

Loss-Estimation Modeling of Earthquake Scenarios for Each County in Nevada Using HAZUS-MH

Nevada Bureau of Mines and Geology
Open-File Report 06-1
University of Nevada, Reno

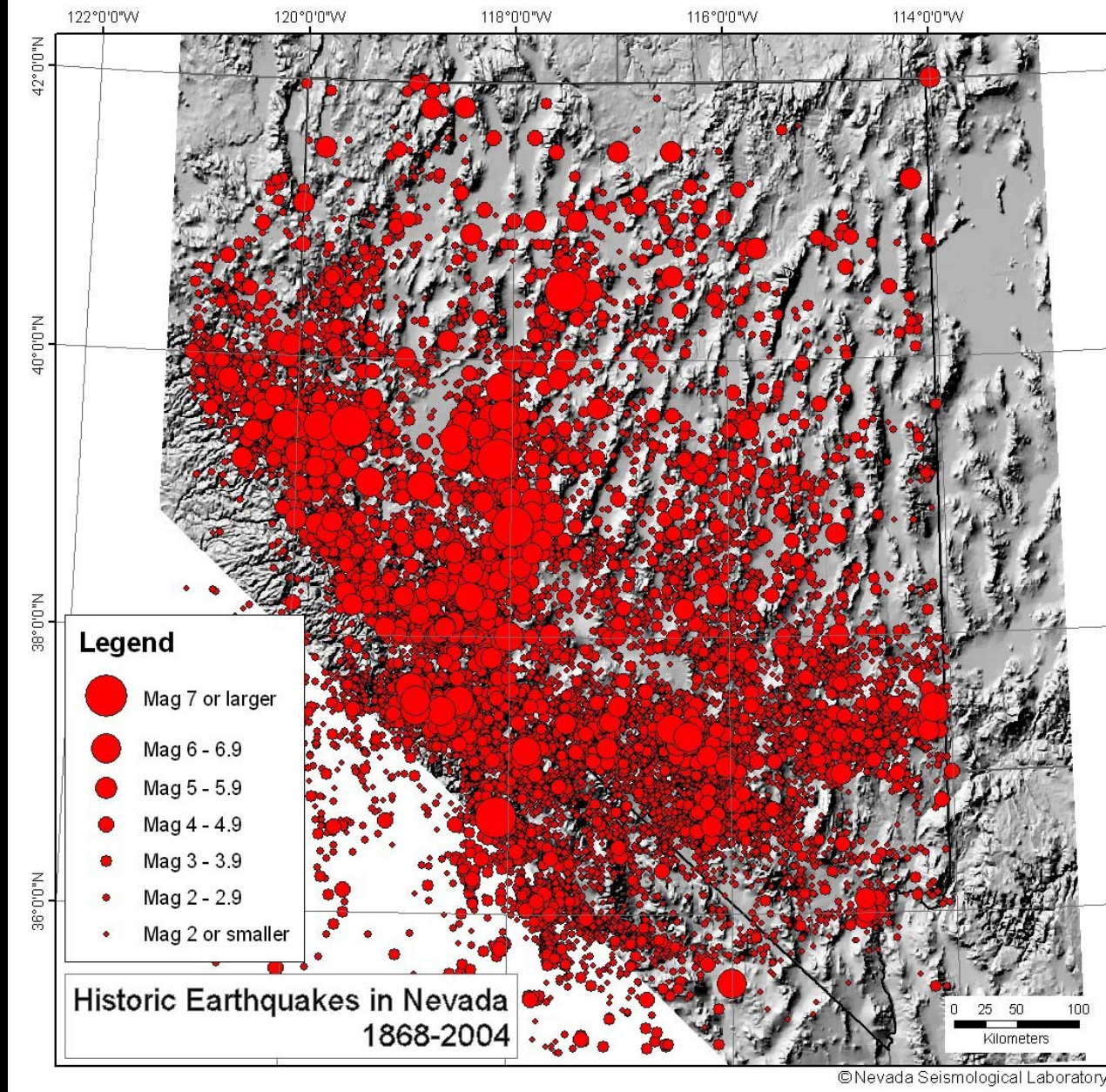
There are huge risks.

