

LAHARS, TSUNAMIS, AND FIRES, OH MY! **COMMUNITY EVACUATION PLANNING**

ITE Western District Annual Meeting – Bellevue, Washington, 2026



Mt St. Helens Eruption, 1980, USGS



Japan 9.0 Earthquake & Tsunami, 2011, Mainichi



Santiam Fires, Oregon, 2020, Getty

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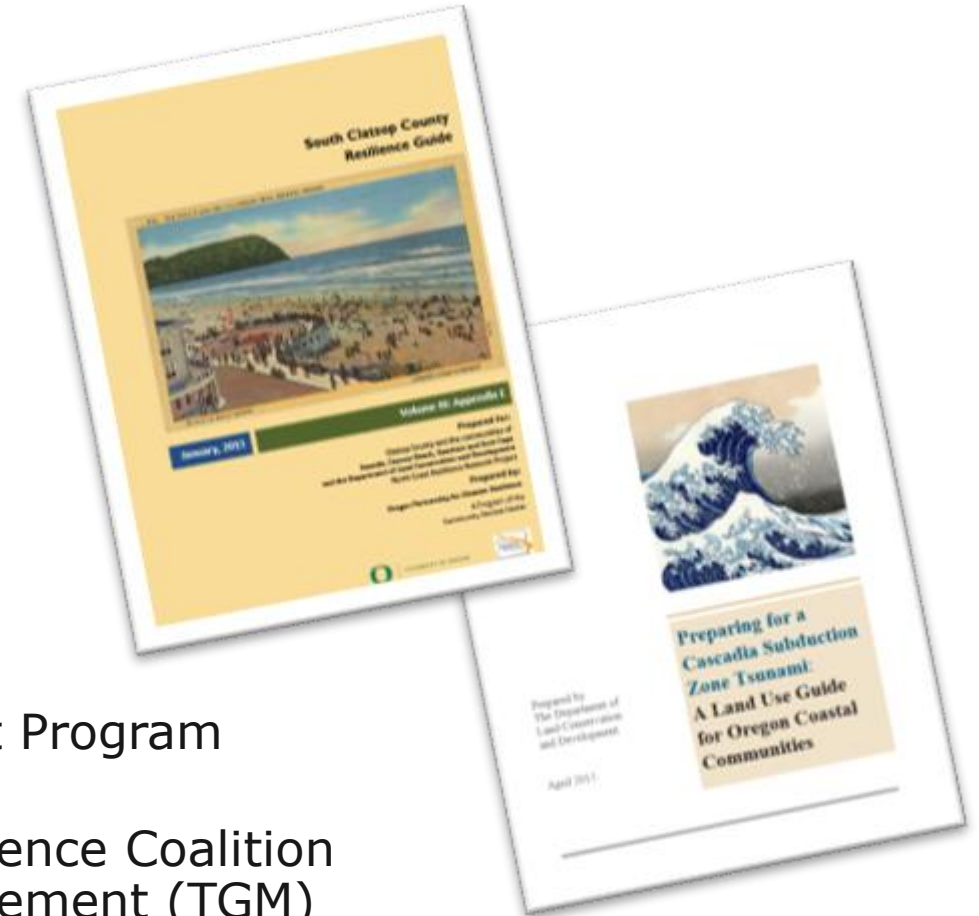
WHAT CAN COMMUNITIES DO TO PREPARE FOR AN EVACUATION?

