfire hazard map acknowledge the high degree of variance in the data and the distortion caused by using tax lots, noting that actual "hazard can vary across a single tax lot." In fact, they say, "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."[ii] In a recent communication with us one of the OSU developers confirmed that there is no scientific basis for tax lots as pre-defined zones.[iii]

In the final iteration of the wildfire hazard map the developers attempted to address the high variation in hazard ratings between adjacent tax lots by introducing a "smoothing" algorithm to reduce the variance in hazard ratings. By adjusting the pixel values on the edges of tax lots they tried to minimize differences in the final summary ratings of adjacent tax lots. This is clearly a band-aid attempt to fix the larger problem of averaging hazard values within tax lots in the first place. In this case "smoothing" essentially means changing the hazard values to make things look better. This does not make a more accurate map. If the developers had confidence in the data, they would not degrade it just to create a more pleasing result.

One of the primary purposes of the wildfire hazard map is to “identify where defensible space standards and home hardening codes will apply.” [iv] These standards and codes will be directed at homes across the landscape, not on land parcels. It stands to reason then that the Map should be focused on the spatial relationship between actual fire hazard and actual home/structure location, not on tax lots which serve only to dilute and distort the underlying source data.

The distortions caused by the tax lot criteria might also hamper firefighting efforts. Defensible space regulations are intended in part to reduce risk to firefighters during a wildfire and aid in their efforts. The uneven and arbitrary application of regulations across the landscape create the potential for a patchwork of homes with and without defensible space, thereby complicating firefighting efforts.

We can provide evidence of the problems caused by averaging values within tax lots through a somewhat technical example that exposes some of the inherent flaws. In the wildfire hazard map, fire hazard ratings are calculated for each 30-meter cell, or pixel (representing 0.2224 acres), before averaging across tax lots.[v] For each pixel, a hazard value is calculated by multiplying the value for burn probability by the flame length modifier.[vi] These values come from the two separate models for burn probability and average flame length.

According to OSU, while the burn probability model has a theoretical range of values from 0 to 1.0, the dataset itself has a maximum burn probability of 0.0743202.[vii] The fire intensity—or average flame length—model produced values from 0 to greater than 12 feet. Flame length modifier values were then created by normalizing the flame length values to a scale of 0 – 100.[viii] Therefore 0 – 100 is the full range of possible flame length modifier values.[ix]

Based on the ranges for burn probability (0 - 0.0743202) and flame length modifiers (0 - 100) the range of possible hazard ratings (burn probability multiplied by flame length modifier) is 0 – 7.432202.

The wildfire hazard map has three wildfire hazard categories based on hazard values:

- Low: hazard value < 0.001911
- Moderate: hazard value ≥ 0.001911 - 0.137872
- High: hazard value ≥ 0.137872 [x]

Since the bounds for hazard ratings are 0 and 7.432202, the ranges and midpoint values for each of the three hazard categories are:

- Low: range of 0 - 0.001910, and midpoint of 0.000955
- Moderate: range of 0.001911 - 0.137872, and midpoint of 0.069892
- High: range of 0.137873 – 7.432202 and midpoint of 3.784946

The three hazard value categories are not divided evenly across the total range (0 – 7.432202) of possible values. The low category represents only 0.0003% of the total range, the moderate category represents 1.83%, and the high category is 98.14% of the total range.

The effect of this distribution imbalance comes into play once individual pixel-level hazard values are averaged across tax lots. Just a few pixels with high ratings can have an overwhelming impact on the overall average.

For example, a tax lot where 98 percent of all of the 30-meter pixels (representing 0.2224 acres) have hazard ratings of 0.069892 (in the middle of the moderate range) can still be classified with a high average hazard rating of 0.144193 if only two percent of the pixels in the tax lot have a hazard rating of 3.874946 (the midpoint of the range of the high category). A forty-acre parcel, therefore, could have less than one acre with a high hazard rating of 3.874946 while the remaining 39 acres have a moderate rating of 0.069892 and the entire parcel is classified as a high hazard zone.