We can take action to reduce the risks.

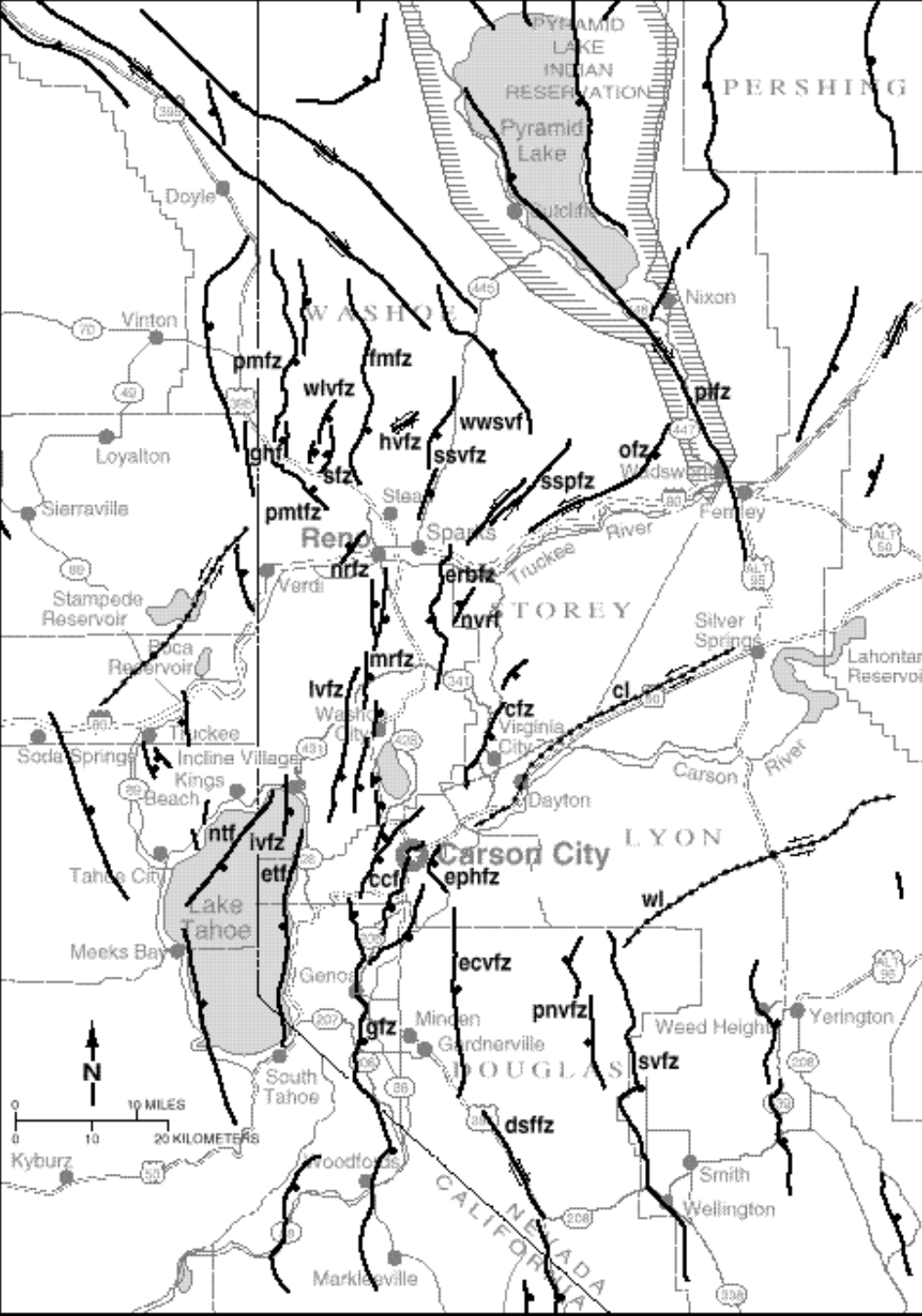


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