- **Studies & Plans**

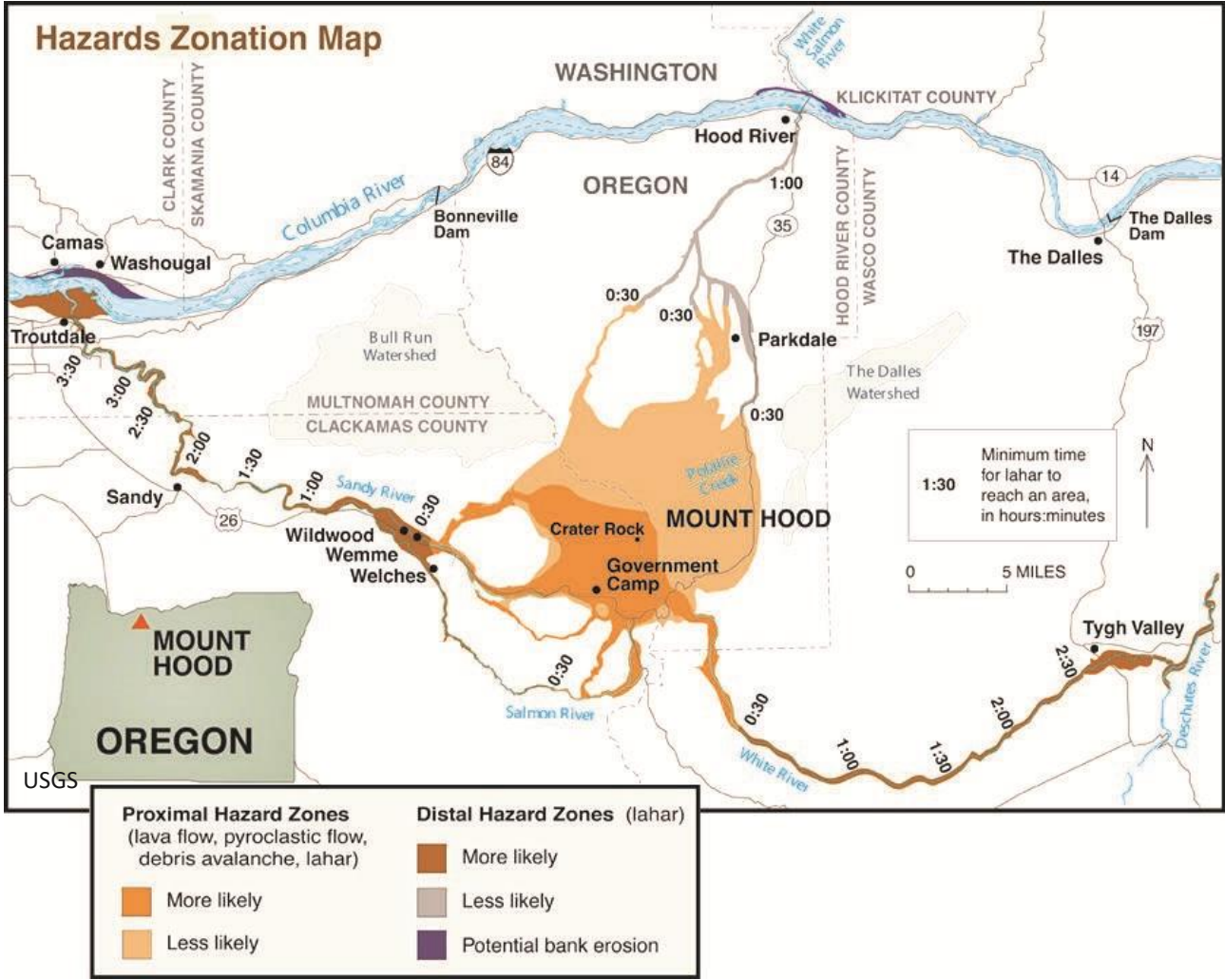
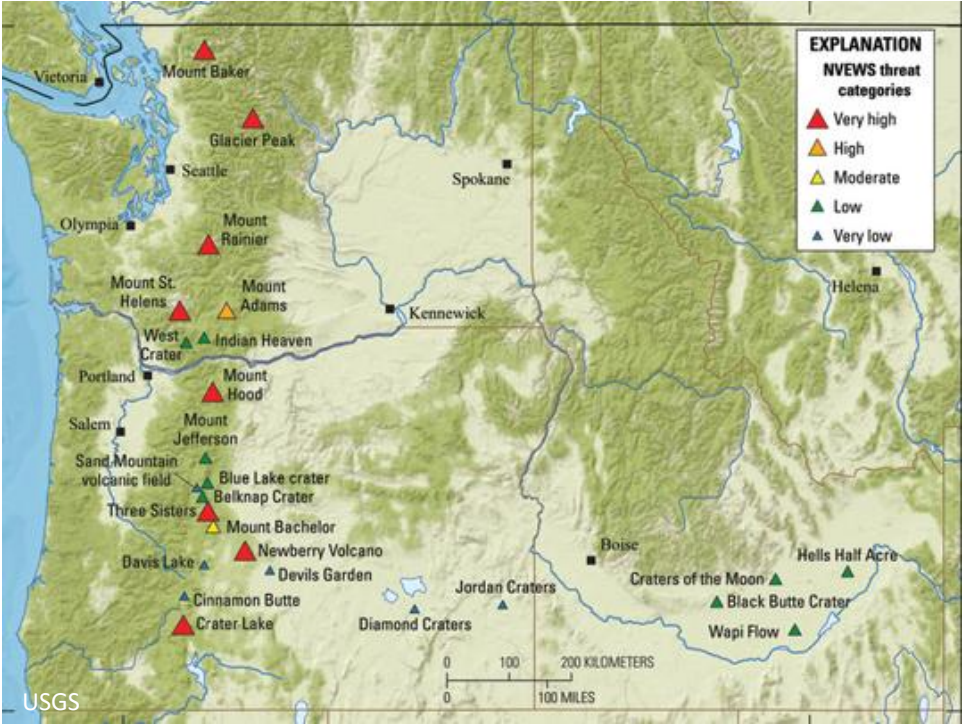
- Single or Multi-Hazard Evacuation Plans
- Resilience Improvement Plans
- Hazard Mitigation Plans
- Community Wildfire Protection Plans (CWPP)
- Transportation System / Comprehensive Plans

- **Funding**

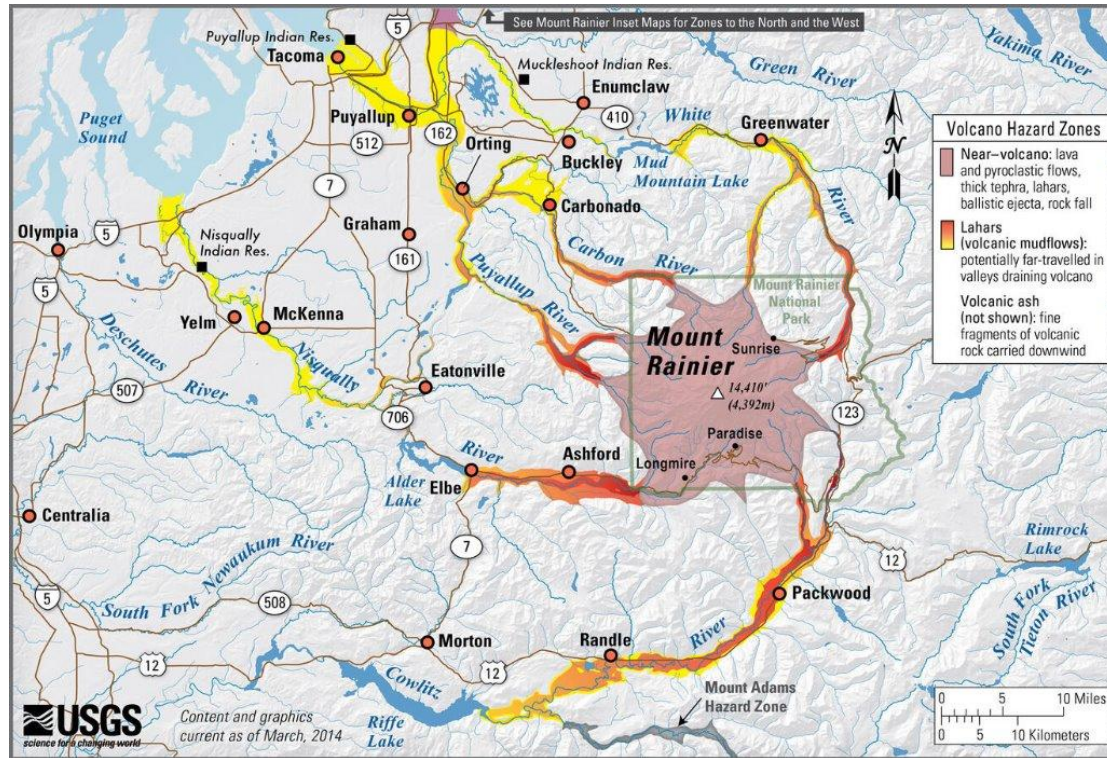
- Federal: PROTECT Grant, Hazard Mitigation Grant Program (HGMP)
- State [Oregon example]: State Community Resilience Coalition (SCRC), ODOT Transportation and Growth Management (TGM) Grant



