

# Geovisualization of Mitigation Strategies for Pedestrian Evacuation for Near-Field Tsunami Hazards Along the Cascadia Subduction Zone

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## Introduction

With projected increases in populations along coastlines, societal exposure to a variety of coastal hazards is likely to increase. Particularly threatening to humans are tsunamis, which can strike with little to no warning. Along the US Pacific Coast, the Cascadia Subduction Zone places communities at risk for near-field tsunamis which can strike within 15 to 45 minutes after an earthquake. In the event of a sudden near-field tsunami, evacuation choices are likely to be made by self-controlled, pedestrian traffic.

Evacuation research is commonly an exposure analysis and does not consider pre-disaster mitigation implementation. Risk perception largely influences the likelihood for individuals and stakeholders to implement crucial mitigation policies. By quantifying variables that hinder evacuation potential, risk mapping procedures can be applied to evacuation potential to accurately portray risk and thus lead to steps in increasing resiliency for coastal communities.



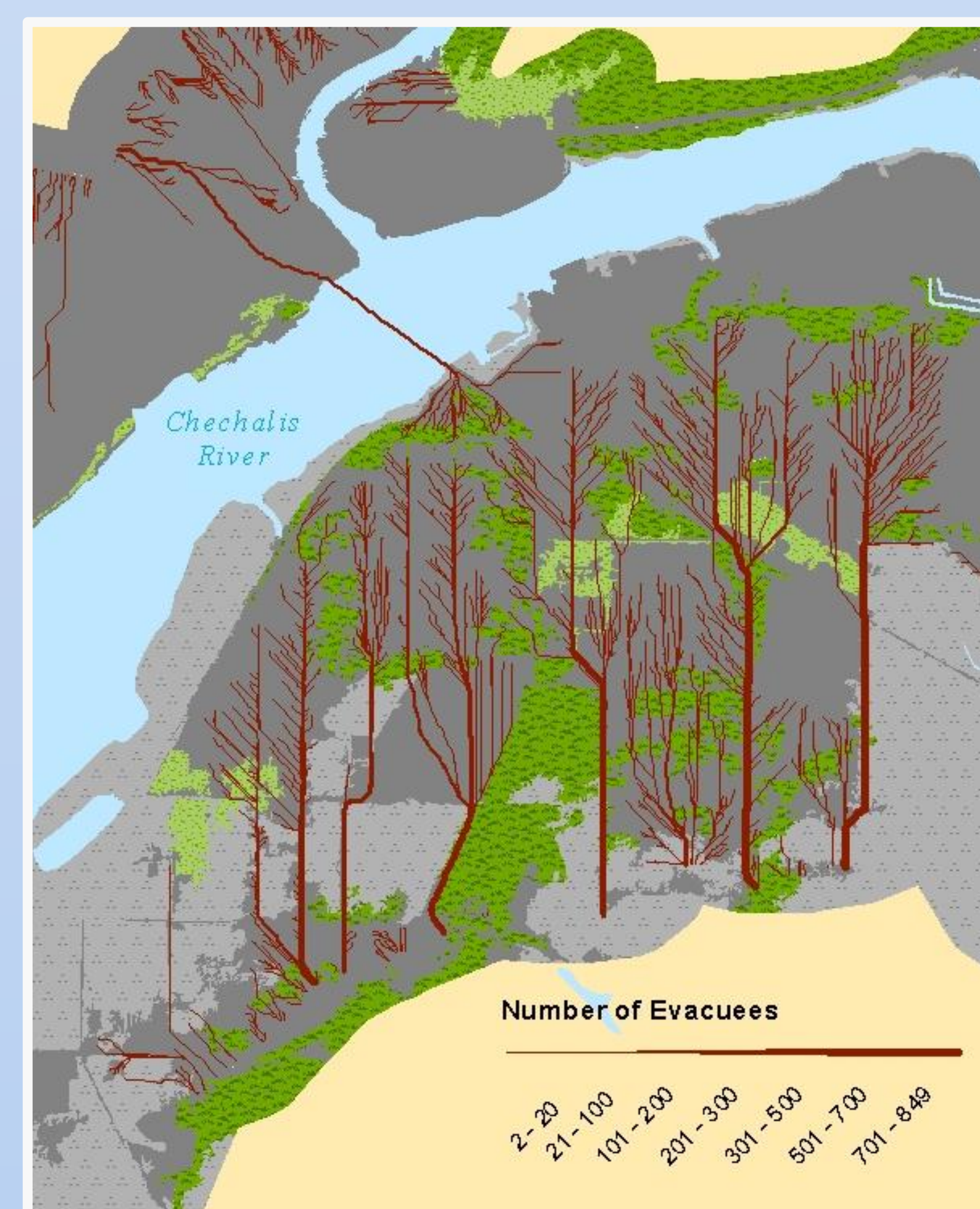
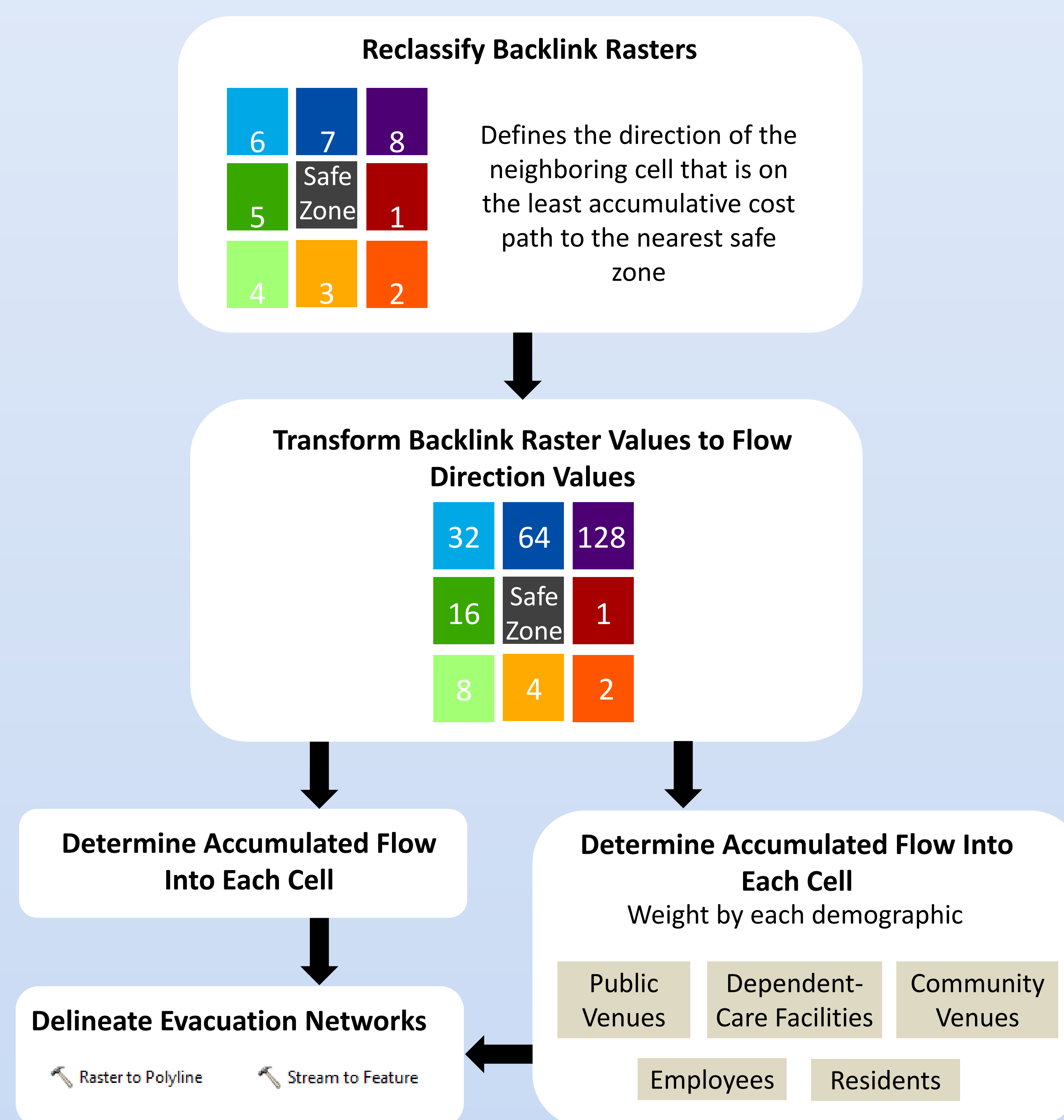
## Objective

- To estimate the least-cost paths for pedestrians given land cover barriers and to estimate the number of people traversing these paths using ArcMap's hydrology toolset
- To utilize risk mapping procedures to accurately visualize near-field tsunami risk for pedestrians

