Communities-at-Risk
Housing and Long-term Recovery Challenges

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HAYWIRED

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HayWired Damages

Mainshock and Aftershock damages

- $72B regionwide.; $33B in Alameda County
- Extensive/Complete damage is 8% of 9 county buildings; 27% of Alameda County

Population effects

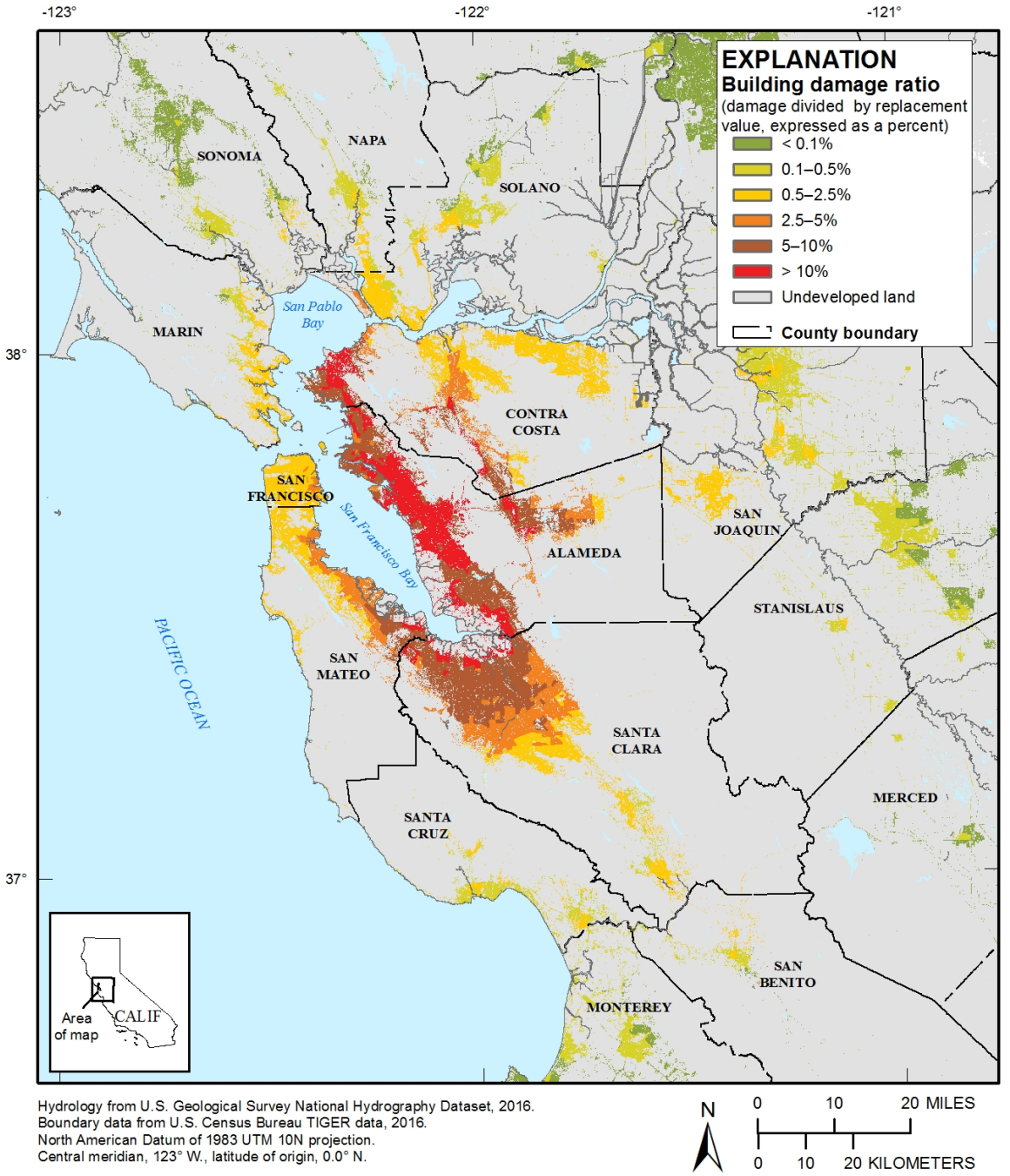
- 800 Deaths; 1800 injuries
- 77,000-152,000 displaced households

Earthquake insurance payouts

- 9% of residential, 20% of commercial damages
- 60% insured losses in Alameda, 17% in Santa Clara, 11% Contra Costa, <5% elsewhere