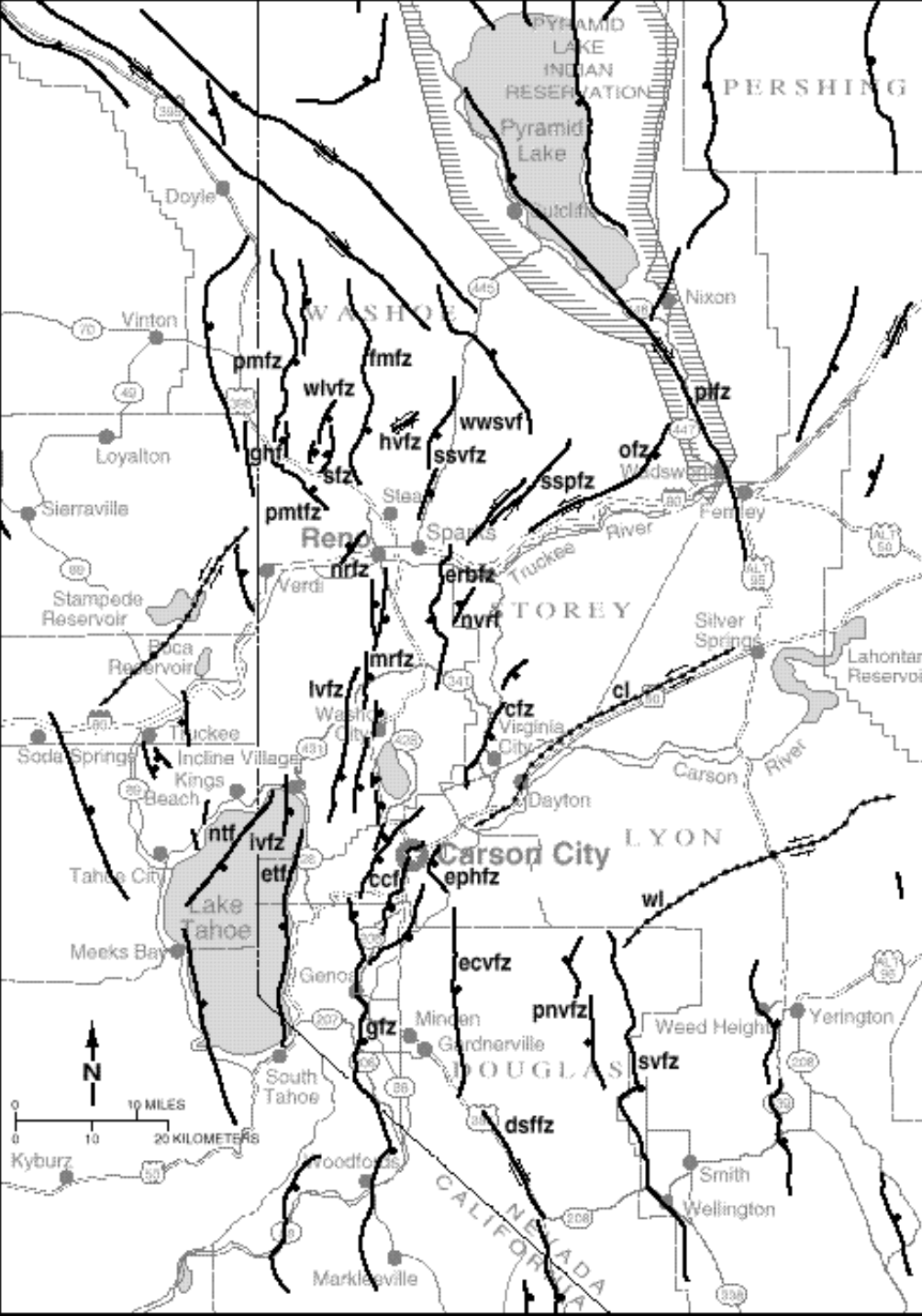
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Earthquakes have occurred throughout Nevada.



