

Wildfire GPT



Hello! Thank you for coming to discuss wildfire risk management and the impact of climate change. Before we proceed further, I'll need to ask you a few questions. This helps us tailor our consultation to your specific needs and concerns. If you're unsure about any question, feel free to say "I don't know." Let's start with the first question:

May I know what your professional background is?



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I am an urban planner



Thank you for sharing that. Next question:

What are your primary concerns or questions about wildfires?



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I am interested in how to manage development to mitigate fire-related hazard risk. I am an urban planner in Beaverton, Oregon, just outside Portland.



That's a crucial area to focus on, especially given your role. Now, can you specify the exact location of concern for assessing wildfire risks in terms of Latitude and Longitude? If you don't

Ask me anything?



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Sure show me the map



Please confirm the location by clicking the 'Confirm Location' button on the map provided for Beaverton, Oregon. Let me know once you've confirmed it.



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The location has been confirmed: latitude 45.48366474908892, longitude -122.80603408813478.



Thank you for confirming the location. Next, could you specify the urgency or timeline for addressing your concerns about wildfire risks?



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This is for a long-term community plan. The timeline is 30 years.



Understood, a long-term perspective is essential for sustainable urban planning regarding wildfire management. Lastly, are there specific aspects of wildfire risks that you are particularly interested in exploring?



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Can you provide some examples?



Certainly! Some specific aspects you might consider include:

1. **Fire Behavior Modeling:** Understanding how wildfires spread based on terrain, vegetation, and climate conditions.
2. **Building Codes:** Reviewing or developing building regulations to enhance fire resistance in urban design.
3. **Evacuation Routes:** Planning effective evacuation procedures and routes to enhance public safety.
4. **Infrastructure Resilience:** Enhancing resilience of public utilities and services against fire damage.
5. **Community Education:** Programs to educate residents about fire prevention and safety.

Which of these areas, or any others, do you find most pertinent to your work as an urban planner?



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I'm interested in Building Codes and Infrastructure Resilience



Thank you for specifying your interests. Let me summarize the information gathered:

- **Profession:** Urban planner

- **Concern:** Interested in managing development to mitigate fire-related hazard risks
- **Location:** Beaverton, Oregon (Latitude: 45.48366474908892, Longitude: -122.80603408812478)
- **Time:** 30-year timeline for a long-term community plan
- **Scope:** Focused on Building Codes and Infrastructure Resilience

I will share this checklist with you now to confirm all details are correct. Here it is:

- **Profession:** Urban planner
- **Concern:** Interested in managing development to mitigate fire-related hazard risks
- **Location:** Beaverton, Oregon (Latitude: 45.48366474908892, Longitude: -122.80603408812478)
- **Time:** 30-year timeline for a long-term community plan
- **Scope:** Building Codes and Infrastructure Resilience

Please let me know if all details are accurate or if there's anything else you'd like to adjust.



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Yes this is accurate



Based on our previous discussions and the specific concerns you have as an urban planner focusing on building codes and infrastructure resilience in Beaverton, Oregon, here is the customized plan to help assess and mitigate wildfire risks for your long-term community plan:

Step 1: Data Analysis

- **Dataset:** Long Term Fire History Records
 - I will analyze this dataset to identify patterns or cycles in wildfire activity over the years in and around Beaverton. Understanding historical trends is crucial for anticipating future wildfire scenarios and their potential impact on urban areas.

Step 2: Literature Search

- **Scope:** Research on building codes and infrastructure resilience in wildfire-prone areas
 - I will conduct a literature review to gather insights from scientific studies and case studies relating to effective methods for constructing fire-resilient buildings and infrastructure. This includes architectural innovations, materials, and design strategies proven to mitigate fire risk.

Step 3: Recommendations

- **Deliverables:** A comprehensive report including analysis results, literature review findings, and practical recommendations
 - Based on the analysis of the historical fire data and the findings from current research, I will compile actionable recommendations tailored to enhance Beaverton's resilience against wildfires. This includes proposed updates to building codes and suggestions for infrastructure improvements.

This plan is designed to arm you with a data-driven foundation and research-backed strategies that align with Beaverton's development goals while ensuring long-term safety and sustainability in the face of wildfire risks.

Do you have any questions or concerns about this plan? Would you like to discuss any specific elements in more detail or add anything else to the approach?



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As for the dataset, could you analyze fire weather index instead?