LAHAR HAZARDS



LAHAR EVACUATION PLANNING



Lahar Evacuation



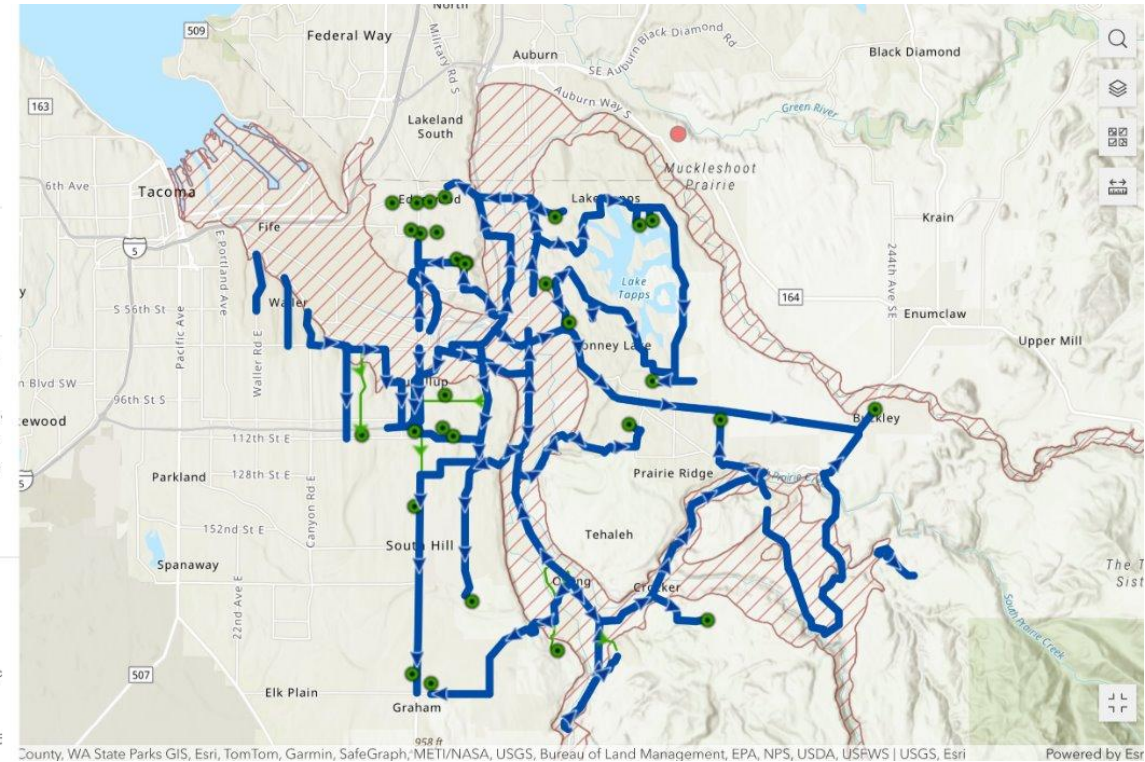
Lahar Evacuation



Regional Evacuation



Recent Earthquakes



- Potential advanced warning signs, evacuate early!
- Minimal time after eruption, go now to high ground!
- Designated routes and wayfinding to high-ground