There is a good chance that you will experience a major earthquake. There are at least 30 faults that could cause damage in the Reno-Carson City urban corridor.



The probability of at least one magnitude 6 or greater event in the next fifty years is between 34 and 98%. The probability of at least one magnitude 7 or greater event in the next fifty years is between 4 and 50%. Hazards include intense ground shaking, ruptures of the ground, liquefaction, landslides, and ancillary problems, such as fires and hazardous waste spills.

We used FEMA's loss-estimation model, HAZUS-MH, to estimate the effects of potential earthquakes near each of the county seats in Nevada.

This model is used in emergency-response and recovery exercises and will be used to help rapidly estimate the scope of damage and losses immediately after an earthquake (information that helps with a Presidential Declaration of Disaster).

The risks are huge.

For a magnitude 6.9 earthquake on the Mount Rose fault, HAZUS estimated, for the Washoe-Carson-Storey-Douglas region:

**up to \$7.6 billion in economic loss
(~2.9 billion in Washoe County alone)**

major damage to approximately 12,000 buildings

800 to 3,000 people needing public shelter

80 to 300 fatalities.

The risks are huge.

For a magnitude 7.1 earthquake on the Genoa fault, HAZUS estimated, for the Washoe-Carson-Storey-Douglas region:

**up to \$2.5 billion in economic loss
(~\$471 million in Douglas County alone)**

major damage to approximately 12,000 buildings

800 to 3,000 people needing public shelter

80 to 300 fatalities.

The risks are huge.

For a magnitude 6.5 earthquake on a fault near Virginia City, HAZUS estimated, for the Washoe-Carson-Storey-Douglas region:

**up to \$2.5 billion in economic loss
(~\$8.5 million in Storey County)**

major damage to approximately 3,500 buildings

200 to 800 people needing public shelter

20 to 90 fatalities.

The risks are huge.

For a magnitude 6.5 earthquake on the Carson City fault, HAZUS estimated, for the Washoe-Carson-Storey-Douglas region:

