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Analyzing Intensifying Storm Events Correlation to Landslide Frequency in Portland's West Hills

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Analyzing Intensifying Storm Events Correlation to Landslide Frequency in Portland's West Hills

Aurora Villa Juan¹
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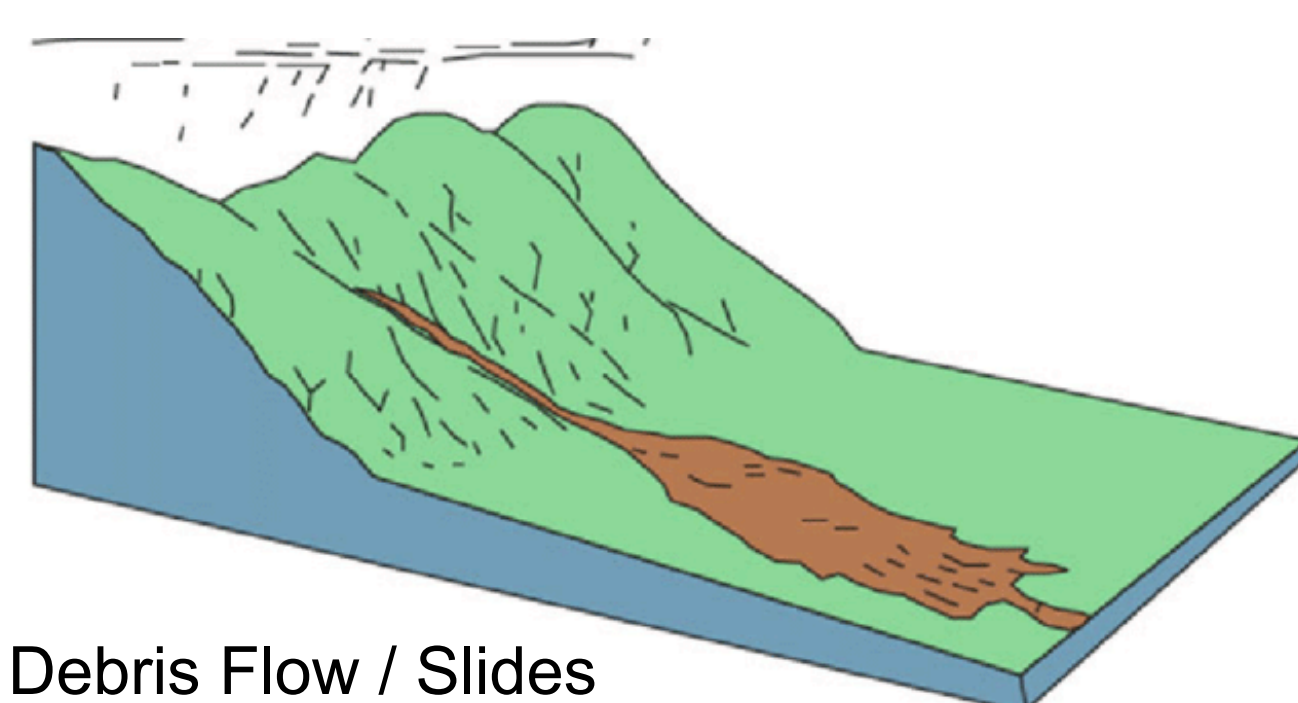
ABSTRACT

As the Pacific Northwest climate changes, extreme weather, such as intensifying storms, and a shift in the type of precipitation experienced with warmer winters causing more precipitation to fall as rain instead of snow, may lead to an increased frequency of landslides. There have been several recent landslides in Portland, noticeable to the public, particularly in areas of high elevation such as Council Crest, which stands at 1,073 feet. Additionally, residents of neighboring homes have observed changes in the landscape, including those on private properties. To better safeguard both public and private property, comprehensive research and mitigation efforts are required. This analysis looks at weather and slide trend data to determine if there is a correlation between the increase in storm intensity and the frequency of landslides in the Portland Metro Area. Opportunities for further study and the critical consideration of community safety are highlighted. Understanding the correlation between intensifying storm events and landslide occurrences is crucial for implementing effective mitigation strategies and ensuring the safety of residents in landslide-prone areas.