Absolutely, analyzing the Fire Weather Index (FWI) can indeed provide valuable insights, particularly in anticipating future fire risk conditions, which is essential for your focus on building codes and infrastructure resilience. Here's how we could incorporate the FWI into our plan:

Step 1: Data Analysis

- **Dataset:** Fire Weather Index (FWI)
 - I will analyze the FWI focusing on both current trends and projections for the mid-century (2045-2054) to assess the potential increase in fire danger due to climate change.

This will help predict more dangerous periods or seasons for wildfires around Beaverton.

Step 2: Literature Search

- I will continue to search for literature on effective building codes and infrastructural designs that enhance resilience to wildfires, ensuring that they align with the predictions derived from the FWI analysis.

Step 3: Recommendations

- Based on the trends identified in the FWI and insights from the literature, I will provide tailored recommendations. These will focus on updating building codes, infrastructure planning, and possibly adjusting urban development strategies to mitigate the heightened fire risks identified for future decades.

Does this adjustment to the plan meet your expectations? Would you like to discuss any specific elements in more detail, or is there anything else you'd like to add to the approach?



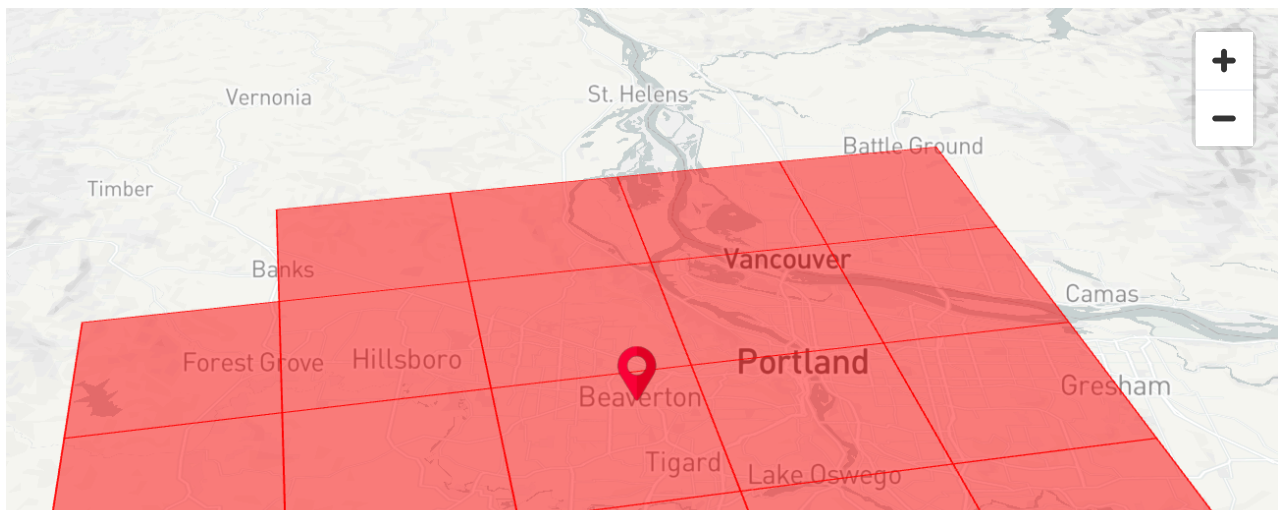
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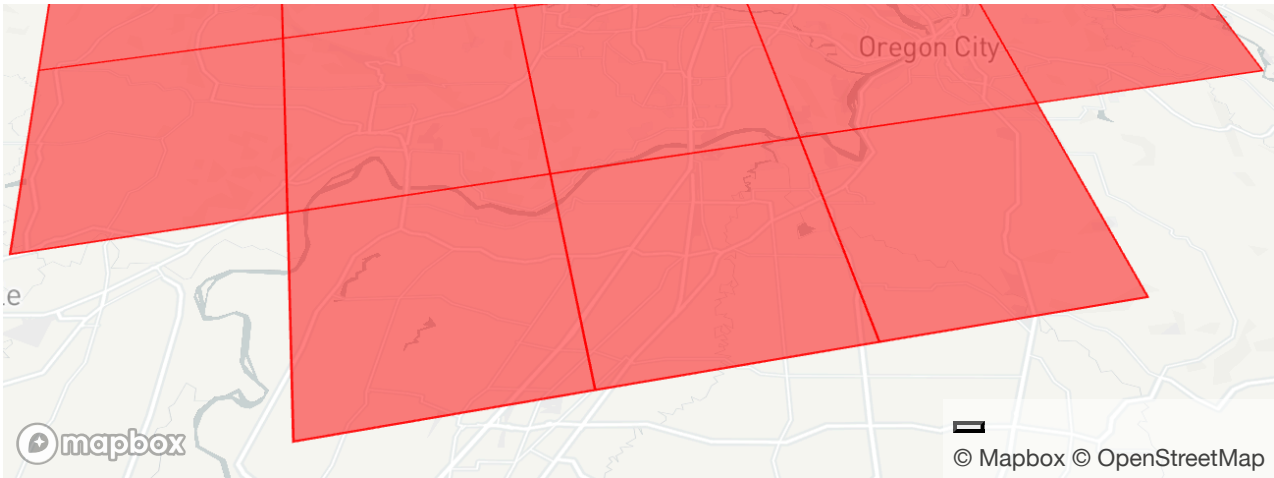


