Wildfire Mapping:Legal and Analytical Challenges

2025-02-19

This document presents appeals information concerning significant discrepancies between the stated policy and its implementation. While some aspects of ORS 477.027 are not applied as intended, the current methodology results in an overclassification and overestimation of wildfire risk across multiple areas. Additionally, the burn probability models are invalidated by their inability to reliably predict burn and non-burn areas on a long-term horizon. This analysis is structured around four key arguments demonstrating how these methodological flaws have unjustifiably led to my property's high risk classification.

Argument 1: 60% Overclassification in Wildfire Risk Mapping and Violation of ORS 477.49(4)(b)

Wildfire risk classification must adhere to the policy framework outlined in **ORS 477.490**, which defines how risk classes should be established and how the final map should integrate required elements.

According to **ORS 477.490** (https://oregon.public.law/statutes/ors_477.490), wildfire risk mapping must follow these guidelines:

> *"The map must:*
> *(a) Be based on the wildfire risk classes.*
> *(b) Be sufficiently detailed to allow the assessment of wildfire risk at the property-ownership level.*
> *(c) Include the boundaries of the wildland-urban interface (WUI), 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."*

Additionally, **ORS 477.490(4)(b)** mandates that wildfire risk classes must be determined based on:

> *"In consultation with Oregon State University, the department shall establish five statewide wildfire risk classes of extreme, high, moderate, low and no risk. The classes must be:*
> *(a) Consistent with ORS 477.027 (Establishment of classes of wildland-urban interface).*
> *(b) Based on weather, climate, topography, and vegetation."*

Legal Violation: Improper Use of the WUI Subset

The wildfire risk classification model **does not comply with ORS 477.490(4)(b)** because it relies on **a subset of the WUI** to define risk classifications rather than basing them strictly on **weather, climate, topography, and vegetation**, as required by law.

By **using the WUI subset as a determinant in classification**, the model introduces **a systematic bias** that results in **overclassification of risk**. The law allows for the **WUI to be mapped**, but it does not authorize its **use as a primary input for wildfire risk classification**.

Flawed Statistical Methodology

Beyond violating **ORS 477.490**, the wildfire risk classification methodology introduces a **serious statistical flaw**:

- It **derives risk thresholds from a subset (WUI structure points)** and **applies them to the full dataset**, despite the two distributions being different.
- The **WUI subset is not randomly selected** and does not represent the full hazard distribution of Oregon.
- Applying thresholds from a **biased subset** results in **systematic overclassification** when extended statewide.

Impact of Overclassification & Reference to Analysis

The statistical misclassification is **demonstrated in my Wildfire Hazard Analysis** (https://datazenith.github.io/wildfireHazardAnalysis/). Key findings include:

- **The 90th percentile of the WUI subset corresponds to only the 40th percentile of the full hazard dataset.**

  - This means that **60% of Oregon is overclassified**, as areas with **low-to-moderate hazard values in the full dataset** are being **artificially escalated into higher risk categories**.

- **Map Comparisons Demonstrate Overclassification:**
  - **Current Risk Map (Overclassified Model)** – Shows risk classification based on the **WUI subset-derived 90th percentile threshold**, overestimating risk statewide.
  - **Corrected Risk Map (Full 90th Percentile Model)** – Uses the **90th percentile from the entire hazard dataset**, revealing that actual high-risk areas are far fewer than the current classification suggests.
  - These maps visually demonstrate the difference **inside the Wildfire Hazard Analysis**, showing how improper WUI thresholding has **inflated high-risk classifications**.
- **Box and Whisker Plot Shows Bias in WUI Subset:**
  - The **box and whisker plot in the Wildfire Hazard Analysis** confirms that **WUI hazard values are systematically lower** than the full dataset.
  - Since the subset is **not representative**, its threshold **misclassifies risk statewide when applied to the full dataset**.

For full statistical details and visuals, refer to **my Wildfire Hazard Analysis** (https://datazenith.github.io/wildfireHazardAnalysis/).