Fire following Earthquake

- Another $30 B in property losses
- Increases deaths, injuries, displacement



HayWired Scenario – Communities-at-risk Analysis

Damage Footprint and Dollars – High-impact areas were defined by combining the Hazus estimates of building damage resulting from earthquake shaking, landslide and liquefaction damage with the fire following earthquake damage

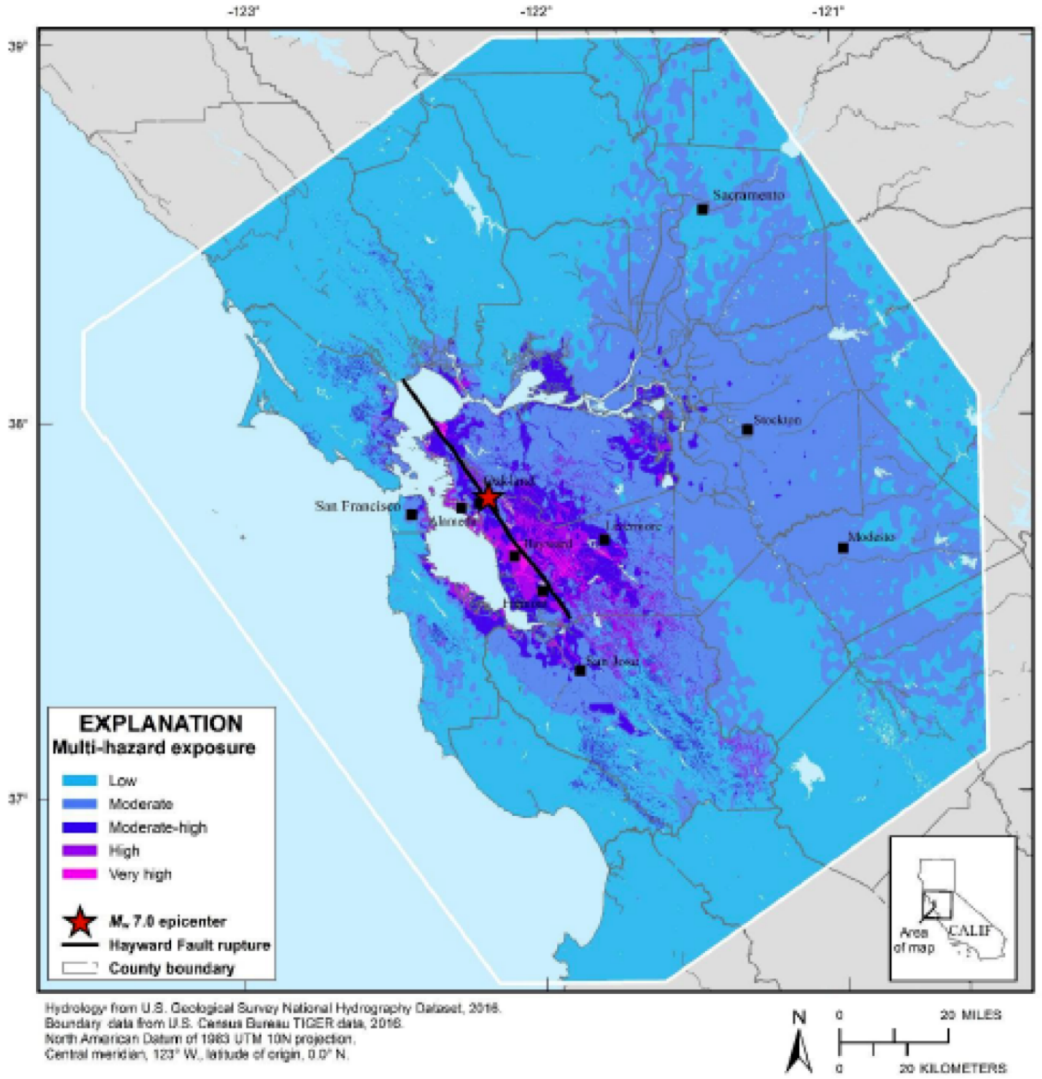
Population Displacement – Consider recent studies of short- and long-term population displacement following large-scale disasters and analyze displacement risk using a range of methods – Hazus, damage footprints and utility disruptions, and socioeconomic vulnerability

