

Wildfire GPT



Hi there! I'm WildfireGPT, your friendly wildfire risk consultant. With access to comprehensive wildfire datasets, I'm here to help you understand and prepare for potential risks in your area.

To provide the most relevant information, I'll start by working through a checklist of questions about your background and concerns prior to our consultation session. Your responses will help me tailor my recommendations to your unique situation. If you're unsure about any question, feel free to say "I don't know."

Once I have a clear understanding of your needs, I'll summarize our discussion and create a plan to address your concerns. This will include the datasets we'll analyze and the types of recommendations I can provide.

When you're happy with the plan, we'll proceed according to the agreed-upon steps. Feel free to ask questions at any point in the process.

I'm looking forward to working with you to help you better understand and prepare for wildfire risks. Let's get started with our first question: What is your professional background?



Click to provide feedback



I'm a risk manager developing urban development plans for 2050



Thank you for sharing that. Next, could you describe your primary concerns or questions regarding wildfires?



Ask me anything?





We are concerned about the wildland urban interface and impact to water resources



Understood. Could you please specify the area for which you are assessing wildfire risks? If you have the latitude and longitude, that would be helpful. If not, just describe the location and I can help find the coordinates.



Click to provide feedback



Las Vegas, NM



Please verify the location on the map provided for Las Vegas, NM. Click the 'Confirm Location' button if it is correct.



Click to provide feedback



The location has been confirmed: latitude 35.5939, longitude -105.2239.



Great, thank you for confirming. Now, could you specify the time frame you are interested in for assessing wildfire risks and implementing strategies? This could be short-term (1-10 years), medium-term (10-30 years), or long-term (30-80+ years).



Click to provide feedback



medium-term (10-30 years)



Thank you for specifying the time frame. Lastly, what specific aspects of wildfire risks are you interested in exploring? If you're unsure, I can provide examples such as fire behavior analysis, impact on infrastructure, evacuation planning, etc.



Click to provide feedback



We are interested in impacts to housing risks and water resources



Thank you for providing all the necessary information. Here's a summary of our conversation:

- **Profession:** Risk manager developing urban development plans for 2050.
- **Concern:** Concerned about the wildland urban interface and impact to water resources.
- **Location:** Las Vegas, NM with coordinates latitude 35.5939, longitude -105.2239.
- **Time:** Interested in a medium-term (10-30 years) timeframe for assessing wildfire risks and implementing strategies.
- **Scope:** Interested in exploring impacts to housing risks and water resources.

Please confirm if all the details are accurate before I proceed with updating our records.



Click to provide feedback



Looks good



The checklist has been successfully updated with your details. I have a few more follow-up questions about the scope of this session to better tailor our approach. Are you ready to proceed with these questions?



[Click to provide feedback](#)

Sure



Great! Could you provide more details on the specific historical data and predictive models available regarding wildfire frequency and intensity near the Las Vegas, NM wildland-urban interface? This information will help us understand the existing resources and gaps in knowledge.

If you're unsure, we can include this as a topic to explore further in today's session.

[Click to provide feedback](#)

Let's include this topic



Understood, we'll include exploring the historical data and predictive models as a part of our session.

Next, can you provide more details on the current housing structures and future development plans in the areas most susceptible to wildfires? If this information isn't readily available, we can also add this to our agenda for further exploration.

[Click to provide feedback](#)

Please add that to the agenda



Added to the agenda.

Finally, how might potential wildfire scenarios impact the quality and availability of water resources in Las Vegas, NM, and what mitigation strategies are currently in place or proposed? If this information is not available, would you like to discuss this further during our session?