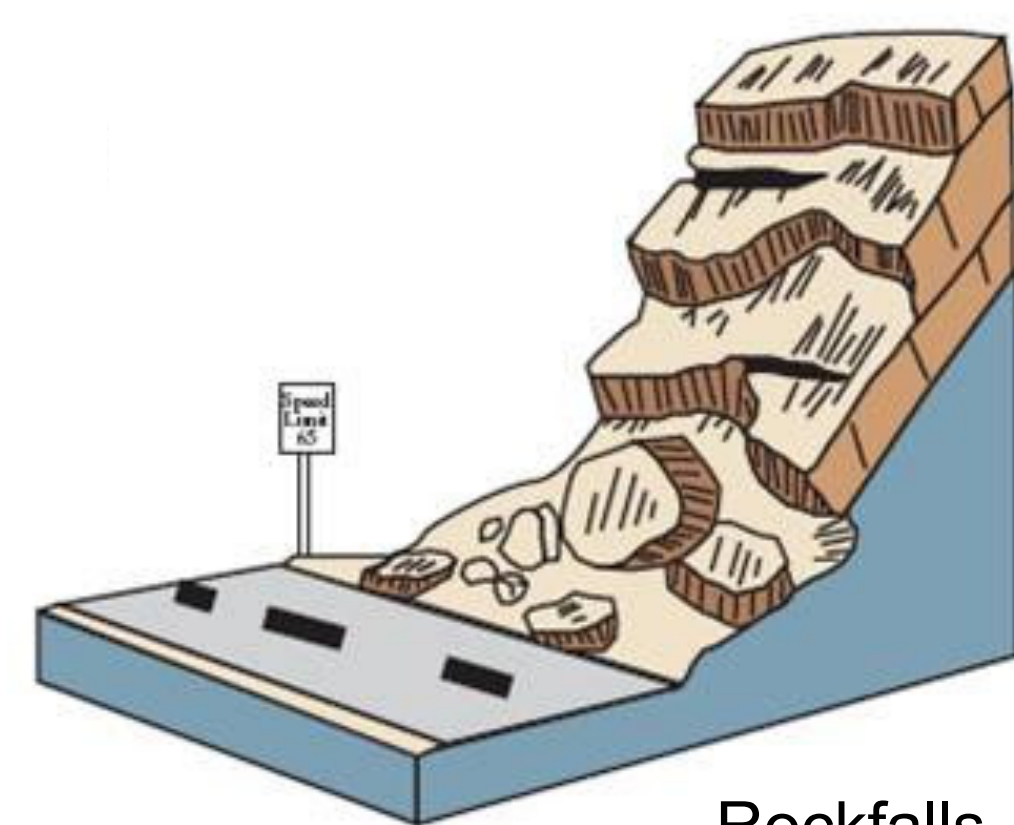
BACKGROUND / INTRODUCTION

At least 1,700 landslides have occurred within the City of Portland during the last 90 years (1928–2016). Of these landslides, approximately 830 occurred during the severe storms in 1996.