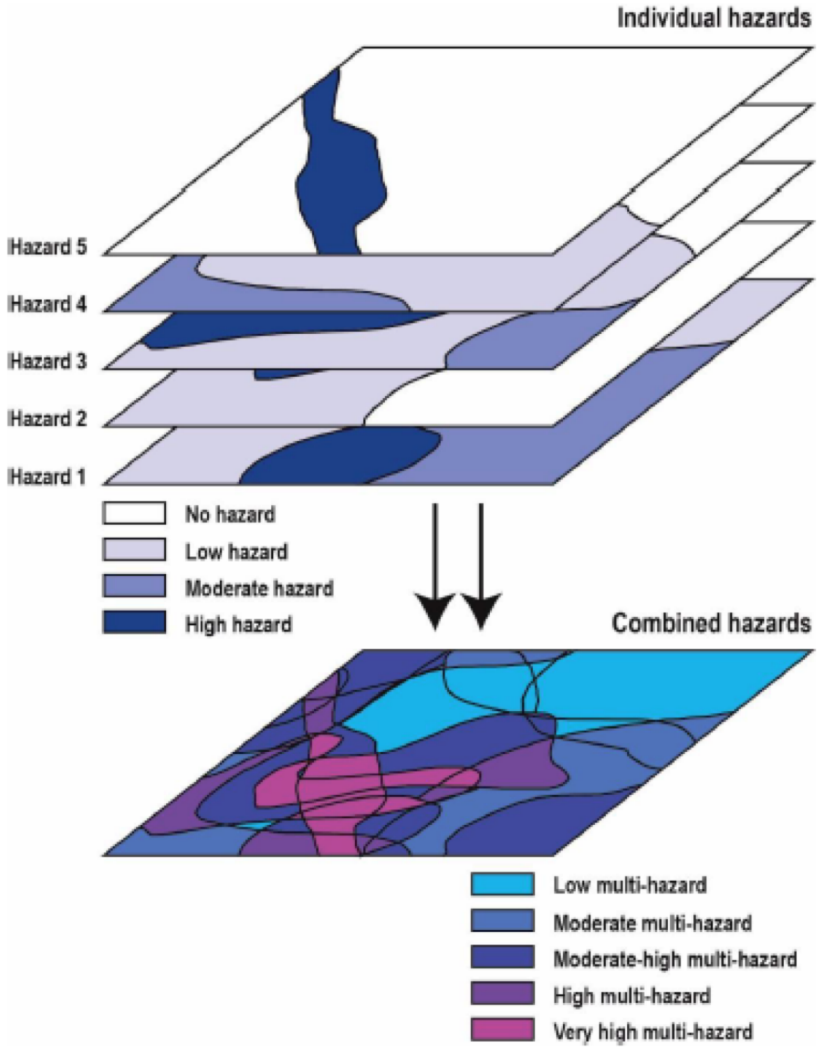
Long-term Community Recovery – Identify the potential long-term recovery challenges for communities and residents after a catastrophic earthquake like the HayWired Scenario

Community Resilience – Highlight the spatial and systematic approach needed to build community resilience and truly realize the community-wide benefit of individual resilience efforts

Combined Hazard Exposure:

Earthquake ground shaking, landslides, liquefaction and fires



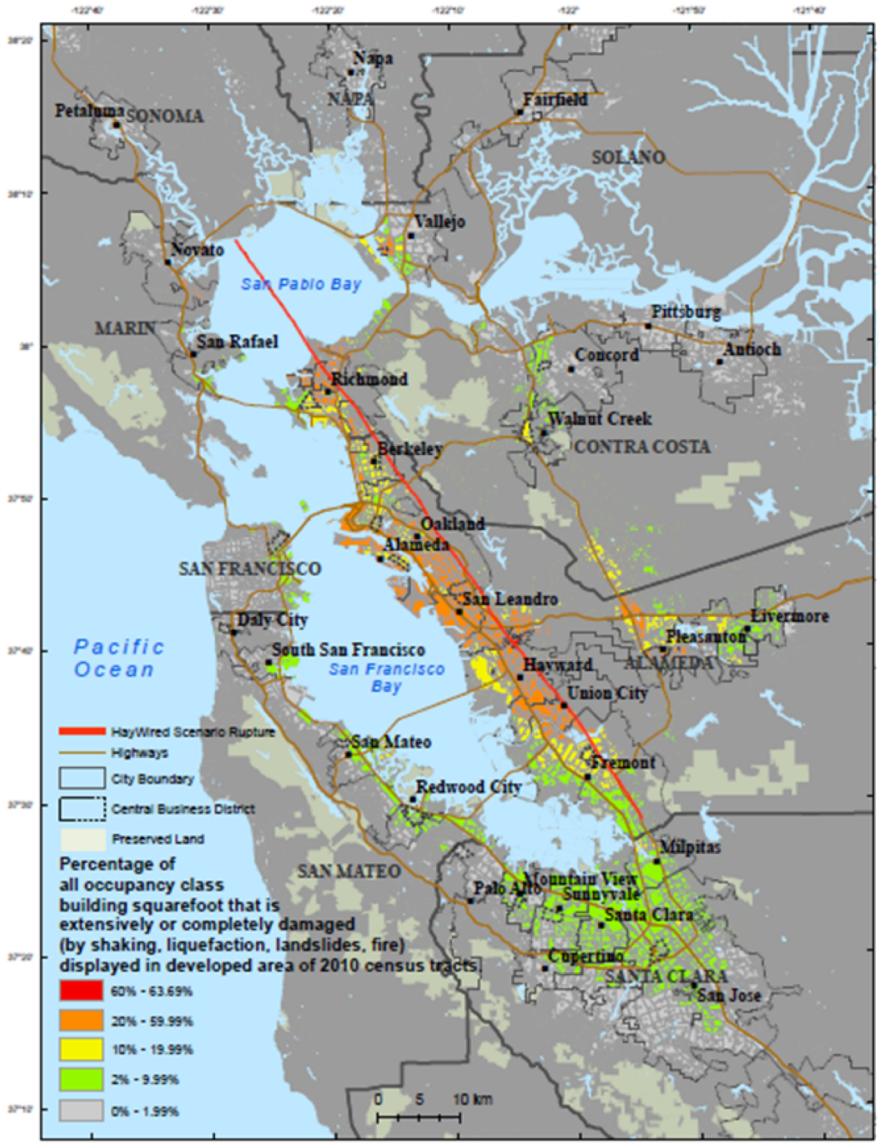


Combined Damage “Footprint”

Combined effects of earthquake ground shaking, landslides, liquefaction and fires

- Nearly 1 million residential buildings (1.4 million housing units) and nearly 40,000 non-residential buildings sustain damage. Almost 1/3 of Bay Area housing stock would be damaged
- 100,000 residential buildings sustain extensive or complete damage

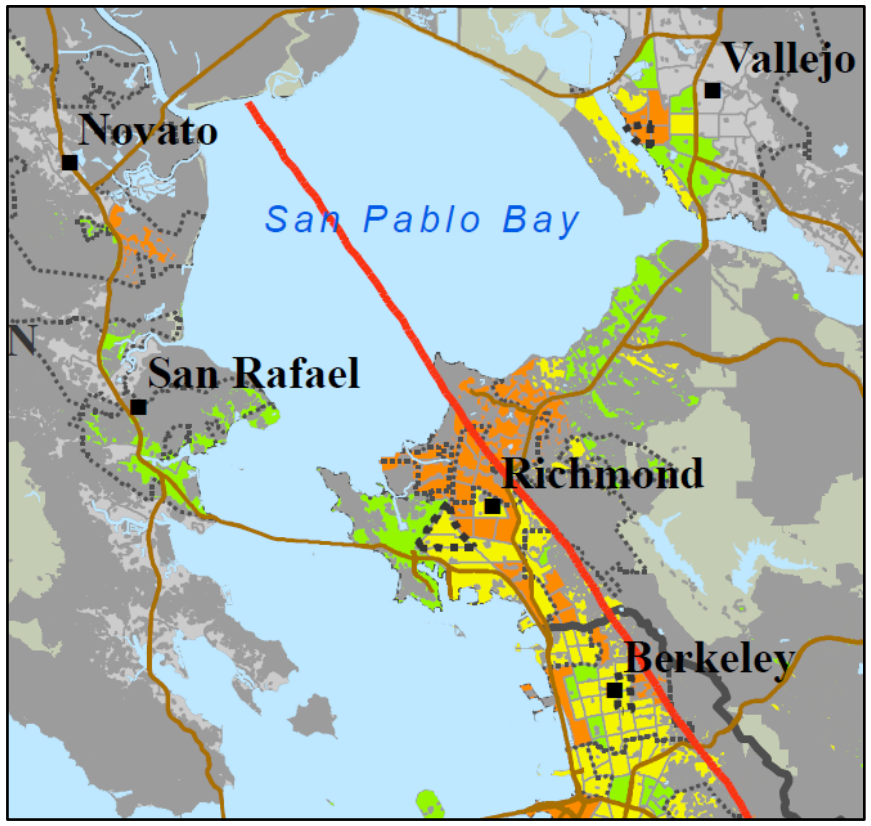
High-impact areas cover only 8% of all census tracts in the 9-county region, but contain nearly 50% of all housing that is likely to be uninhabitable or completely destroyed and 600,000 employees