**up to \$2.2 billion in economic loss
(~\$665 million in Carson City alone)**

major damage to approximately 3,900 buildings

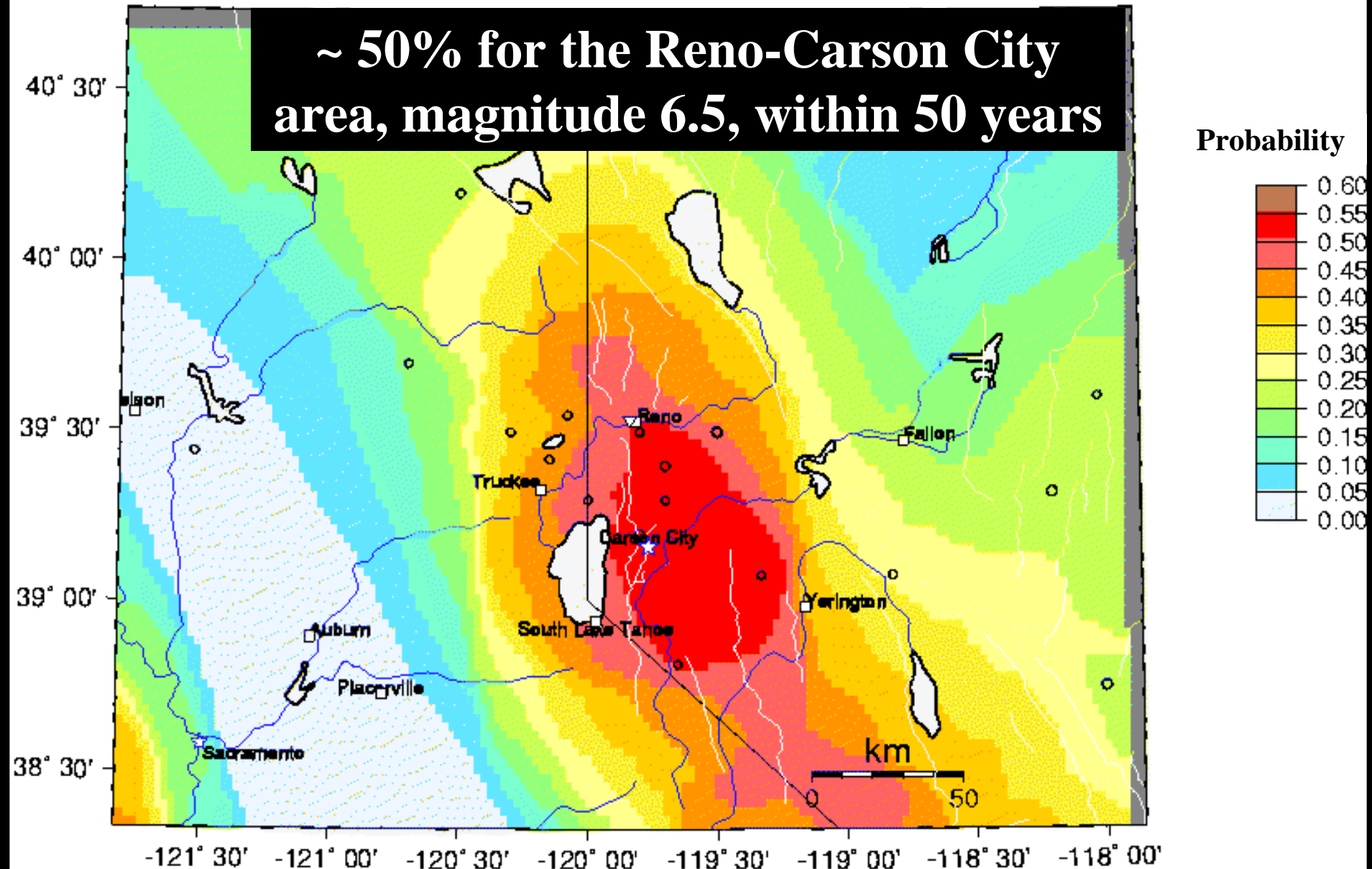
170 to 700 people needing public shelter

30 to 110 fatalities.

We don't know exactly how often these specific earthquakes occur, but we do have reasonable estimates of earthquake rates for each region.