Click to provide feedback



Let's add this topic as well



While I am working diligently creating a comprehensive plan, I wanted to touch base and let you know that I can leverage three powerful datasets that each offer unique insights into wildfire risks within a 36km radius of the area of interest we discussed earlier:

- Fire Weather Index (FWI) from [ClimRR](#) allows us to assess potential trends in fire danger from the historical period (1995-2004) through the mid-century (2045-2054) and up to the end of the century (2085-2094). This dataset is ideal if you're interested in understanding how fire risks may evolve over time.
- Long term fire history records from [International Multiproxy Paleofire Database \(IMPD\)](#), specifically the metadata from the North American Tree-ring Fire Scar Synthesis (NAFSS) provides a rich dataset including scientific studies derived from tree-ring records across North America, capturing centuries of wildfire occurrences. This dataset can be instrumental in analyzing wildfire risk by providing historical context and identifying patterns or cycles in wildfire activity in the long term. If analyzing long-term wildfire trends is a priority for you, this dataset is a fantastic resource.
- Recent fire incident data reported to the [IRWIN system](#): Wildland Fire Interagency Geospatial Services (WFIGS) Group wildfire incidents record allows you to retrieve yearly and monthly wildfire incident counts between 2015 and 2023. This dataset is perfect if you want to focus on recent fire incidents in your area.

Currently, these are the datasets I can access. If I mistakenly suggest analyzing types of data that are beyond my current access, please kindly point them out to me so I can adjust our plan accordingly.

In addition to these datasets, the related academic papers are compiled by the Argonne National Laboratory's [Community and Infrastructure Adaptation to Climate Change \(CIACC\) tool](#). For each

retrieval, I can extract abstracts from 3 relevant published papers within the corpus and provide you with a summary of the findings.

I am currently working on creating a comprehensive, personalized wildfire risk analysis plan for you. As I work on your plan, I kindly ask for your patience. Please refrain from typing anything until I have shared the completed plan with you for your review ...

Once I have completed the plan, I will share it with you for your feedback. At that time, please let me know if you have any specific preferences or areas of focus you'd like me to prioritize in future revisions or updates to the plan.



Click to provide feedback



Here's the plan I propose to address your concerns about wildfire risks and their impact on urban development and water resources in Las Tunic, NM:

Step 1: Analyze the Fire Weather Index (FWI) Dataset

- I will focus on the projected data for the Mid-Century period (2045 - 2054) to understand the potential trends in fire danger. This analysis will help predict the future fire behavior and danger levels, which is crucial for planning the development of housing and managing water resources in a wildfire-prone area.

Step 2: Analyze the Long Term Fire History Records

- By examining these records, we will identify historical patterns and trends in wildfire activity. This will provide a context for understanding how wildfires have historically impacted the region, which is essential for assessing the risk to new urban developments and water resources.

Step 3: Literature Search

- I will search for scientific papers focusing on wildfire management and mitigation strategies, particularly in areas similar to Las Vegas, NM. This will include exploring effective measures for protecting urban interfaces from wildfires and strategies for safeguarding water resources during and after wildfires.

Step 4: Recommendations

- Based on the analysis of the datasets and findings from the literature search, I will provide detailed recommendations. These will focus on urban planning strategies to minimize wildfire risks and methods to protect water resources from the adverse effects of wildfires.

Please let me know if you have any questions about this plan or if there's additional information you'd like to include in our analysis.



Click to provide feedback



Looks good



While I am preparing the analysis, I'd like to let you know that I can also report some census data. Specifically, I can analyze the following demographic information reported at the census block level within a 36 km radius of the location of interest:

- Total population
- Number of Housing Units
- Number of People Below Poverty Level

If you need to assess the potential impact of a wildfire on the local community, you can ask me to provide this demographic information by asking questions like: "who will be affected by the wildfire?"



Click to provide feedback



Fire Weather Index (FWI) Data for Location (lat: 35.5939, lon: -105.2239) within a 36 km radius, shown at a grid cell level.

Select Season

autumn



Select Period

Hist



Display Map

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: 35.5939, lon: -105.2239) with standard error

Category	Spring	Summer	Autumn	Winter
Historical(1995 - 2004)	13.1 (se: ± 3.97) Medium	17.04 (se: ± 4.13) Medium	19.31 (se: ± 4.48) Medium	6.98 (se: ± 2.51) Low
Mid-Century(2045 - 2054)	17.31 (se: ± 4.52) Medium	18.26 (se: ± 3.7) Medium	16.25 (se: ± 3.27) Medium	8.49 (se: ± 2.49) Low
End-of-Century(2085 - 2094)	23.82 (se: ± 5.4) High	20.43 (se: ± 4.12) Medium	20.5 (se: ± 3.76) Medium	11.52 (se: ± 2.9) Medium