Percentage of all building square footage in a census tract in an extensive or complete damage state

- >60%
- 20% - 60%
- 10% - 20%
- 2% - 10%
- <2%

High Impact Areas: Central Alameda and Western Contra Costa counties



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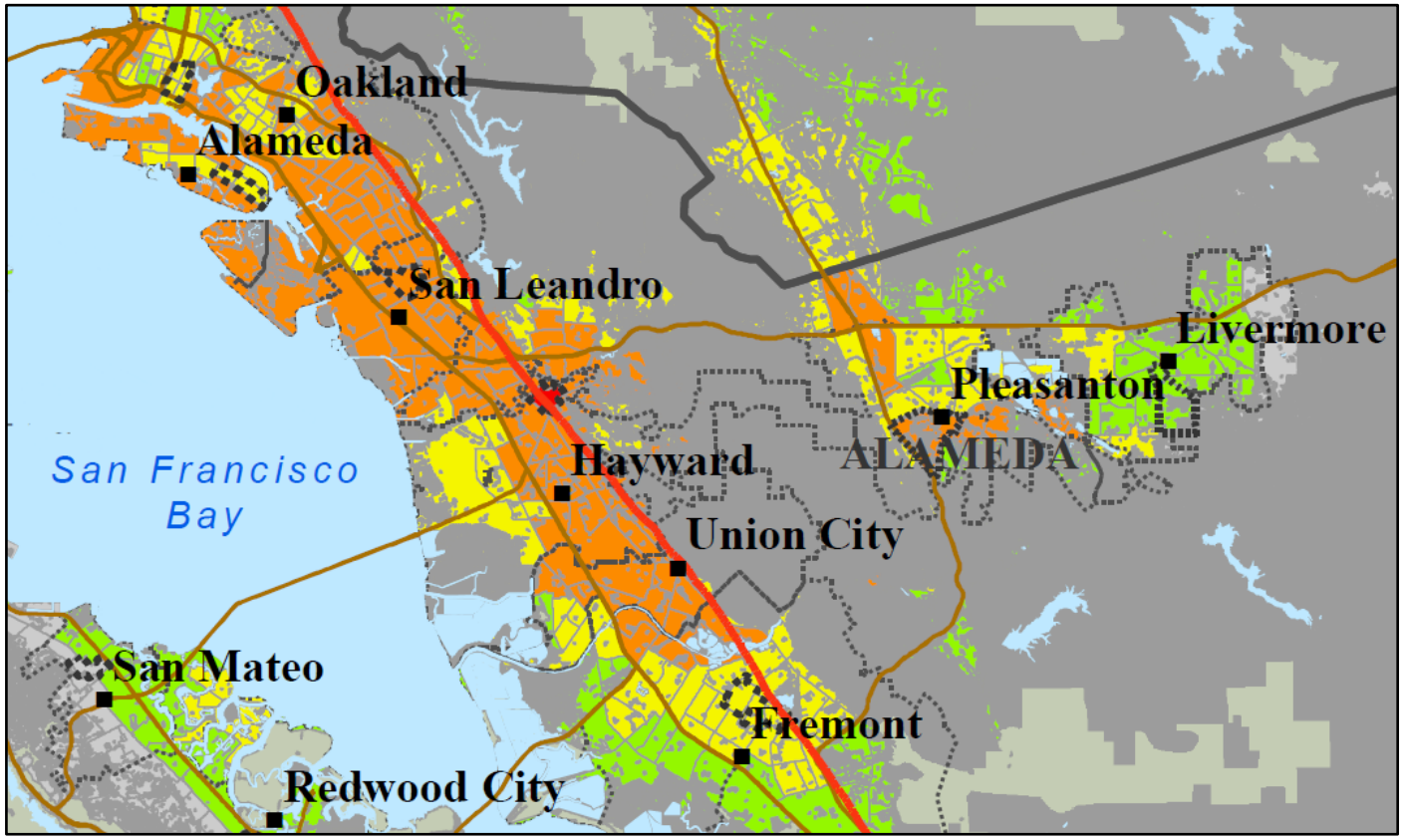