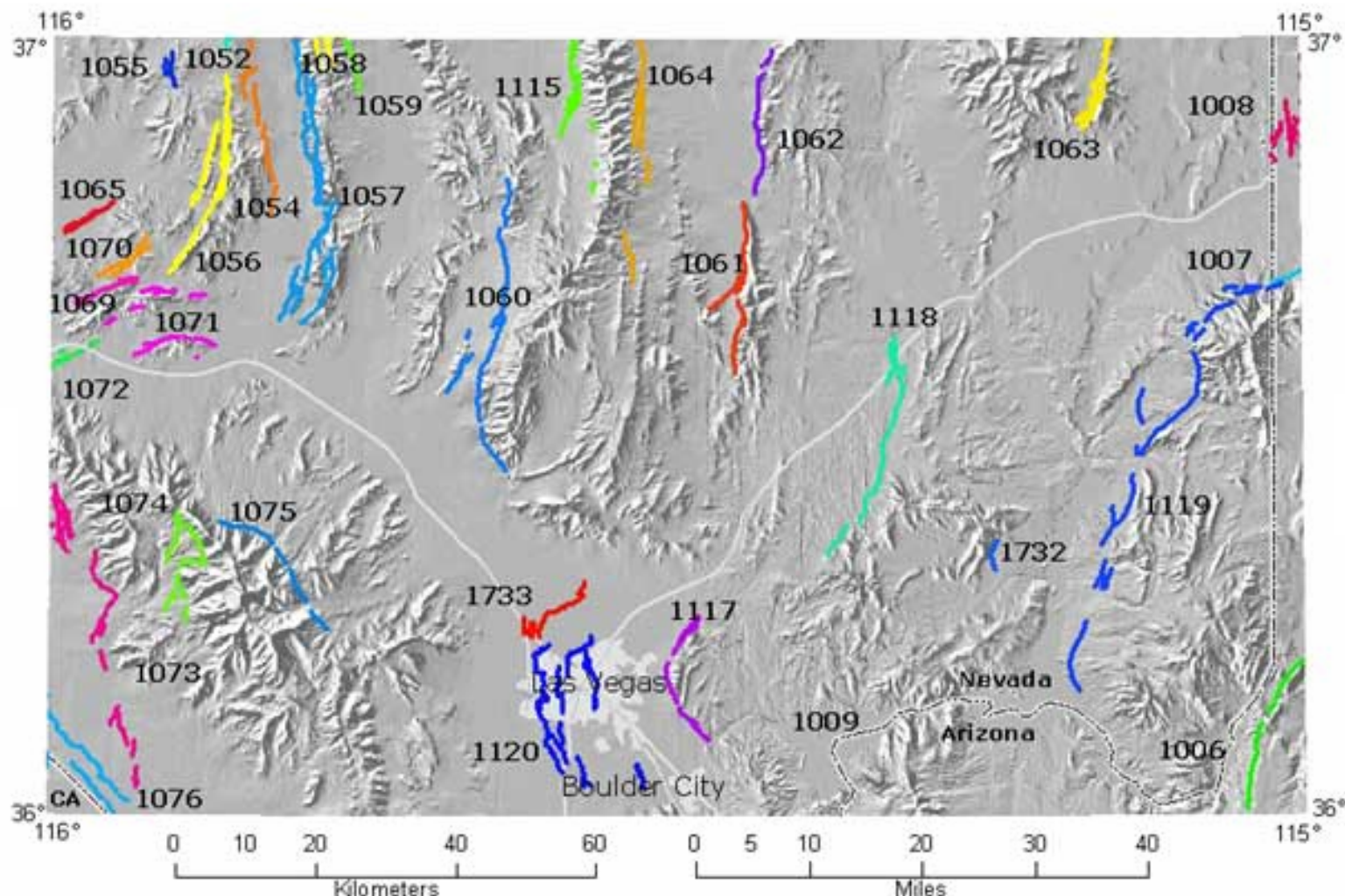
Probability of an earthquake of magnitude 6.5 or greater occurring within 50 km in 50 years (from USGS probabilistic seismic hazard analysis)