Looks good



Fire Weather Index (FWI) Data for Location (lat: 45.48366474908892, lon: -122.80603408812478) within a 36 km radius, shown at a grid cell level.





FWI Class	FWI Values in Class
Low	0-9 FWI
Medium	9-21 FWI
High	21-34 FWI
Very High	34-39 FWI
Extreme	39-53 FWI
Very Extreme	Above 53 FWI

Fire Weather Index (FWI) Data for Location (lat: 45.48366474908892, lon: -122.806034088124)

Category	Spring	Summer	Autumn	Winter
Historical(1995 - 2004)	2.0 (se: ± 0.44) Low	14.92 (se: ± 1.4) Medium	12.3 (se: ± 1.13) Medium	0.59 (se: ± 0.17) Low
Mid-Century(2045 - 2054)	1.94 (se: ± 0.42) Low	14.15 (se: ± 1.45) Medium	12.81 (se: ± 1.13) Medium	0.56 (se: ± 0.18) Low
End-of-Century(2085 - 2094)	2.13 (se: ± 0.46) Low	16.37 (se: ± 1.56) Medium	11.62 (se: ± 1.03) Medium	1.2 (se: ± 0.32) Low

The Fire Weather Index (FWI) projections for Beaverton, Oregon, indicate a generally stable fire risk from historical periods into the mid-century, with minor fluctuations across the seasons. Specifically, the historical FWI (1995 - 2004) shows:

- Spring: Low risk (FWI = 2.0)
- Summer: Medium risk (FWI = 14.92)
- Autumn: Medium risk (FWI = 12.3)
- Winter: Low risk (FWI = 0.59)

Looking into the mid-century (2045 - 2054), the projected values are:

- Spring: Low risk (FWI = 1.94)
- Summer: Medium risk (FWI = 14.15)
- Autumn: Medium risk (FWI = 12.81)
- Winter: Low risk (FWI = 0.56)

Although there's a slight decline in summer and an increase in autumn risks, the area remains mostly in the low to medium fire danger category. These predictions are essential for planning as they imply that fire-related hazards might not drastically increase, but continuous monitoring and mitigation approaches should still be prioritized to address these consistent fire risks.

You can view more detailed data and methodology at the Climate Risk & Resilience Portal: <https://disgeoportal.egs.anl.gov/ClimRR/>.

Would you like to delve deeper into any specific season or aspect of these projections, or shall we proceed with the next steps, such as reviewing relevant literature for urban planning strategies against fire hazards?



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Let's review some relevant literature



In addressing the pressing issue of wildfire resilience in urban areas, researchers and urban planners have proposed various strategies that resonate closely with concerns for communities like Beaverton, Oregon.

Constanza Gonzalez-Mathiesen and Alan March (2018) emphasize that urban planning can significantly enhance wildfire resilience by adopting design principles focused on physical resistance and facilitating response (Gonzalez-Mathiesen & March, 2018). Such principles can be integral to developing more robust building codes and ensuring that urban infrastructure in Beaverton is attuned to withstand fire threats.

Crystal Kolden and Carol Henson (2019) provide a compelling case study from Montecito, California, during the 2017 Thomas Fire, showcasing the efficacy of community-wide mitigation strategies. They highlight that robust community partnerships and proactive mitigation efforts substantially reduced vulnerability and damage despite extreme conditions (Kolden & Henson, 2019). This example sets a benchmark for Beaverton's approach towards community involvement and pre-fire preparations.

