**JOHNS HOPKINS UNIVERSITY
DATA VISUALIZATION PROGRAM
LITERATURE SURVEY**

Fire Risk Dashboard — Literature Review & Annotated Bibliography

I.   Introduction

This annotated bibliography reviews literature and technical resources relevant to the development of an interactive dashboard for wildfire-risk visualization in southern Chile. The focus is on:

1. Methods for assessing fire hazards;
2. Open meteorological data sources for modelling;
3. Digital visualization tools for communicating environmental risk.

Together, these references inform the project's methodological design—particularly the use of modelled atmospheric data, adapted fire-risk indices, and interactive visualization frameworks.

II.   Annotated bibliography

1. Dentoni, M. C., & Muñoz, M. M. (2012). *Sistemas de evaluación de peligro de incendios*. Informe Técnico Nº 1. Plan Nacional de Manejo del Fuego – Programa Nacional de Peligro de Incendios y Alerta Temprana. Esquel, Chubut, Argentina. ISSN 2313-9420.
    Argentina's National Fire Management Plan provides an overview of fire-risk evaluation systems, including the Rodrigues-Moretti Index (IRM). The IRM incorporates temperature, relative humidity, wind speed, and days without rain (precipitation < 2 mm) to assess fire danger, offering an open and transparent framework adaptable to other regions. It forms the methodological foundation for the "days without rain" variable used in the Bosque Pehuén dashboard.

2. Zacharakis, I., & Tsihrintzis, V. A. (2023). Environmental Forest Fire Danger Rating Systems and Indices around the Globe: A Review. *Land*, *12*(1), 194. https://doi.org/10.3390/land12010194
    This global review compares fire-risk rating systems and indices, highlighting methodological differences and regional adaptations. It situates the IRM among international standards like the Canadian standard (CFFDRS) and U.S. NFDRS. The article clarifies conceptual categories of indices which helps justify the Bosque Pehuén dashboard's chosen variables and scoring logic.

3. Open-Meteo (2022–2025). *Weather Forecast API*. Retrieved from https://open-meteo.com/en/docs
The Open-Meteo API provides open access to global modelled weather data, based on leading numerical weather models (ECMWF, GFS, ICON). Its open-license (CC BY 4.0) and standardized outputs allow users to retrieve real-time and historical data at specific coordinates. It serves as the project's core data source, ensuring continuous updates and reproducibility.

4. Cavalcante, R.B.l.; Souza, B.M.; Ramos, S.J.; Gastauer, M.; Nascimento, W.R.; Caldeira, C.F.; Souza-Filho, P.W.M. (2021). Assessment of fire hazard weather indices in the eastern Amazon: a case study for different land uses. *Acta Amazonica 51*: 1-13. https://doi.org/10.1590/1809-4392202101172
This study evaluates the performance of several fire-risk indices, including the IRM, in predicting fire occurrence. By correlating meteorological variables with observed fire events, the authors assess index sensitivity to local climatic conditions. Their findings confirm that including drought-duration metrics like "days without rain" improves predictive accuracy, validating this approach for Bosque Pehuén.

5. Inglis, N. C., & Vukomanovic, J. (2020). Visualizing when, where, and how fires happen in U.S. parks and protected areas. *ISPRS International Journal of Geo-Information, 9*(5), 333. https://doi.org/10.3390/ijgi9050333
This paper introduces VISTAFiRe, an open-source, interactive decision-making tool that harmonizes U.S. fire databases to visualize the spatio-temporal dynamics of fires. The emphasis is on accessibility and stakeholder communication, enabling the public to interpret complex fire tendencies quickly. For Bosque Pehuén, it validates an interactive dashboard approach that communicates the connection between risk indicators and management actions to promote mitigation.

6. USDA Forest Service. (2020–2025). *Wildfire Risk to Communities*. Retrieved November 4, 2025, from https://wildfirerisk.org
This U.S. Forest Service platform provides a national-scale tool to explore wildfire risks and impacts to homes, communities, and natural resources across the U.S. It emphasizes clear visualization, accessibility, and non-technical usability. It promotes community-oriented communication to empower local leaders and residents to understand and mitigate wildfire risk—principles directly informing the communication strategy and user-experience goals of the Bosque Pehuén fire risk dashboard.

III.   Summary

Together, these references establish the methodological, technical, and communicative foundations of the Fire Risk Dashboard for Bosque Pehuén.

Dentoni and Muñoz (2012) and Cavalcante et al. (2021) provide the empirical basis for constructing the fire-risk index, validating the inclusion of drought-duration metrics such as "days without rain." Zacharakis and Tsihrintzis (2023) broaden this foundation by situating the Rodríguez-Moretti Index within the global landscape of fire-danger rating systems, supporting its methodological consistency. Open-Meteo (2022–2025) ensures that the dashboard is built around a continuous data source through open and updated meteorological data.

Inglis and Vukomanovic (2020) and the USDA Forest Service (2020–2025) demonstrate how interactive, publicly accessible dashboards can translate complex wildfire data into actionable understanding, emphasizing user engagement, transparency, and non-technical usability.

Together, these resources support a project that combines fire-science methodology, open source infrastructure, and visualization design, creating a tool that not only represents wildfire risk but also enhances community awareness and adaptive capacity in Bosque Pehuén and its surrounding area.