Analysis of Fire Weather Index (FWI) Data for Las Vegas, NM

The Fire Weather Index (FWI) data for Las Vegas, NM, reveals a concerning trend in fire danger levels over the next few decades. Historically, from 1995 to 2004, the FWI values indicated a medium risk during spring, summer, and autumn, with lower risks in the winter. Specifically:

- **Spring:** 13.1 (Medium)
- **Summer:** 17.04 (Medium)
- **Autumn:** 19.31 (Medium)
- **Winter:** 6.98 (Low)

Looking ahead to the mid-century period (2045-2054), the projections show a slight increase in the FWI values, especially in spring:

- **Spring:** 17.31 (Medium)
- **Summer:** 18.26 (Medium)
- **Autumn:** 16.25 (Medium)
- **Winter:** 8.49 (Low)

By the end of the century (2085-2094), the spring season is expected to experience a significant increase in fire danger:

- **Spring:** 23.82 (High)
- **Summer:** 20.43 (Medium)
- **Autumn:** 20.5 (Medium)
- **Winter:** 11.52 (Medium)

This trend suggests an increasing risk of wildfires, particularly in the spring, which will necessitate enhanced fire management and urban planning strategies to mitigate risks to housing and water resources. The higher FWI values indicate drier and potentially windier conditions, which can facilitate the rapid spread of wildfires.

Given these projections, it is crucial to integrate robust wildfire risk management strategies into urban development plans for Las Vegas, NM. These should include considerations for fire-resistant building materials, strategic water resource management, and emergency response planning.

[Data Source: Climate Risk & Resilience Portal \(ClimRR\).](#)

Limitations in Historical Fire Data

Unfortunately, there are no historical fire records found within a 36 km radius of Las Vegas, NM, from the International Multiproxy Paleofire Database. This absence of data limits our ability to analyze long-term fire history trends directly around Las Vegas, NM. However, the FWI data provides a valuable alternative for understanding potential future fire risks.

[Fire History Data Source: International Multiproxy Paleofire Database \(IMPD\)](#)

Would you like to explore alternative sources or datasets, or shall we proceed with developing recommendations based on the FWI data and other relevant research?



Click to provide feedback



Proceed with the recommendations



Recommendations for Urban Development and Water Resource Management in Las Vegas, NM

Given the projected increase in wildfire risks as indicated by the Fire Weather Index (FWI) data, here are several tailored recommendations for urban development and water resource management in Las Vegas, NM:

1. Enhanced Urban Planning and Building Codes

- **Fire-Resistant Materials:** Encourage the use of fire-resistant building materials in all new constructions. This includes non-combustible roofing, fire-resistant siding, and dual-paned glass windows.
- **Defensible Space:** Implement and enforce zoning laws that require the creation of defensible spaces around properties. This involves clearing vegetation and other flammable materials within a specified radius around homes.
- **Community Firebreaks:** Develop community firebreaks that can act as buffers to slow or halt the progress of a wildfire. This could include open spaces like parks or green belts that are strategically maintained.

2. Water Resource Management

- **Water Supply Resilience:** Increase the resilience of water supply systems to ensure availability during and after wildfire events. This could involve constructing new reservoirs, enhancing existing water treatment facilities, and establishing emergency water supply locations.
- **Protect Water Quality:** Develop strategies to protect water quality from the effects of wildfires, such as increased sedimentation and contamination. This might include erosion control measures and enhanced filtration systems at water treatment facilities.

3. Community Preparedness and Emergency Response

- **Evacuation Plans:** Regularly update and practice community evacuation plans. Ensure that all residents are aware of the plans and know what to do in the event of a wildfire.
- **Public Education:** Implement ongoing public education campaigns to raise awareness about wildfire risks and prevention techniques. This could include workshops, school programs, and community meetings.
- **Emergency Services:** Strengthen local fire departments and emergency services with training in wildfire response and ensure they are equipped with the necessary tools to combat fires effectively.