Most common landslide found in the Portland area



Debris Flow / Slides

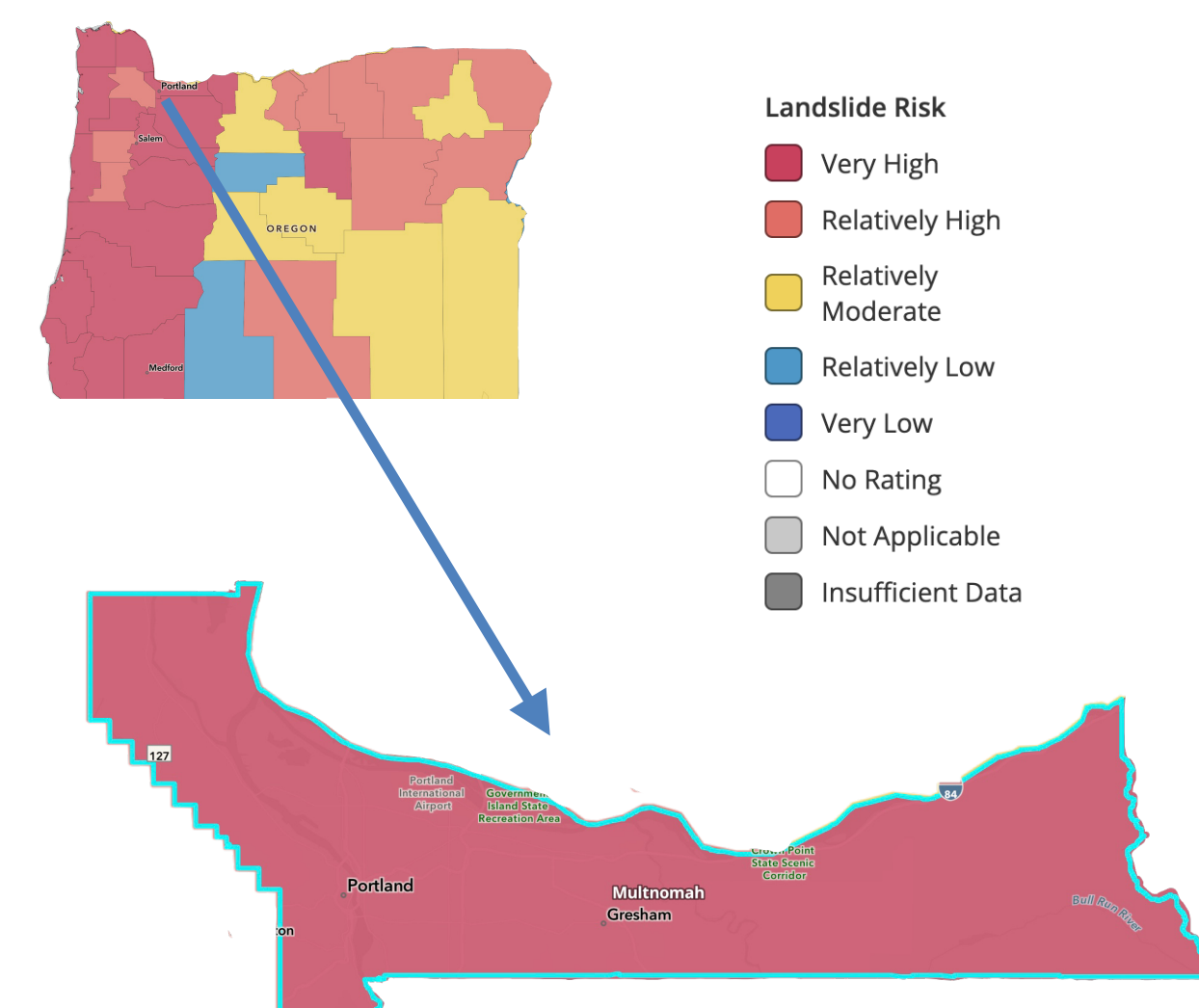


Rockfalls