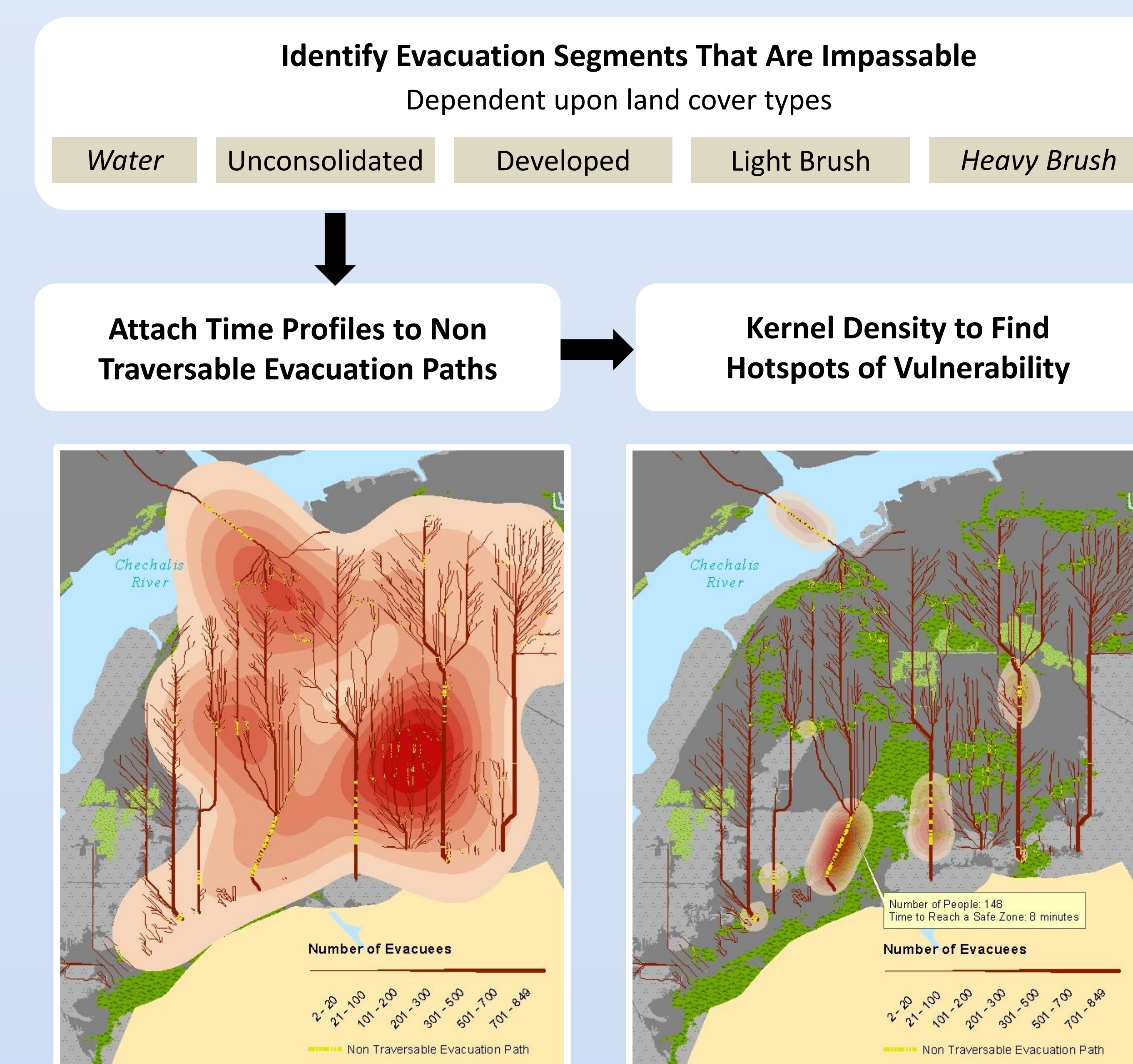
## Research Questions

- How does the use of different GIS Hydrology tools impact the development of least cost evacuation pathways?
- How can mapping risk be utilized to encourage mitigation strategy implementation?
- How can the application of cartographic principles be used to accurately portray risk?

## Methodology



## Application of Methodology



## Results and Further Analysis

- By identifying inaccessible portions of the least-cost paths to safety, mitigation efforts can be focused on congestion hotspots in terms of land cover constraints
- Future work will examine other elements of vulnerability along the estimated evacuation routes and identify problematic areas given other demographic and economic data

## Acknowledgements

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## References

- Cova, T., Johnson, J. (2002) Microsimulation of neighborhood evacuations in the urban-wildland interface. *Environment and Planning A*, 34(12), 2211-2229
- Wood, N., 2007. Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon. United States Geological Survey Technical Report.
- Wood, N., M. Schmittlein (2013) Community variations in population exposure to near field tsunami hazards as a function of pedestrian travel time to safety. *Natural Hazards*, Vol. 65, pg. 1603-1628