4. Environmental and Land Use Policies

- **Vegetation Management:** Implement systematic vegetation management programs to reduce fuel loads in and around urban areas. This includes regular clearing, controlled burns, and the management of land use to prevent overgrowth.
- **Wildlife Corridors:** Design and maintain wildlife corridors that can help manage the landscape's natural ecology, reducing the chance of catastrophic wildfires and promoting biodiversity.

5. Monitoring and Research

- **Continuous Monitoring:** Utilize satellite imagery and remote sensing technologies to monitor fire risks and respond promptly to potential outbreaks.
- **Research Partnerships:** Collaborate with academic institutions and research organizations to stay updated on the latest fire management strategies and technologies.

By integrating these recommendations into the urban development plans for 2050, Las Vegas, NM can enhance its resilience against future wildfire risks and ensure the sustainable management of its water resources. These strategies will not only protect the community and its infrastructure but also preserve the environment and quality of life for its residents.



Click to provide feedback



Are there good examples of similar cities that might experience similar shifts in wildfire risk? What mitigation strategies are those cities implementing?



Analysis of Mitigation Strategies in Cities Facing Increased Wildfire Risks

Cities similar to Las Vegas, NM, which are experiencing shifts in wildfire risk due to climate change, have been adopting innovative and proactive mitigation strategies. Here's a look at some of the approaches highlighted in recent research:

1. California's Altered Future Climate (Moritz & Stephens, 2008)

- California is a prime example of a region adapting to increased wildfire risks. The study by Moritz and Stephens (2008) emphasizes the need for a sustainable coexistence with wildfire through policy, planning, and management changes. Key strategies include:
 - **Risk-Based Framework:** Implementing a risk-based framework for fire-related decisions to address natural hazards systematically.
 - **Reintroduction of Fire:** Using controlled burns to reintroduce fire in a managed way to fire-prone ecosystems.
 - **Urban Planning Reevaluation:** Reevaluating urban planning and building in fire-prone locations to make future cities less susceptible to wildfire damage.

This approach suggests that Las Vegas, NM could benefit from integrating these strategies into its urban development plans to enhance resilience against wildfires.

2. Adaptive Responses in Western North American Forests (Schoennagel et al., 2017)

- The research by Schoennagel et al. (2017) focuses on the western regions of North America, where wildfires have become increasingly frequent and severe. They propose

shifting from traditional resistance strategies to adaptive resilience approaches:

- **Accepting Wildfire:** Recognizing that fuels reduction alone cannot alter regional wildfire trends.
- **Targeted Fuels Reduction:** Focusing on adapting some ecosystems and residential communities to more frequent fires.
- **Active Fire Management:** Managing more wild and prescribed fires with varying severities.
- **Development Planning:** Incentivizing and planning residential development to withstand inevitable wildfires.

These insights could guide Las Vegas, NM in adopting policies that promote adaptive resilience, preparing the community and ecosystems for changing fire regimes.

3. Landscape and Planning Relations with Extreme Wildfires (Bouillon et al., 2020)

- Bouillon and colleagues (2020) explore the relationship between landscape characteristics, human settlements, and extreme wildfires in various territories. They highlight:
 - **Spatial Planning:** Emphasizing the importance of spatial planning in territories threatened by wildfires.
 - **Fuel Management:** Discussing different approaches to fuel management as a critical component of fire prevention and management.

This study underscores the importance of integrating spatial planning and targeted fuel management into the broader strategy to mitigate wildfire risks effectively.

References:

- Moritz, M., & Stephens, S. (2008). Fire and sustainability: considerations for California's altered future climate. <https://doi.org/10.1007/s10584-007-9361-1>
- Schoennagel, T. et al. (2017). Adapt to more wildfire in western North American forests as climate changes. <https://doi.org/10.1073/pnas.1617464114>
- Bouillon, C. et al. (2020). The relation of landscape characteristics, human settlements, spatial planning, and fuel management with extreme wildfires. <https://doi.org/10.1016/b978-0-12-815721-3.00004-7>

These examples provide valuable insights into how cities facing similar challenges to Las Vegas, NM, are adapting to increased wildfire risks through innovative planning and management strategies. Integrating these approaches could significantly enhance Las Vegas, NM's resilience against future wildfire threats.



Click to provide feedback 