Stephen R. Miller et al. (2016) discuss both regulatory and non-regulatory tools that communities can employ to manage wildfire risks effectively. Covering a range of options from zoning codes to educational platforms, this guide provides a comprehensive resource for municipalities to customize their strategies based on specific local needs (Miller et al., 2016).

Each paper underscores the multifaceted approach needed to tackle wildfire risks effectively, blending regulation, community action, and informed urban planning to safeguard urban interfaces.

References:

Gonzalez-Mathiesen, C., & March, A. (2018). Establishing Design Principles for Wildfire Resilient Urban Planning. DOI: [10.1080/02697459.2018.1429787](https://doi.org/10.1080/02697459.2018.1429787)

Kolden, C., & Henson, C. (2019). A Socio-Ecological Approach to Mitigating Wildfire Vulnerability in the Wildland Urban Interface: A Case Study from the 2017 Thomas Fire. DOI: [10.3390/fire2010009](https://doi.org/10.3390/fire2010009)

Miller, S. R., et al. (2016). Planning for Wildfire in the Wildland-Urban Interface: A Resource Guide for Idaho Communities. DOI: [10.2139/ssrn.2845046](https://doi.org/10.2139/ssrn.2845046)

Would you like further analysis or specific case studies from these papers to refine our strategy for Beaverton's urban planning?



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Yes, could you please provide additional information on regulatory or policy tools that communities can use to manage wildfire risks?



In the discourse of wildfire management, recent literature emphasizes a variety of regulatory and policy tools that communities can adopt to safeguard against wildfire risks effectively.

Paulo M. Fernandes et al. (2020) critique the lack of dynamic approaches within wildfire regulation policies. They suggest that evolving from fire exclusion to integrated fire management practices is essential. Their analysis indicates that recognizing wildfires as complex socio-ecological processes rather than mere natural hazards can significantly influence policy effectiveness (Fernandes et al., 2020). This perspective opens the door for Beaverton to reimagine its wildfire policies, ensuring that they are adaptive and holistic.

John Heineke and Stein Weissenberger (1974) explore decision-making models to minimize wildfire risks in urban areas. They propose tailor-made policy decisions based on specific data sets that could help manage wildland activities efficiently, preventing ignitions and reducing potential losses (Heineke & Weissenberger, 1974). This method could be particularly beneficial for Beaverton in formulating data-driven policies that adapt to local wildfire dynamics.

Stephen R. Miller et al. (2016) further enrich this dialogue by discussing specific regulatory and non-regulatory tools available to manage wildfire risks. They highlight the importance of comprehensive urban planning mechanisms like zoning codes, building codes, and community wildfire protection plans. Additionally, they suggest leveraging educational platforms like Firewise to enhance community awareness and preparedness (Miller et al., 2016). This comprehensive approach could serve as a blueprint for Beaverton, integrating educational outreach with stringent regulatory measures to foster a safer urban environment.

References:

Fernandes, P. M., et al. (2020). Wildfire policies contribution to foster extreme wildfires. DOI: [10.1016/b978-0-12-815721-3.00010-2](https://doi.org/10.1016/b978-0-12-815721-3.00010-2)

Heineke, J., & Weissenberger, S. (1974). An Analysis of Wildfire Prevention. DOI: [10.1109/tsmc.1974.4309359](https://doi.org/10.1109/tsmc.1974.4309359)

Miller, S. R., et al. (2016). Planning for Wildfire in the Wildland-Urban Interface: A Resource Guide for Idaho Communities. DOI: [10.2139/ssrn.2845046](https://doi.org/10.2139/ssrn.2845046)

Would you like a deeper exploration into any specific regulatory models or further guidance on implementing these tools in Beaverton's urban planning?



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What are some specific changes to zoning codes and/or building codes that communities can make to manage wildfire risk?



To effectively manage wildfire risks in communities like Beaverton, Oregon, specific changes to zoning codes and building codes can be integral. Here are some recommended strategies tailored to enhance resilience against wildfires:

Zoning Codes Adjustments:

1. **Defensible Space Zones:** Create zoning regulations that mandate defensible spaces around properties, classified into different zones with specific vegetation management requirements to reduce fire fuel.
2. **Buffer Zones:** Implement zoning that incorporates buffer zones between wildland areas and urban developments. These areas can be managed to have low fire fuel vegetation or be used for agricultural purposes that naturally resist fire spread.
3. **Land Use Planning:** Restrict or carefully control development in high-risk wildfire areas. This might include limiting the types of allowable constructions or the density of buildings to reduce potential fire damage.