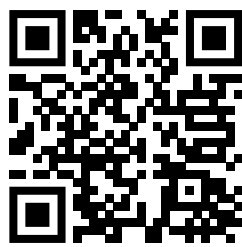
TSUNAMI PLANNING EVACUATION MAPS



Oregon

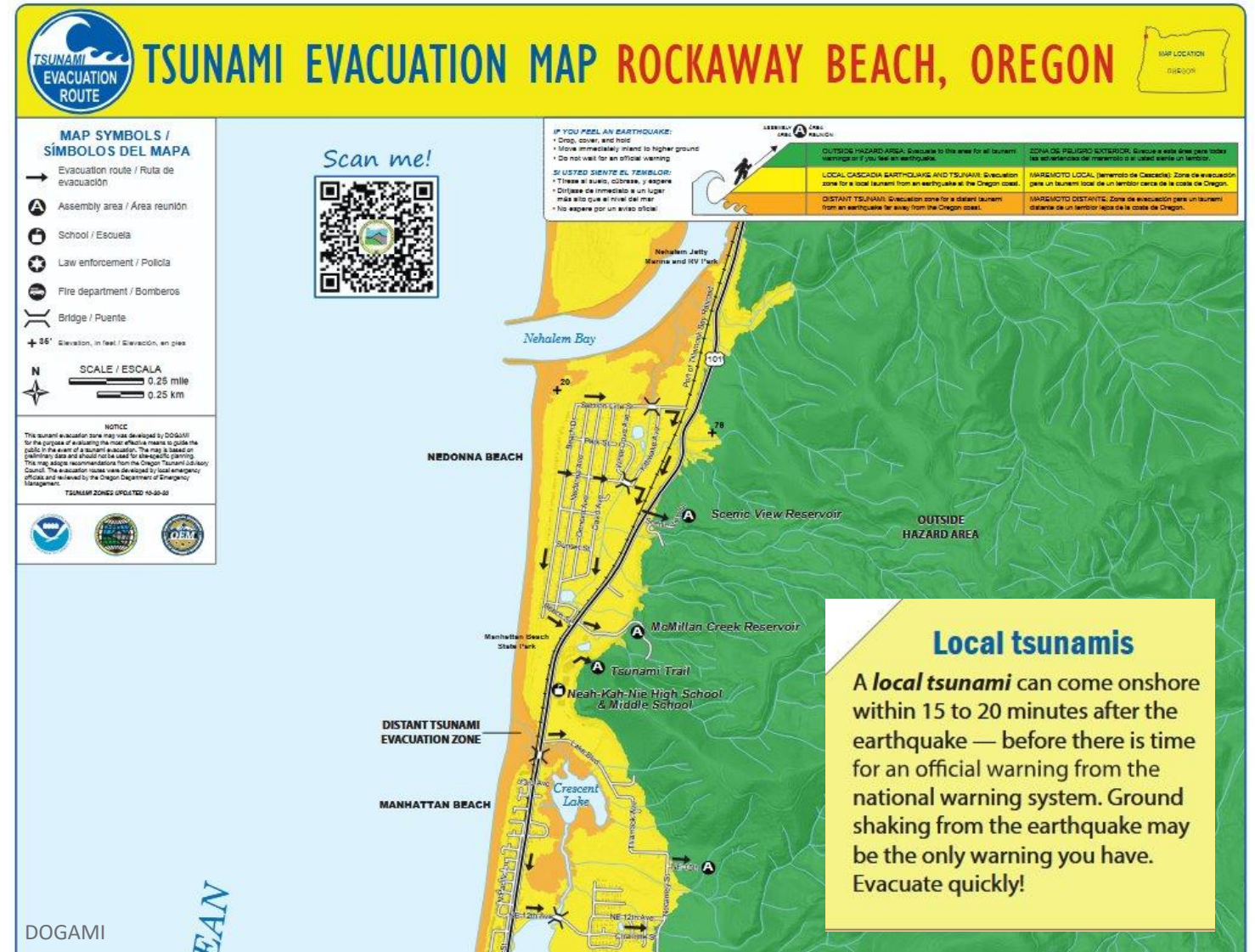


Washington



OR: www.Oregon.gov/dogami/tsuclearinghouse

WA: <https://mil.wa.gov/tsunami-resources>



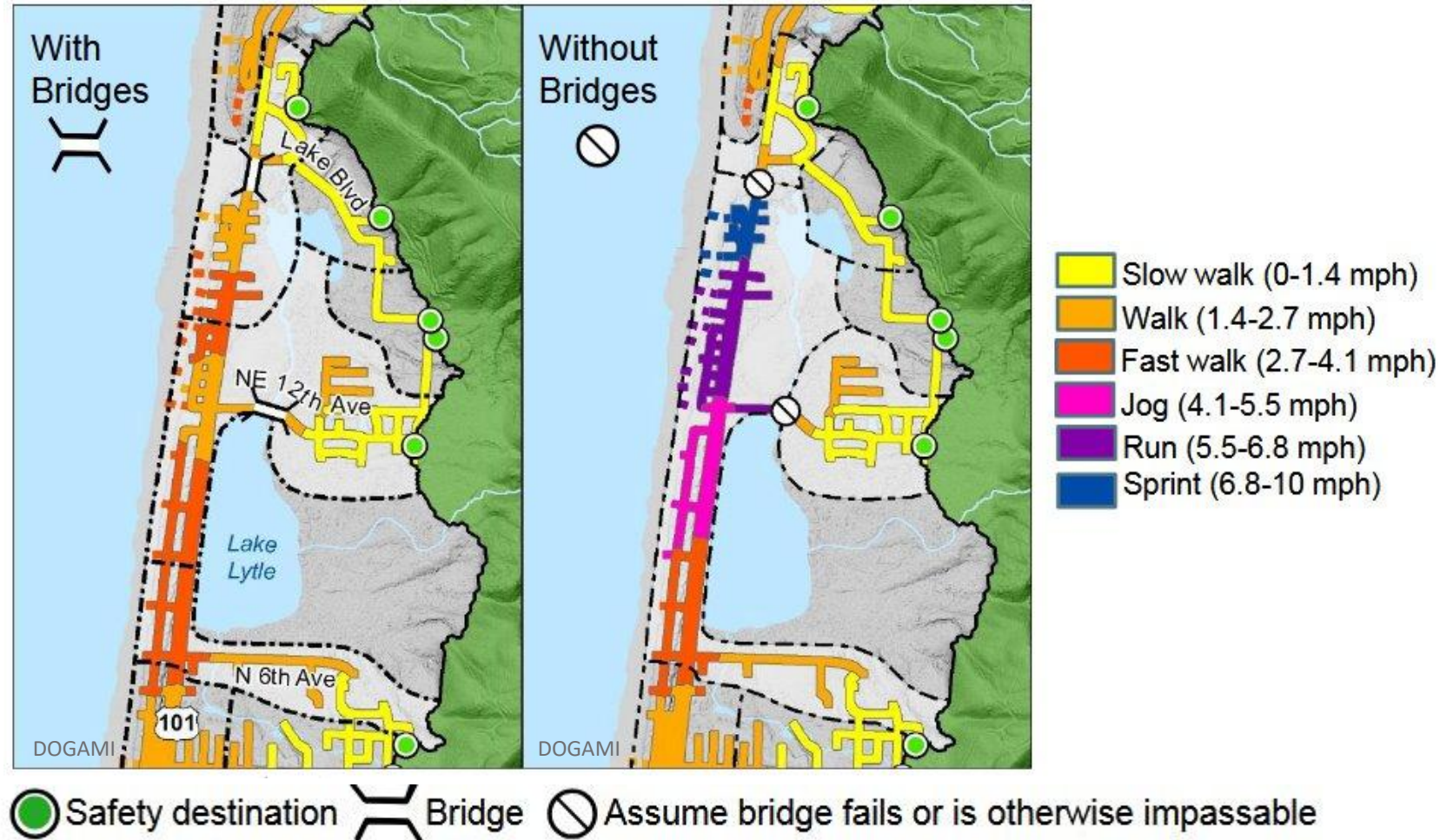
Local tsunamis

A **local tsunami** can come onshore within 15 to 20 minutes after the earthquake — before there is time for an official warning from the national warning system. Ground shaking from the earthquake may be the only warning you have. Evacuate quickly!

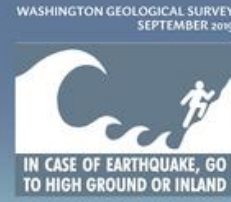
BEAT THE WAVE TECHNICAL MAP SCENARIOS



DOGAMI



DKS



MITIGATION SOLUTIONS