Potential Population Displacement

Factors affecting initial and subsequent waves of displacement:

- **Direct damage and access to housing**
- **Lifeline utility and community service outages**
- **Environmental health effects**
- **Aftershocks**
- **Social vulnerability and access to resources**
- **Availability of interim housing**
- **Availability of employment and education**

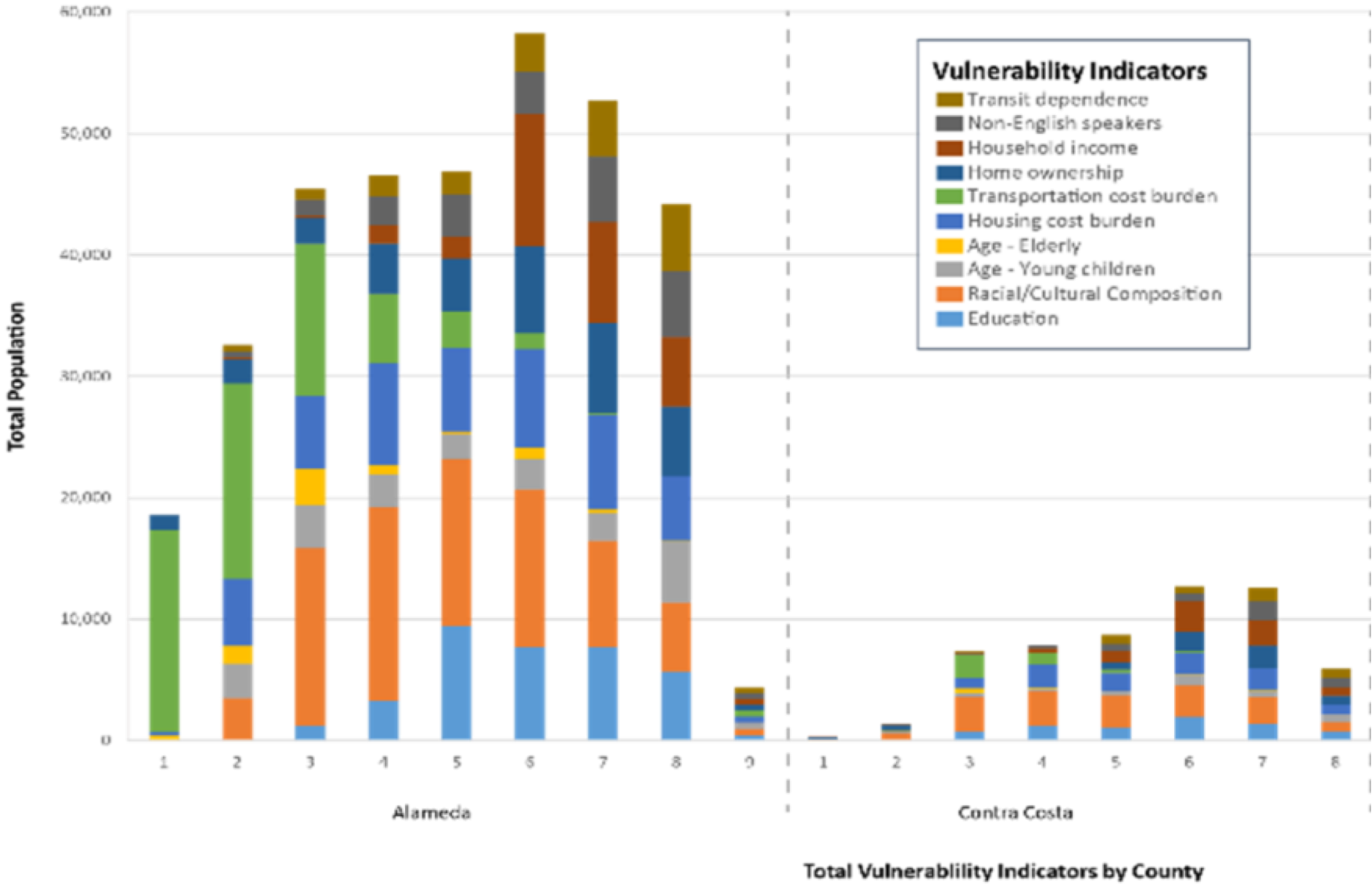
Where are the receiving communities?

What are the rates of population return and newcomers?