~ 50% for the Reno-Carson City area, magnitude 6.5, within 50 years

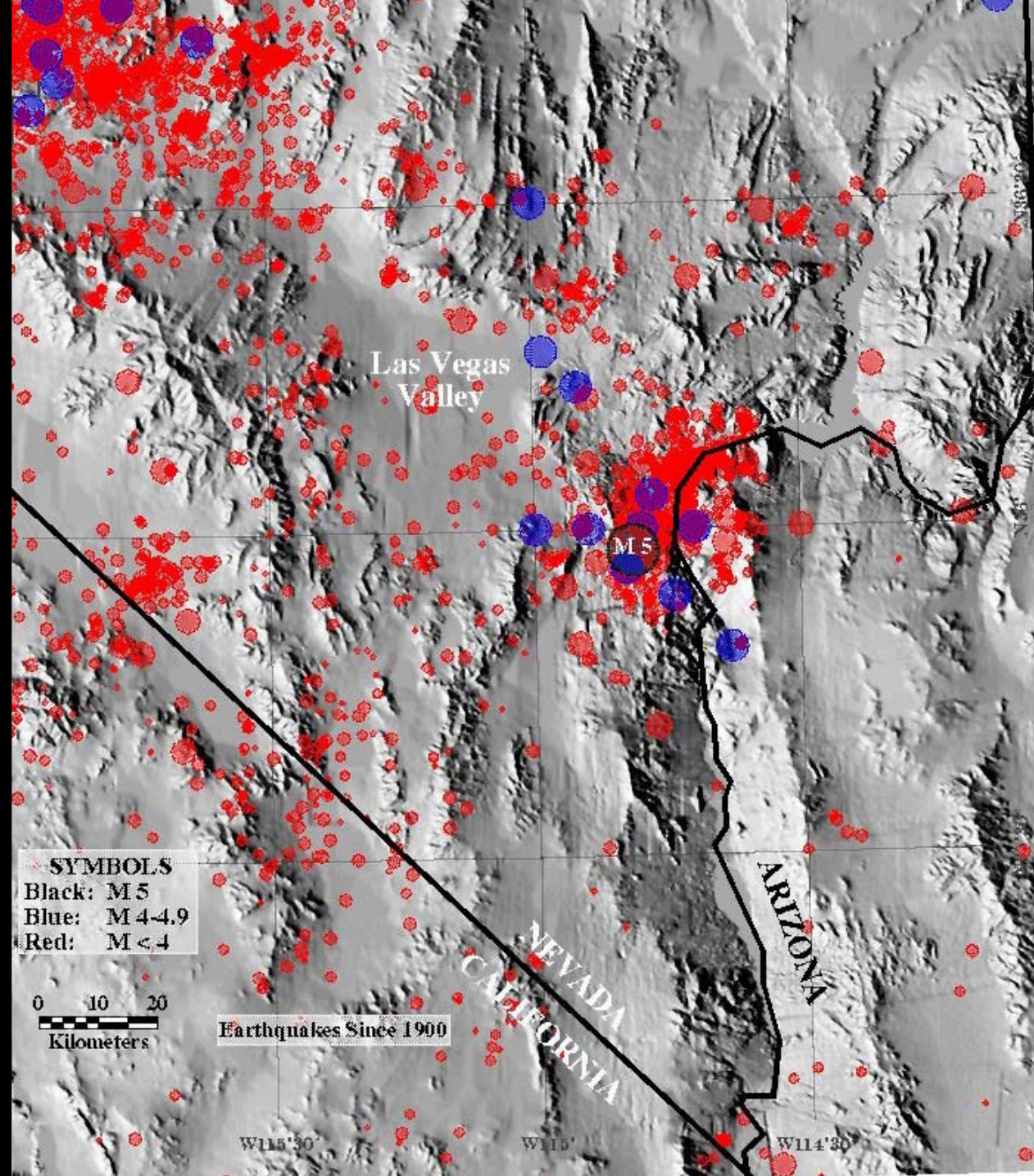


Las Vegas 1° x 2° Sheet

There are numerous faults capable of producing large earthquakes in and near Las Vegas.



Measured earthquakes in the Las Vegas area



The risks are huge.

For a magnitude 6.6 earthquake on the Frenchman Mountain fault, HAZUS estimated:

\$4.4 to 17.7 billion in economic loss

major damage to approximately 30,000 buildings

3,000 to 11,000 people needing public shelter

200 to 800 fatalities.

For a magnitude 5.9 daytime earthquake on the Frenchman Mountain fault, HAZUS estimated, for all of Clark County:

\$2.2 to 8.9 billion in economic loss,

of which \$1.2 to 4.7 billion would be in building damage,
\$0.3 to 1.3 billion would be in damage to building contents, and
\$0.7 to 2.9 billion in business interruption losses related to the building stock;