- **Secondary egress**
- **Trails**
- **Vertical evacuation structures**
- **Assembly areas**
- **Bridge seismic retrofits**
- **Wayfinding**

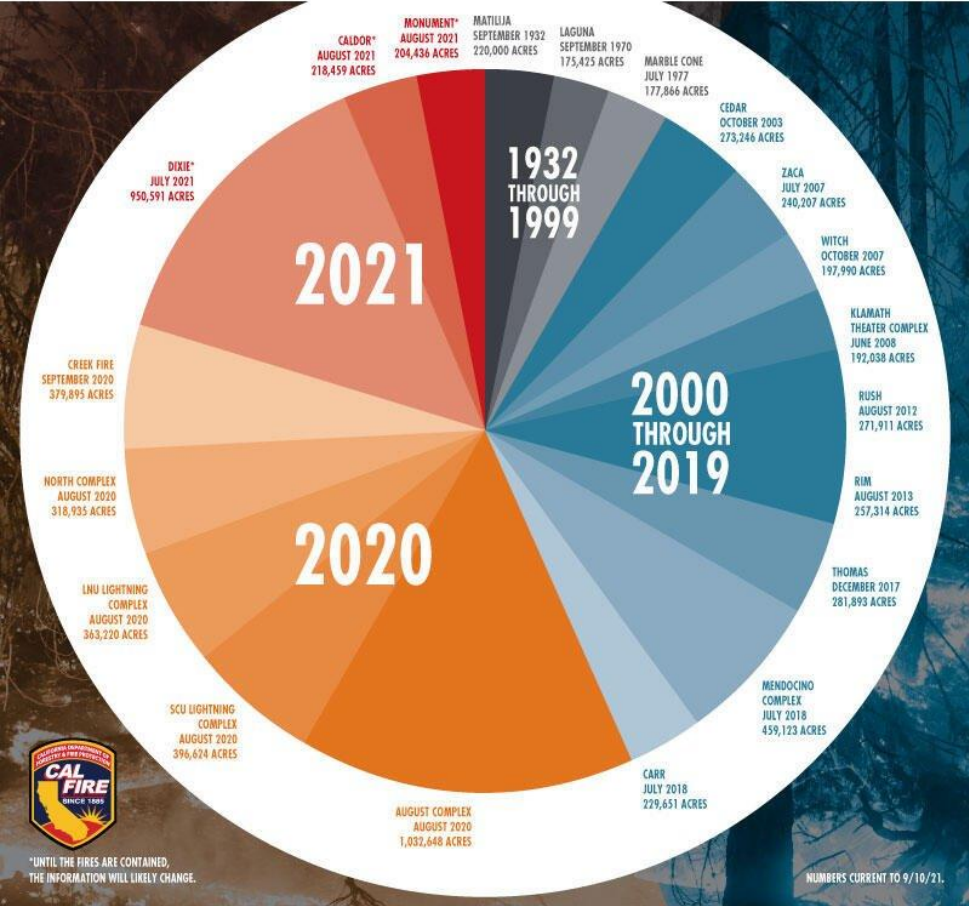


WILDFIRE EVACUATION PLANNING NEED

Oregon 2020 Labor Day Fires



TOP 20 LARGEST CALIFORNIA WILDFIRES



Tragic Outcomes

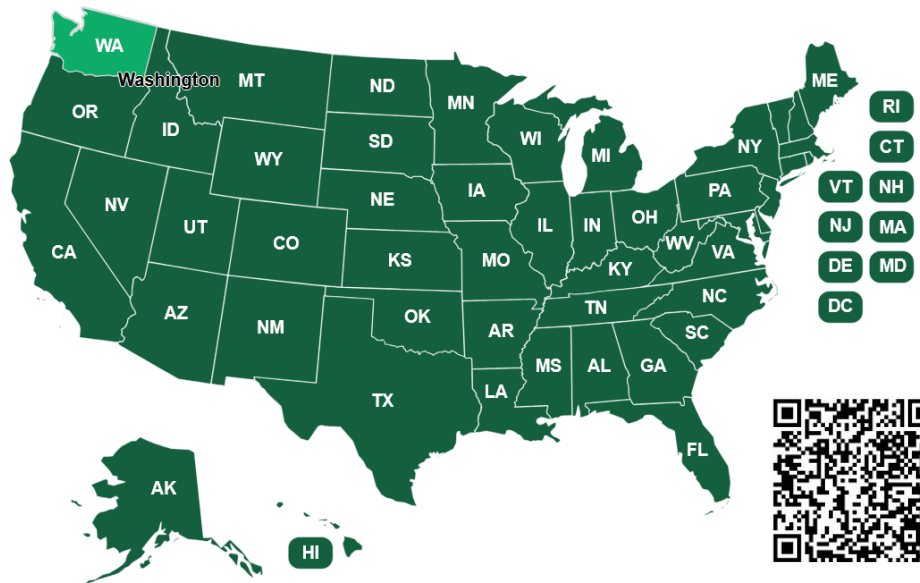


WILDFIRE PLANNING GUIDANCE

Community Wildfire Planning Center: www.communitywildfire.org



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WASHINGTON

WUI Mitigation Codes, Standards, Programs, and Guidance

This CWPC report provides a comparative analysis to inform community wildfire risk reduction in Washington.