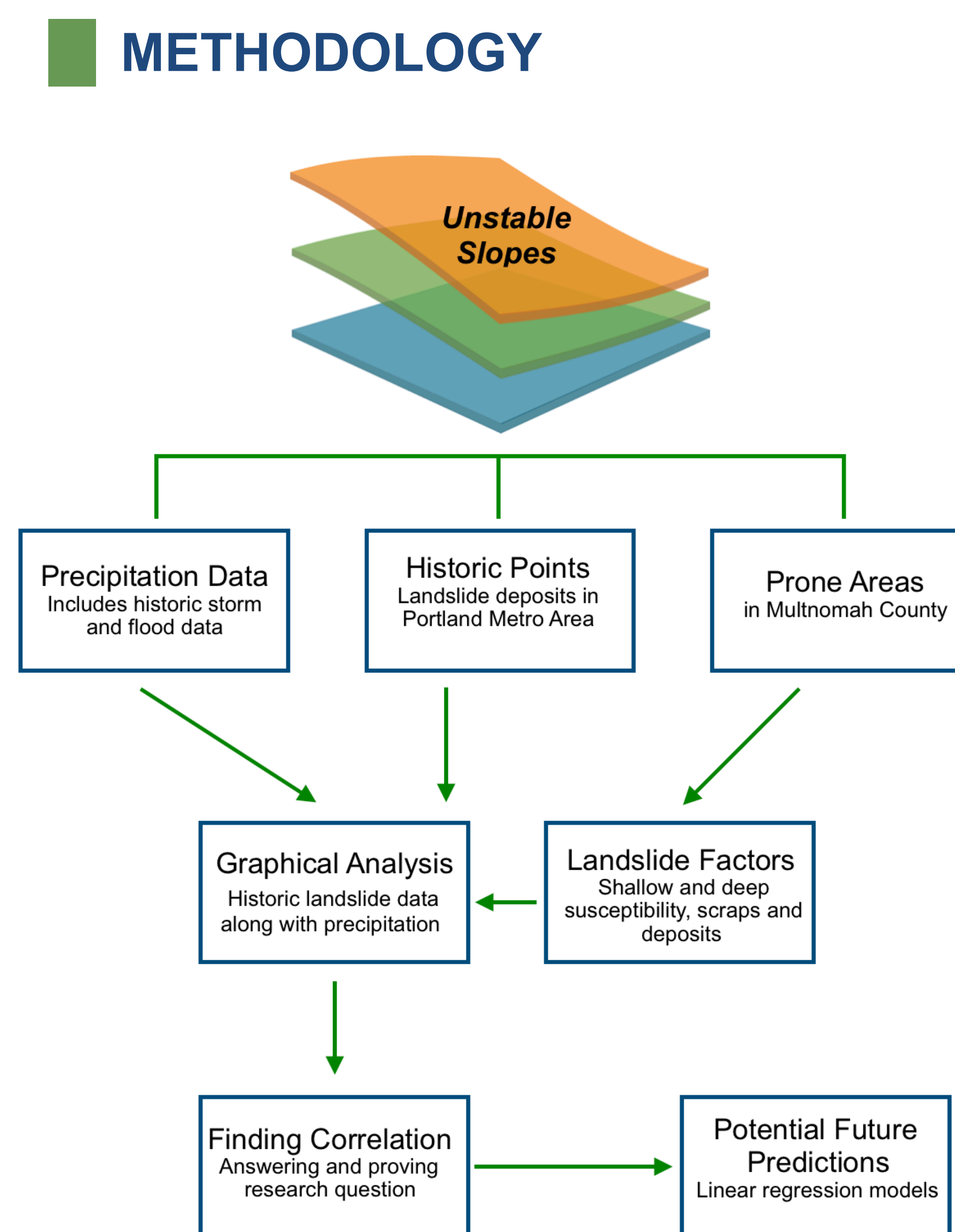
Earthflow

METHODOLOGY