	Households	Population
Hazus analysis of mainshock - ground shaking and liquefaction only	152,881	414,298
Integrated damage data of mainshock increased by 20% to account for long-term utility outages	267,510	719,601
High-impact footprint for all occupancies combined	267,631	765,402
High-impact footprint for single family/duplex dwellings	128,543	363,315
High-impact footprint for multi-family dwellings	520,210	1,451,838
Hazus analysis of aftershocks– earthquake shaking only	2,845	7,653

Social Vulnerability

- 14% of Alameda County population (207,000 people) and 4% of Contra Costa County (40,000 people) reside in high-impact areas with 5 or more of the 10 community vulnerability indicators



Utilities and Transportation Disruption

Electric power: 3-4 weeks

Fuel: 7 -10 days (minimum)

Voice and data: 7-10 days

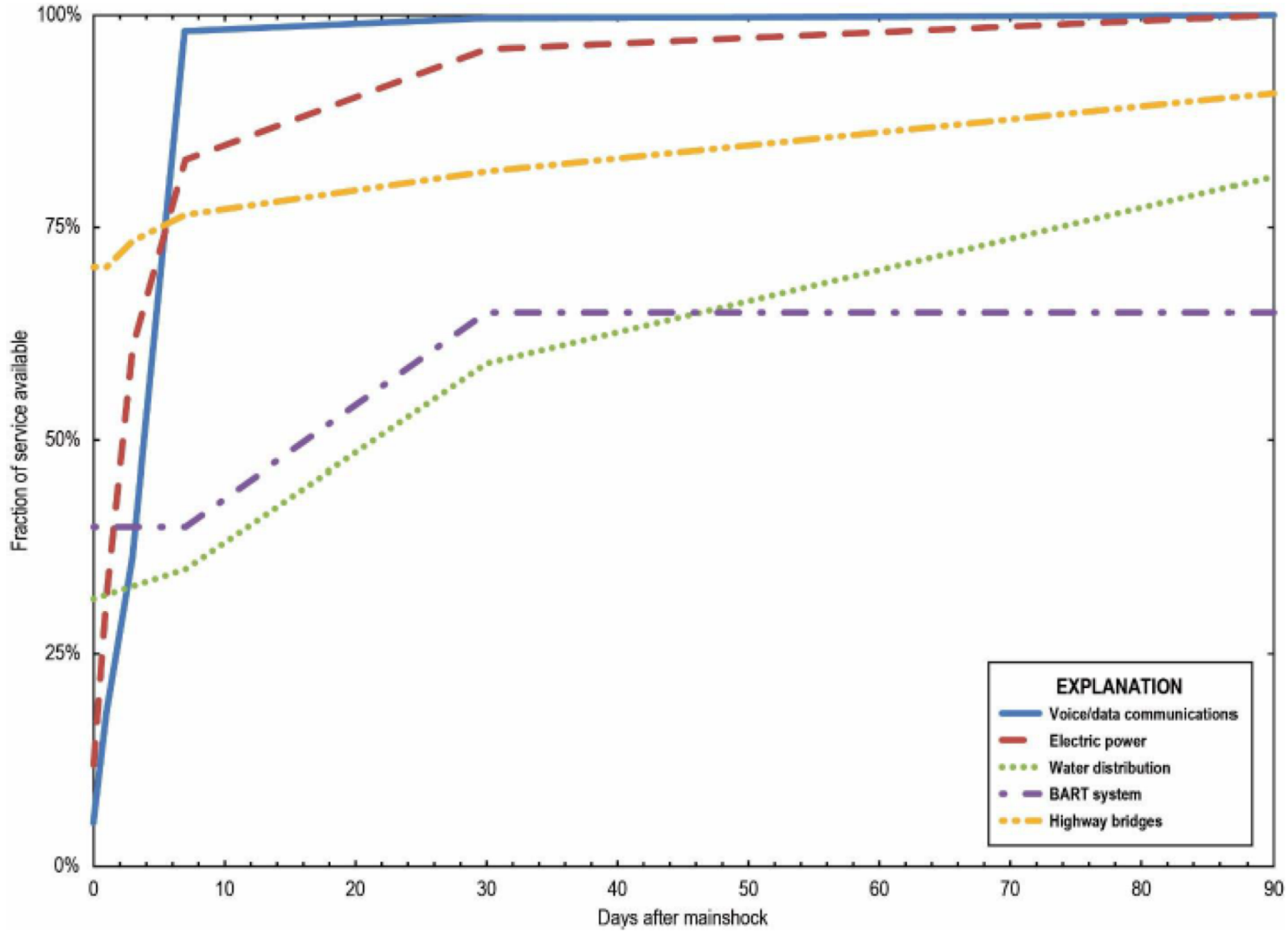
Water: up to 6 months in core damage areas