Wildfire Hazard and Risk Mapping

WA DNR website on the development of a wildfire hazard and risk mapping initiative, as directed by Senate Bill 6120.

Washington State Fire Adapted Communities Learning Network

This website includes resources for before, during, and after the fire for residents, neighborhoods, businesses, land owners, first responders, community groups and local leaders.

Land Use Planning Approaches in the Wildland-Urban Interface

This report analyzes four western states, including Washington, to show how different state frameworks address the WUI through planning and legislation.

An Introduction to Land Use Planning for Wildfires – Participant Training Handout

This is the participant package that attendees of the Introduction to Land Use Planning for Wildfire training course can download and use while attending the training.

National Resources

Planning the Wildland-Urban Interface

This publication by the American Planning Association and USDA Forest Services is free and offers a comprehensive overview of the wildland-urban interface, wildfire hazard, wildfire risk, planning tools, and examples from across the U.S..

Fire Adaptations in Four Western Counties

A CWPC report highlighting how four counties (Deschutes, Boise, Chelan, Larimer) and associated landscapes are adapting to wildfire.

National Wildland-Urban Interface Maps

National WUI maps and data published by University of Wisconsin-Madison SILVIS Lab.

Wildland Urban Interface Resources

The U.S. Fire Administration provides resources and information to help communities prepare for wildfire.

County Wildfire Playbook

This interactive guide by the National Association of Counties (NACo) provides wildfire planning resources for counties based on their level of capacity.

Wildland Urban Interface Wildfire Mitigation Desk Reference Guide

This guide is published by the National Wildfire Coordinating Group (NWCG) to promote common usage of wildfire mitigation terms and definitions.

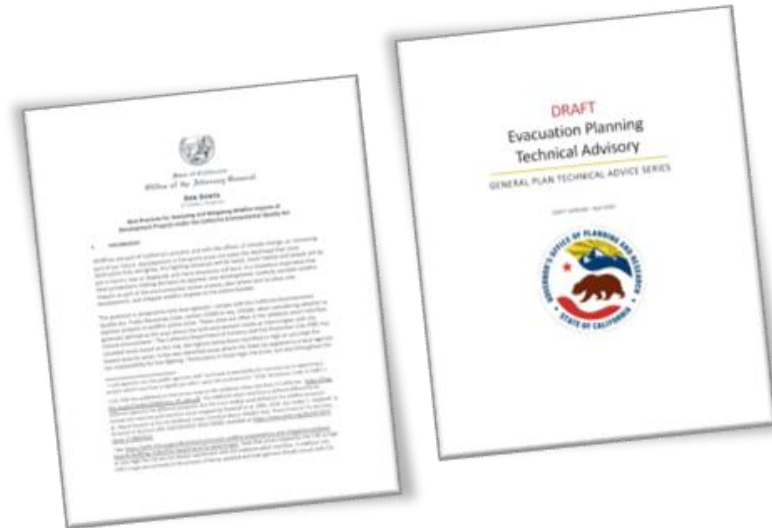
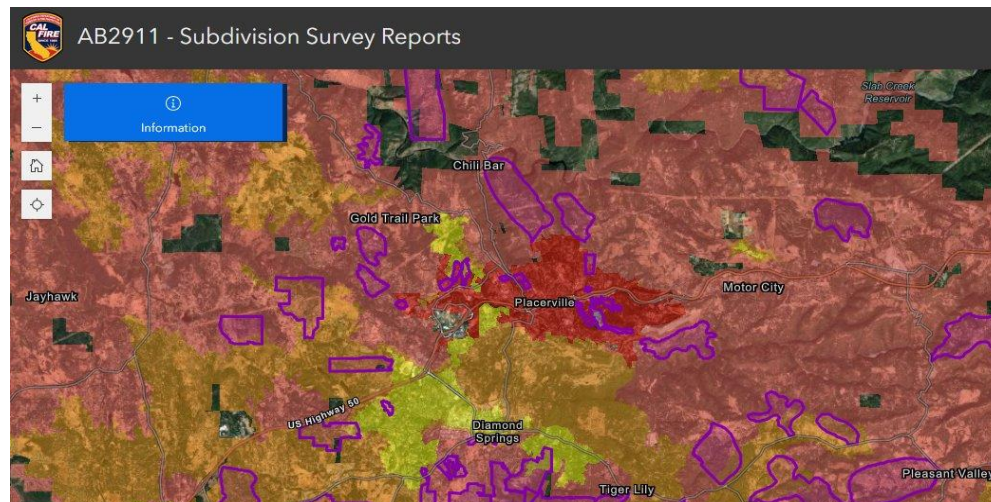
Wildfire Mitigation Assessment (MAT) Reports

Post-fire assessments and technical guidance from FEMA to inform wildfire resilient building and planning decisions at the property and subdivision scales.