This example is quite conservative given that it relies on the midpoint values for the ranges of moderate and high hazard categories. More extreme values at the far end of the high hazard range will have even greater impact on averages across tax lots. The accuracy of the example shown above was confirmed in our recent communication with one of the OSU map developers.[xi]

This type of example is common on the ground statewide. In Hood River County it is quite ordinary to see a parcel with around 38 acres of orchard on level ground along with two wooded acres in the far end on a steep bank bordering a stream. Those few acres of riparian vegetation can sway the average hazard value for the entire parcel, regardless of the geographic location of a home or other structures.

The fact that the three hazard categories have such significantly different ranges is not necessarily an inherent problem. The issue arises when widely dissimilar values are averaged across tax lots. The map developers could have chosen to use a certain threshold or even a preponderance of hazard values to determine the hazard rating for each tax lot category, which would soften the impact of the skewed data ranges. Better yet, a more logical approach would not use tax lots as pre-defined zones at all.

There are alternatives to using tax-lots as minimum mapping units that can minimize the variance of data within each mapped unit. For example, algorithms can be used to create polygonal zones from raster data by setting parameters for minimum area, coefficients of variation, and other factors. This would result in low-variance wildfire hazard zones that can be used to identify homes and other structures on the landscape that are at risk. This is a far less arbitrary method to apply defensive space regulations to individual homeowners.

Ironically, the use of tax lots as pre-defined hazard zones contravenes the State law behind the fire hazard mapping process. Senate Bill 762 requires that the map must be "sufficiently detailed to allow the assessment of wildfire risk at the property ownership level."[xii] Since individual tax lots are used as hazard zones the wildfire hazard map fails to provide any detail at the ownership level. Rather, all detail is eliminated by averaging across tax-lots and diluting the data.

The two models used to create the wildfire hazard data pose a problem in of themselves. Like most complex models—which are based on theories, assumptions and a wide mixture of data—they cannot be predicted or even verified in the field. Theoretical models such as these can be useful tools for broad planning purposes, but they are quite problematic when used to promulgate regulations on a select portion of the population. One thing we can learn from the recent fires in Los Angeles is that defensible space and home hardening are useful practices wherever we live in the West. We don't need models to tell us that, and we certainly don't need models that arbitrarily target some homeowners with regulations while excluding others.

We urge you to pass SB 83 and repeal the problematic wildfire hazard map and associated regulations.

Respectfully,

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Hood River, Oregon

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[i] Senate Bill 80, Section 1 (5) (b), Oregon Legislative Assembly, 2023 Regular Session.
[ii] Dunn, Chris and McEvoy, Andy. Technical Guide: Mapping Wildfire Hazard to Structures and Other Human Development to Support Implementation of Oregon's 2023 Senate Bill 80. Oregon State University. Page 13.
[iii] Email communication from Andy McEvoy, February 3, 2025.
[iv] Senate Bill 80, Section 1 (2) (c), Oregon Legislative Assembly, 2023 Regular Session.
[v] Dunn, Chris and McEvoy, Andy. Technical Guide: Mapping Wildfire Hazard to Structures and Other Human Development to Support Implementation of Oregon's 2023 Senate Bill 80. Oregon State University. Page 8.
[vi] Oregon State University College of Forestry, Oregon Statewide wildfire hazard map. https://hazardmap.forestry.oregonstate.edu/understand-map.
[vii] Email communication from Andy McEvoy, January 27, 2025.
[viii] Dunn and McEvoy. Page 7.
[ix] Email communication from Andy McEvoy, February 3, 2025.
[x] Dunn and McEvoy. Page 8.
[xi] Email communication from Andy McEvoy, February 3, 2025.
[xii] Senate Bill 762, Section 7 (7) (b), Oregon Legislative Assembly, 2021 Regular Session