Building Codes Enhancements:

1. **Fire-Resistant Materials:** Mandate the use of fire-resistant materials for roofing, siding, and other exterior parts of buildings. Products rated as Class A, such as certain types of metal, tiles, or specially treated wood, offer the highest resistance against fire.
2. **Egress and Access:** Revise building codes to ensure that there are multiple egress routes for residents and adequate access routes for emergency services. This is crucial for both safety

during evacuations and effective firefighting operations.

3. **Landscaping Regulations:** Enforce guidelines on landscaping in residential and commercial properties to include fire-resistant plants and to maintain safe distances between vegetation and buildings.

Combination of Regulatory and Design Approaches:

1. **Cluster Development:** Allow for cluster housing developments that concentrate buildings in safer areas, reducing the interface with high-risk fire zones and thus minimizing the overall community's vulnerability.
2. **Incentives for Retrofitting:** Provide incentives, such as tax reductions or grants, for property owners to retrofit existing structures with fire-resistant designs and materials.
3. **Emergency Infrastructure:** Integrate requirements for fire-adapted infrastructure, including water supply systems designed for firefighting, like static water tanks and increased hydrant availability.

Community Engagement and Enforcement:

1. **Regular Inspections and Compliance:** Implement regular inspections to ensure compliance with new codes and provide educational resources to property owners about the importance and benefits of adherence. 2 & policies**: Ensure that all zoning and building policy changes are developed in consultation with fire departments, urban planners, and community members to create sustainable and widely supported frameworks.

Implementing these changes requires careful consideration of local conditions and should be supported by comprehensive planning and community engagement. These adjustments are designed not only to mitigate the impact of potential wildfires but also to foster a resilient urban environment where the community feels prepared and protected.

Would you like assistance with developing specific policy drafts or planning community engagement strategies to introduce these changes?



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Are there supporting literature for Buffer Zones?



The utility of buffer zones in wildfire management is increasingly recognized in urban planning for its effectiveness in mitigating fire risks. Recent scholarly work points to vital insights that can guide communities like Beaverton in integrating these zones within their developmental strategies.

Greg Penney and Steven Richardson (2019) explore innovative models that address the underestimate of radiant heat flux in urban areas with small vegetation fires. Their research underscores the significance of properly designed urban spaces that act as buffer zones, reducing the impact of wildfires in densely populated localities (Penney & Richardson, 2019). This approach demonstrates the potential of buffer zones to enhance resilience by mitigating fire spread and intensity before it reaches critical urban assets.

Maureen Kennedy and Morris Johnson (2014) investigate the effects of fuel treatments as buffer zones during Arizona's 2011 Wallow Fire. Their analysis shows that these zones significantly lowered fire severity and provided firefighters better management options, thereby protecting urban interfaces (Kennedy & Johnson, 2014). This evidence supports the adjustment of spatial planning to include strategic buffer zones that reduce wildfire transmission to urban areas.

A. Gill and Scott Stephens (2009) discuss the challenges and multifaceted benefits of integrating asset protection zones, which act similarly to buffer zones, in urban-wildland interfaces. They highlight planning strategies that combine urban development with natural landscape management to minimize fire risk impacts efficiently (Gill & Stephens, 2009). This work suggests that Beaverton would benefit from a holistic approach that balances fire protection, biodiversity, and residential needs.

References:

Penney, G., & Richardson, S. (2019). Modelling of the Radiant Heat Flux and Rate of Spread of Wildfire within the Urban Environment. DOI: [10.3390/fire2010004](https://doi.org/10.3390/fire2010004)

Kennedy, M., & Johnson, M. (2014). Fuel treatment prescriptions alter spatial patterns of fire severity around the wildland–urban interface during the Wallow Fire, Arizona, USA. DOI: [10.1016/j.foreco.2014.01.014](https://doi.org/10.1016/j.foreco.2014.01.014)

Gill, A., & Stephens, S. (2009). Scientific and social challenges for the management of fire-prone wildland – urban interfaces. DOI: [10.1088/1748-9326/4/3/034014](https://doi.org/10.1088/1748-9326/4/3/034014)

Would you like to explore more about implementing these strategies in Beaverton's urban planning framework?



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