Argument 2: Invalid Burn Liklihood and Violation of ORS 477.49(7)(b)

Wildfire risk is a function of **burn probability** and **fire intensity**, which together determine the potential for wildfire occurrence and severity. According to the **Hazard Map Methodology** (https://hazardmap.forestry.oregonstate.edu/sites/default/files/OSU_2025_HazardMapMethods.pdf):

> *"Wildfire likelihood, or burn probability, is the average annual likelihood that a specific location will experience wildfire. Burn probabilities are reported as fractions which, when multiplied by 100, can be thought of as the percent chance of fire occurring for a specific location in any given year."*

Additionally, **ORS 477.490(7)(b)** (https://oregon.public.law/statutes/ors_477.490) states:

> *"The map must be sufficiently detailed to allow the assessment of wildfire risk at the property-ownership level."*

The repeated emphasis on **"specific location"** in the Hazard Map definition and the legal requirement for property-level assessment in **ORS 477.490(7)(b)** make it clear that the wildfire risk model must be capable of distinguishing **fire-prone zones from non-fire-prone zones at a fine spatial resolution**. For the model to meet this legal and methodological standard, it must **appropriately rank-order risk** and ensure that **higher-risk locations are meaningfully separated from lower-risk locations**. If the model cannot perform at this required level of granularity, then **its classifications at the property level are unreliable and not in compliance with ORS 477.490(7)(b)**.

Performance Evaluation

The wildfire risk model was tested against **21 years of historical wildfire data** obtained from Oregon State University (OSU), which was also the model's training dataset. The results reveal fundamental issues in its performance:

- **The model does not align with the intent of providing specific location probabilities** as described in the methodology. Because it cannot effectively classify fire-prone vs. non-fire-prone areas or rank-order risk, it fails to meet the requirement of producing meaningful wildfire likelihood estimates at a fine spatial scale.
- **The model's performance shows no ability to distinguish fire zones from non-fire zones.** When tested against its own training data, it fails to separate areas that historically burned from those that did not, demonstrating an inability to function as a wildfire risk classifier.
- **A randomly generated set of probabilities performed equivalently in ranking risk.** This means the model lacks predictive power and does not provide any improvement over assigning fire risk at random.

A detailed analysis of the model's performance is provided in the **Wildfire Hazard Analysis**, available here:
https://datazenith.github.io/wildfireHazardAnalysis/

Flawed Statistical Methodology: Why the Burn Probability Model is Invalid

Multiple statistical metrics in the **Wildfire Hazard Analysis** confirm that the burn probability model **has no ability to reliably distinguish fire-prone areas from non-fire areas—even within its own training data.**

- The model is **statistically indistinguishable from a random number generator**, meaning its results are **no better than assigning fire risk at random.**
- Because the model fails to perform even at the **most basic level of classification**, using it as a component in wildfire hazard calculations is invalid.
- A **risk model that provides no meaningful predictive accuracy cannot be used to justify regulatory policies or property classifications.**

Impact: Misuse of an Invalid Model at the Micro Level

The burn probability model is being used to classify wildfire risk **at the property-ownership level**, despite its inability to provide reliable results at this scale. This directly contradicts both **the model's stated methodology** and the **legal requirements outlined in ORS 477.490(7)(b)**, which mandate that wildfire risk assessments must be sufficiently detailed and capable of supporting property-level evaluations.

- **The model's classification granularity exceeds its actual reliability**, meaning that individual properties are being assigned risk levels based on calculations that **lack statistical validity at this scale**. The model fails to rank-order risk appropriately, violating the expectation that it should provide meaningful location-specific wildfire likelihood estimates.
- **The burden of proof is unfairly placed on property owners**, who must appeal their wildfire risk classifications even though the model itself **has no demonstrated ability to provide accurate property-specific assessments**. This is a direct consequence of applying a model that does not meet the precision required for property-level evaluations.
- **The methodology does not justify the level of precision it is being used for**, yet it is being applied at a micro level in ways that **could affect property values, insurance costs, and regulatory burdens.** ORS 477.490(7)(b) requires the wildfire risk map to be sufficiently detailed to allow assessment at the property level, but a model that cannot distinguish fire-prone from non-fire-prone areas invalidates this application.