CALIFORNIA REGULATION

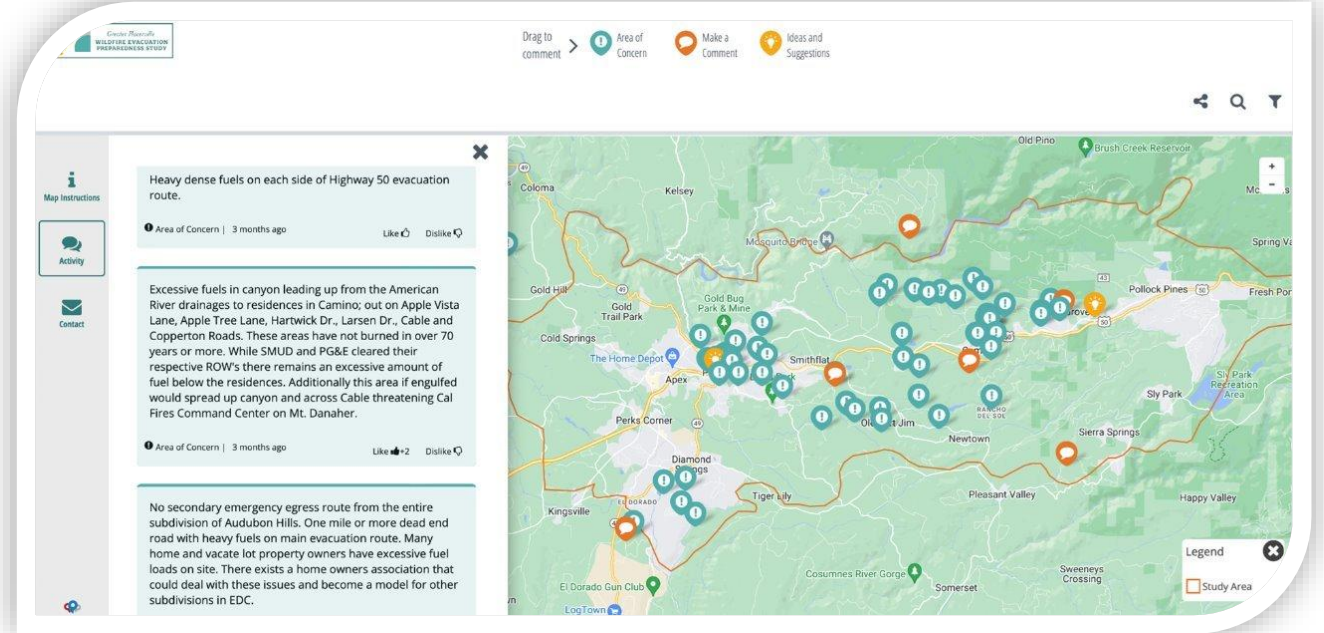
General Plan – Safety Element Update

- SB 99 (2019): Identify residential developments in any hazard area that do not have at least two emergency routes
- AB 747 (2019) and AB 1409 (2021): Identify evacuation routes and their **capacity**, **safety**, and **viability** and **evacuation locations** under a **range of emergency scenarios**



PUBLIC OUTREACH

- Outreach should address local hazards and community context
- *Boots on the ground:* Pop-up events, Fires Safe Councils, stakeholder groups
- *Engaging Tools:* Social Pinpoint comment and idea mapping



EVACUATION SCENARIO DEVELOPMENT

What evacuation scenarios will stress the transportation system the most?

What evacuation scenarios keeps responders up at night?

Evacuation Scenario Development

- Limited-notice scenarios across County (wildfire & flood)
- **Incident Scenario Parameters:** Origin, direction, rate of spread, season, time of day
- **Evacuation Order parameters:** zones, evacuation demand, destination direction percentages, traffic control points, departure time distribution



DATA ANALYSIS & MODELING

Simulation-based dynamic traffic assignment (DTA) model:

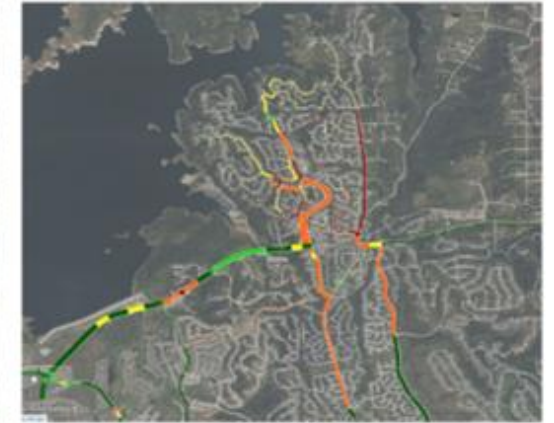
- Complete roadway system and capacity
- Traffic routes responds to congestion
- Who is evacuating: household, employee, visitors
- Evacuation departure timelines
- Evacuation destinations
- Evacuation order closures

Insights:

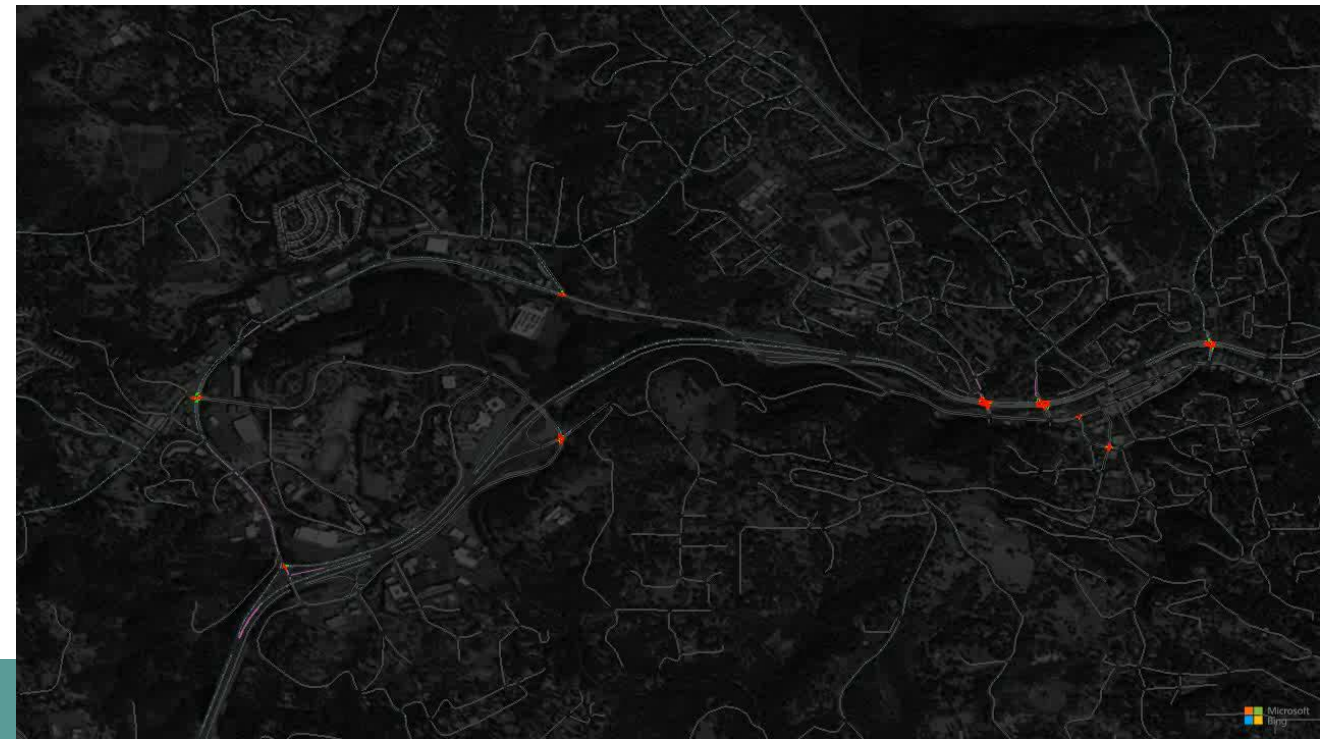
- Evacuation Time Estimates (ETEs)
- Travel time to destinations
- Identification of Resource Needs
- Identification of Infrastructure Mitigation Projects



01:00



01:10



RECOMMENDED TRANSPORTATION IMPROVEMENTS

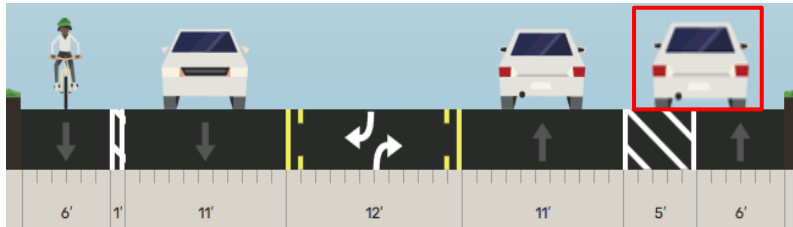
- **Infrastructure**

- Secondary egress, shoulder widening, buffered bike lanes, intersection control, trail connections, wayfinding, striping
- Connected traffic signals, remote cameras, microgrids, backup power, utility pole undergrounding/hardening

- **Operational Strategies**

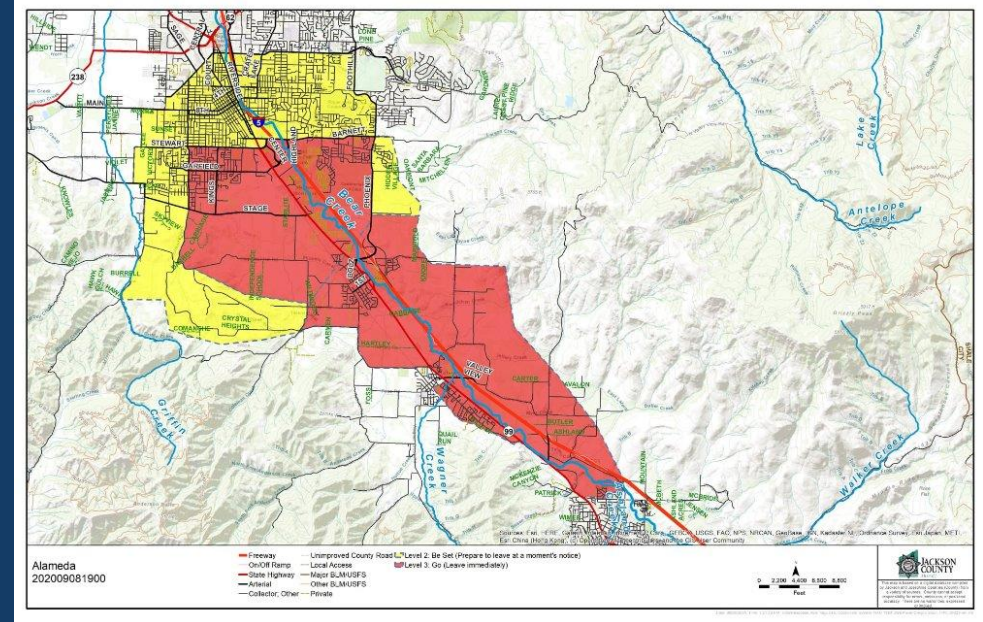
- Connected traffic signals, traffic control points, road closures response times

- **Cost Estimates and Funding Sources**



EVACUATION PLANNING TAKEAWAYS

- Increasing frequency and severity of disasters have an increasing need to evacuate populations out of harms way
- Funding for studies and mitigation improvements can be a challenge to secure
- Incorporate resiliency planning into traditional planning documents and align mitigation projects with safety, maintenance, and/or capitol project plans to increase odds of funding
- Choose the right level of analysis based on the hazards and local context
- Engage everyone!



QUESTIONS?



Dixin Yan

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