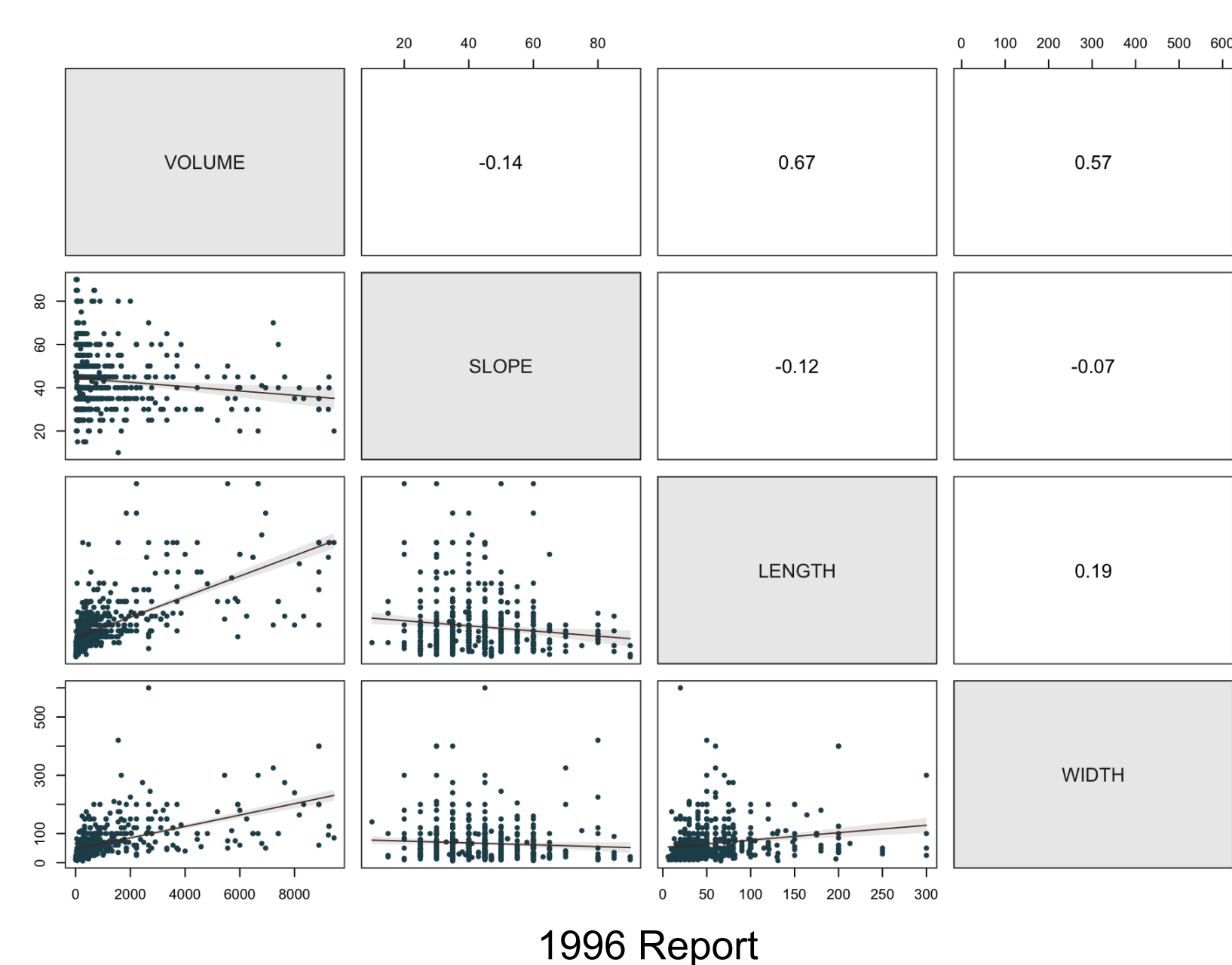