Highway bridges: up to 4-10 months

BART stations: up to 1-3 years

Longest restoration times in Alameda, Contra Costa (water) counties

Intermediate restoration times in Contra Costa, San Mateo, Santa Clara, San Francisco counties



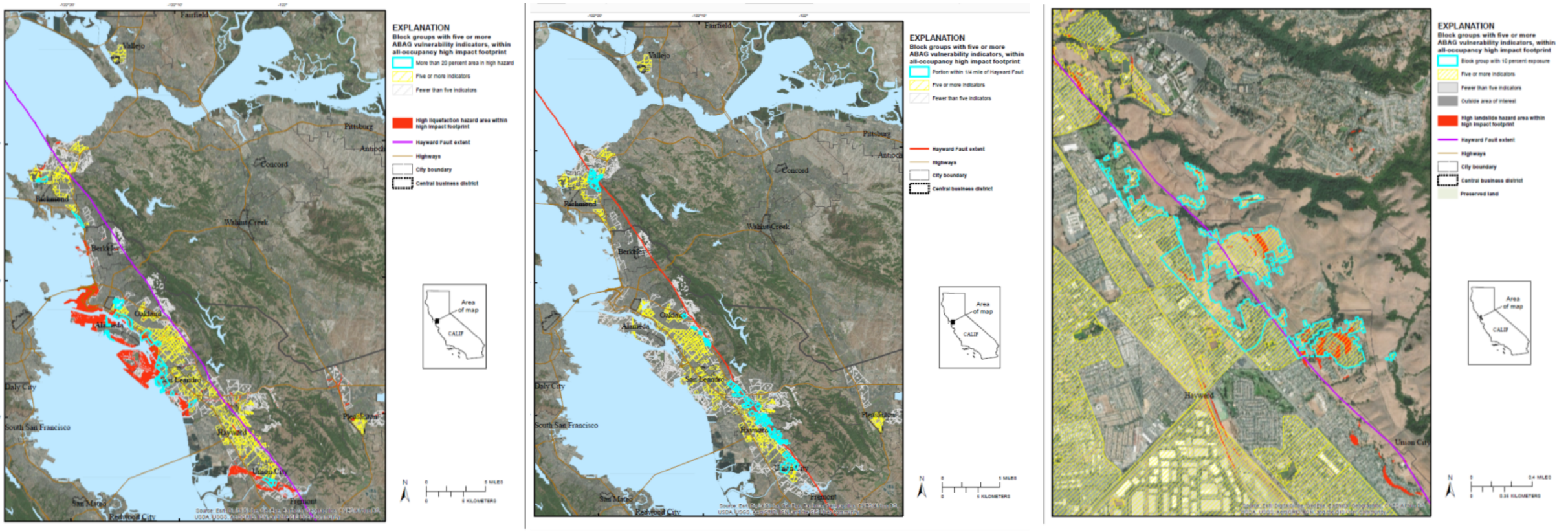
Alameda County lifeline restoration time lines

Long-Term Recovery Challenges

Availability and access to recovery dollars and resources

Repairing and rebuilding damaged housing

Addressing areas requiring substantial re-planning and governmental intervention in order to recover



Blue outlined areas have both high social vulnerability and high hazards (liquefaction, surface faulting or landslides

Opportunities to Improve Community Resilience

1. Accelerate systematic retrofit or replacement of the region's extensive stock of seismically-vulnerable housing.
2. Set region-wide lifeline infrastructure seismic performance objectives and undertake a regionally-shared approach to prioritizing and financing upgrades to the region's seismically-vulnerable lifeline infrastructure, especially water distribution systems.
3. Building more housing in safe locations and to modern or higher construction standards.
4. Acknowledge and address the risks that seismically-vulnerable housing and lifelines pose to communities and the region in local and regional policies.
5. Place greater emphasis on the risk of disaster-induced population displacement, especially vulnerable populations, in government, individual and business response planning, exercises, preparedness campaigns and training.
6. Plan for long-term recovery at all levels of government.
7. Understand and plan for post-earthquake recovery financing at all scales—individuals, businesses, communities, regionally, and even at the state level.