As demonstrated in the **Wildfire Hazard Analysis** (https://datazenith.github.io/wildfireHazardAnalysis/), the burn probability model **fails to correlate with actual fire history** and is not designed for the **high-resolution property classifications it is**

being used to support. Using an invalid model to determine risk at this level results in **unjustified wildfire classifications that could impact property owners.**

Argument 3: Burn Likelihood is Overestimated by 78%

Analysis of **21 years of historical wildfire data**, the same dataset the model was trained on, shows that the **burn probability model systematically overestimates wildfire likelihood by 78%.**

- The model's estimated burn probabilities are **78% higher than the actual wildfire occurrence rates**, even when tested against its **own training data**.
- Instead of producing **accurate fire likelihood estimates**, the model **consistently inflates fire risk classifications**.
- This overestimation introduces **significant bias**, leading to **misclassification of wildfire risk levels** and unreliable hazard assessments.

As demonstrated in the **Wildfire Hazard Analysis** (https://datazenith.github.io/wildfireHazardAnalysis/), this systematic inflation of burn likelihood distorts wildfire risk classification, affecting land management decisions, regulatory policies, and property assessments.

Argument 4: Extreme Hazard Classification is Overestimated by 74%

Analysis of **21 years of historical wildfire data**, the same dataset the model was trained on, shows that the **hazard classification in the extreme wildfire risk zone is systematically overestimated by 74%.**

- The proportion of land classified as **extreme risk** is **74% higher than the actual historical wildfire occurrence supports**.
- Instead of producing **accurate hazard zone classifications**, the model **inflates extreme risk designations**, placing many areas in **unjustified high-risk categories**.
- This overclassification introduces **significant bias**, leading to **unnecessary regulatory burdens, insurance implications, and misallocated fire mitigation efforts**.

As demonstrated in the **Wildfire Hazard Analysis** (https://datazenith.github.io/wildfireHazardAnalysis/), this systematic inflation of extreme hazard classifications distorts wildfire risk assessments, impacting policy decisions, land use, and property owners.

Conclusion

Conclusion

The wildfire risk classification methodology contains fundamental flaws that result in systematic overclassification and unreliable hazard designations. These issues stem from **the model's inability to perform as stated in its methodology** and **its failure to comply with ORS 477.490(4)(b) and ORS 477.490(7)(b)**, which set clear requirements for how wildfire risk must be classified and assessed at the property level.

- **The burn likelihood model is statistically invalid** and fails to distinguish burned areas from non-burned areas, even within its own training data. This violates the **Hazard Map Methodology**, which defines burn probability as a meaningful location-specific estimate.
- **Burn probability is overestimated by 78%,** inflating fire risk classifications beyond what historical wildfire data supports. This contradicts the model's **stated function of providing an accurate measure of long-term wildfire likelihood**.
- **Extreme hazard classification is overestimated by 74%,** leading to unjustified high-risk designations that exceed actual wildfire occurrence rates.
- **The wildfire risk model overclassifies risk by 60% due to biased sampling of the WUI subset,** which underrepresents the full dataset and inflates risk assessments. This **violates ORS 477.490(4)(b),** which requires wildfire risk classification to be based on **weather, climate, topography, and vegetation**, not a WUI-derived subset.
- **Burn likelihood estimates do not align with OSU's stated performance**, failing to meet the expected level of accuracy in distinguishing fire-prone areas. The model was tested on **21 years of historical fire data** but was **unable to differentiate between fire and non-fire areas**, making it statistically indistinguishable from random chance. This failure contradicts the **Hazard Map Methodology's definition of burn probability as a useful wildfire likelihood measure**.
- **The classification methodology does not align with ORS 477.490(7)(b),** which requires wildfire risk mapping to be **sufficiently detailed to allow for property-level risk assessment**. Because the model lacks statistical validity at this scale, its use in determining individual property classifications is not legally justified.

References

1. https://datazenith.github.io/wildfireHazardAnalysis/
2. https://oregon.public.law/statutes/ors_477.490
3. https://hazardmap.forestry.oregonstate.edu/sites/default/files/OSU_2025_HazardMapMethods.pdf