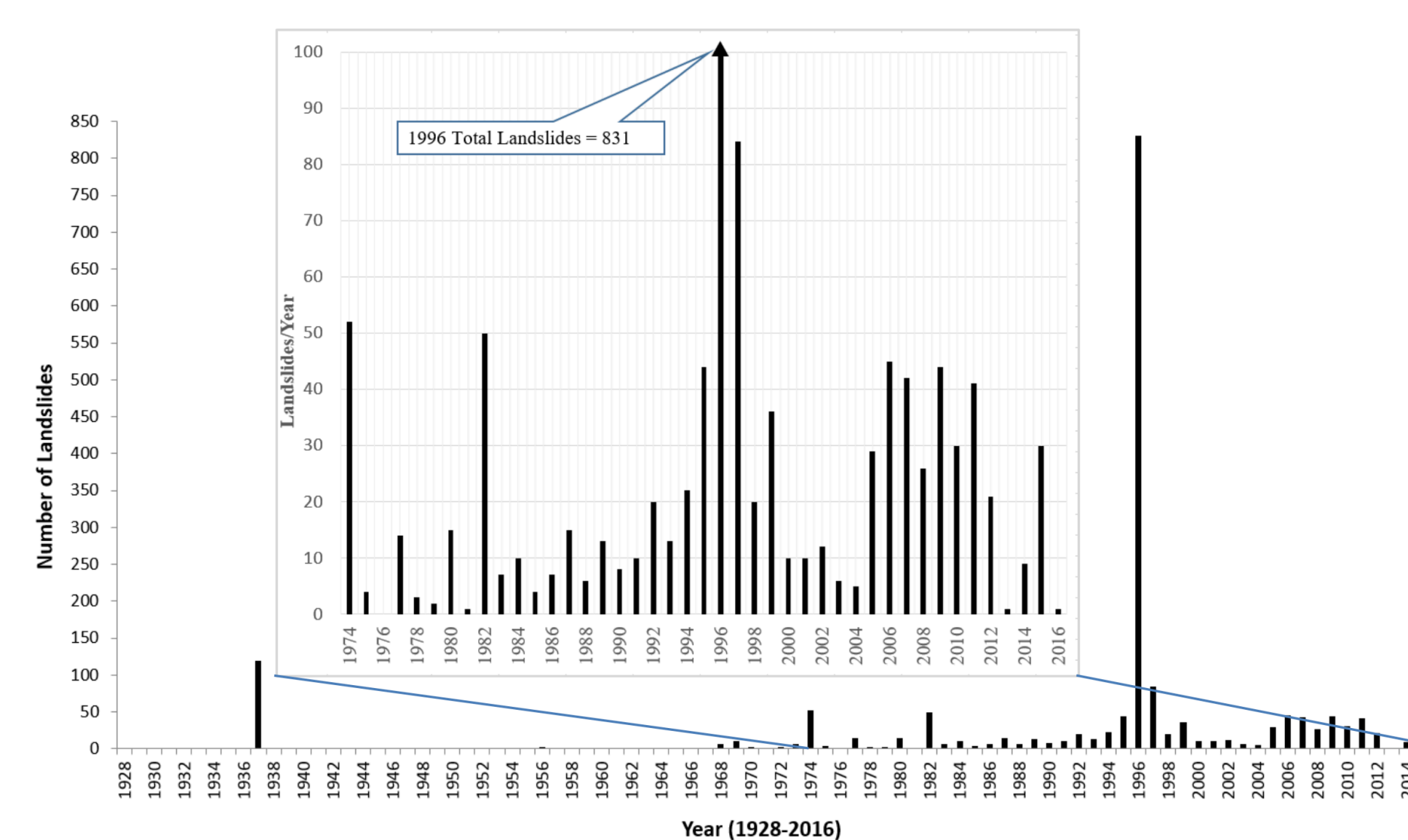
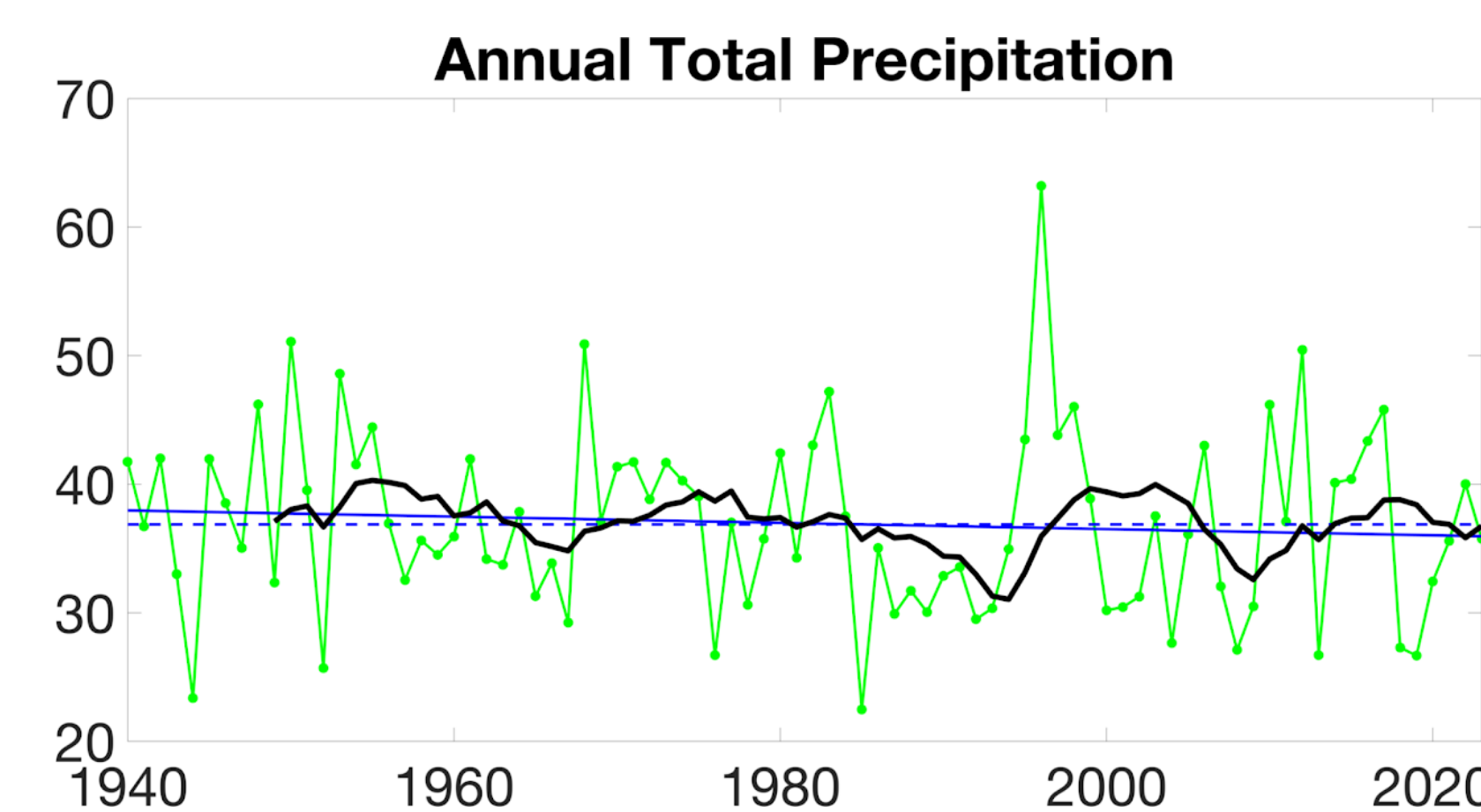


Question

Is there a correlation between the increase of storm intensity and frequency of landslides in the Portland Metro Area?



FINDINGS



Event Type	Date Range	Frequency
Debris Flow	02/05/1996 - 01/06/2022	29
Floods	01/31/1996 - 06/11/2022	33
Flash Flood	06/25/1996 - 05/04/2017	3
Hail	07/31/1991 - 05/04/2008	7
Heavy Rain	08/22/2001 - 06/10/2022	33
Heavy Snow	01/03/1996 - 02/27/2023	346
Ice Storm	01/16/1996 - 02/14/2021	26
Winter Storm	02/05/1996 - 12/22/2022	132

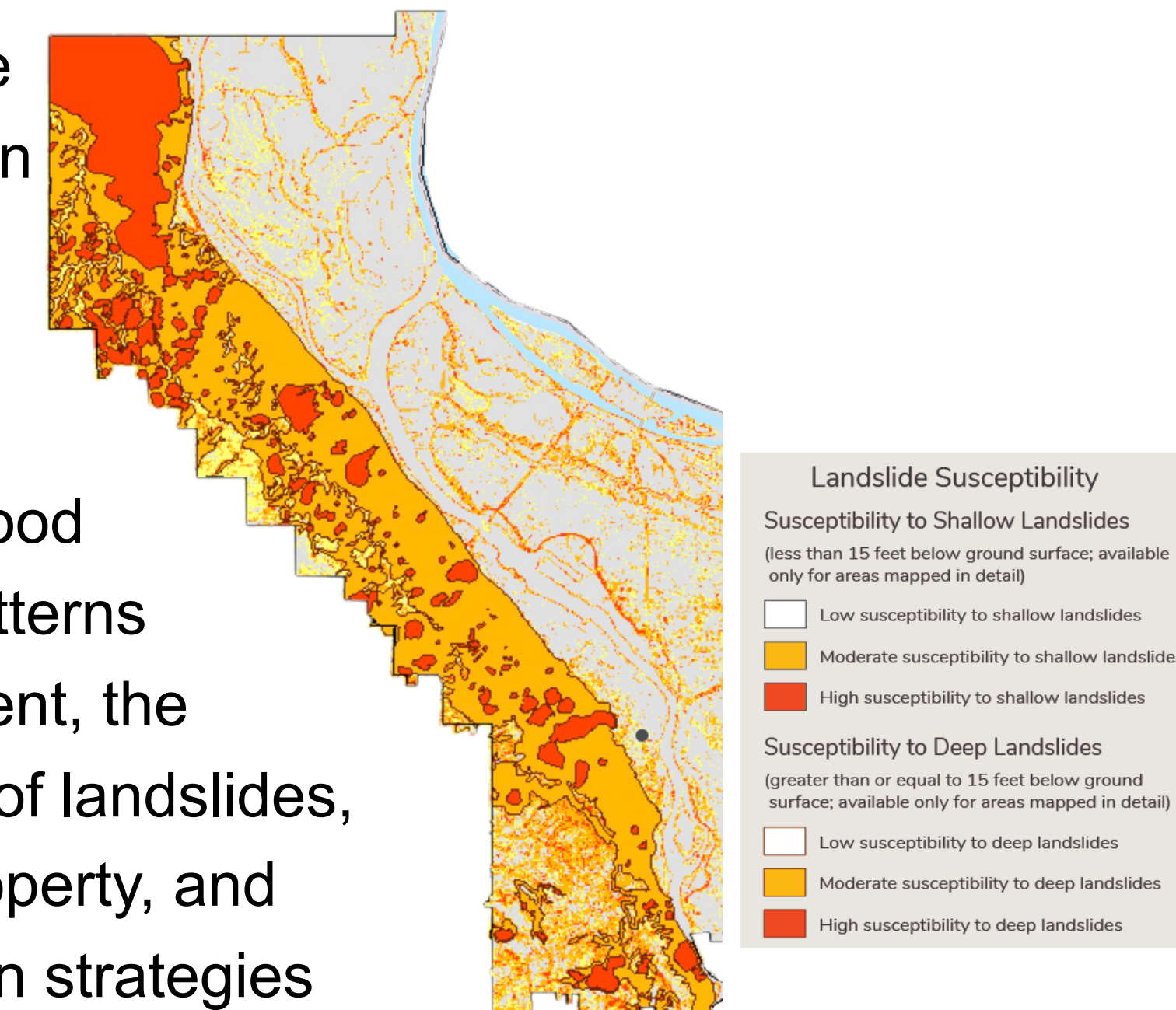
Multnomah County Storm Report provided by ncdc.noaa.gov

There is correlation between the number of inches regarding precipitation, based on the various types of storms and their frequency, which trigger:

- Slope saturation
- Debris flow and slopes
- Soil saturations

CONCLUSION

In Portland, landslides are on the rise due to increased precipitation and storms. This increase in extreme weather events leads to soil saturation, destabilizing slopes and increasing the likelihood of landslides. As precipitation patterns become more intense and frequent, the region experiences higher rates of landslides, posing risks to infrastructure, property, and human safety. Effective mitigation strategies and land management practices are crucial to address this growing hazard and minimize its impact on the Portland area.



DISCUSSION & FUTURE WORK

It's essential to conduct comprehensive research to better understand the complex relationship between precipitation patterns and landslide occurrences in the Portland area. Additionally, implementing advanced predictive models and monitoring systems can provide valuable insights to mitigate risks and enhance preparedness for future landslide events.

Signs for potential landslides on properties in the area

- Bowed trees
- Visual slides/slumps
- Exposed or cut soil
- Alongside any concentrated flows that might contribute to the issue (landslides)

ACKNOWLEDGEMENTS

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- **Community Partner:** West Multnomah Soil & Water Conservation District (WMSWCD)
- **Special Thanks to the input from:** Sahan Dissanayake - (PSU, Economics), Mary Logalbo & Shahbaz Khan (WMSWCD)
- **Relevant Sources:** oregon.gov/dogami/, climate.gov/, hazards.fema.gov/nri/map#

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