major damage to 4,000 to 17,000 buildings

(655 completely destroyed),

3,000 to 12,000 people needing public shelter,

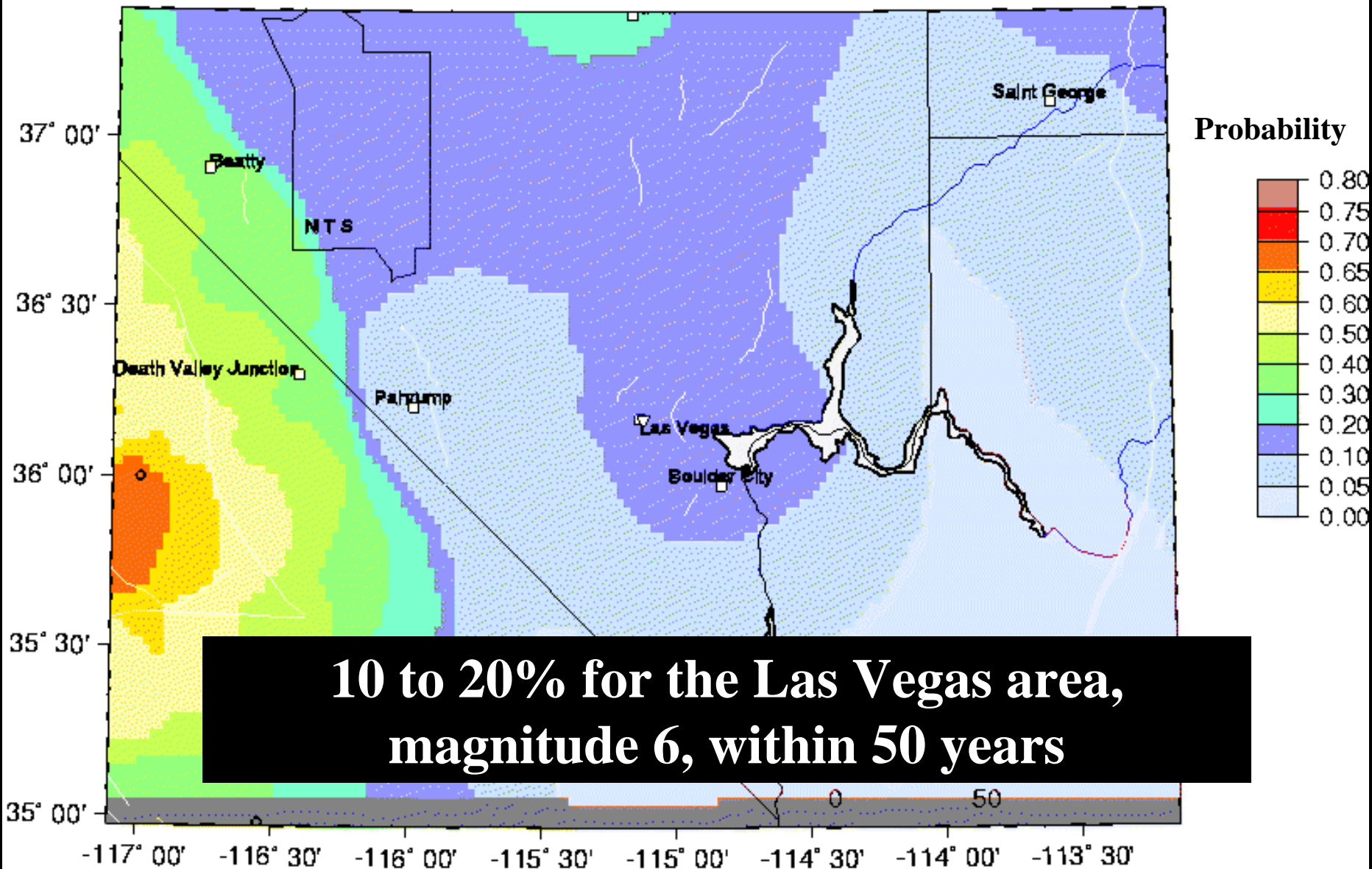
300 to 1,200 people needing hospital care *(but only 768 of 2,341 beds would be available in the county during the first day, up to 910 at Day 3 and 1,730 at Day 30); and*

80 to 300 fatalities.

(Casualty numbers are expected to be less for either a night-time or commute-time earthquake.)

(from NBMG-NDEM-FEMA-sponsored earthquake exercise for the City of Las Vegas, 2003)

**Probability of an earthquake of magnitude 6.0 or greater occurring
within 50 km in 50 years** (from USGS probabilistic seismic hazard analysis)



The main points:

1. The earthquake risks are huge in Nevada.
2. We can do something about it.
 - a. Be prepared to respond.
 - b. Mitigate structural risks, largely through building codes and avoiding faults and areas of liquefaction.
 - c. Mitigate nonstructural risks.



Nonstructural damage often can be easily prevented.



Earthquake-secure bookshelves in the office of the State Geologist



**Secured computers at the
Clark County Building Department**



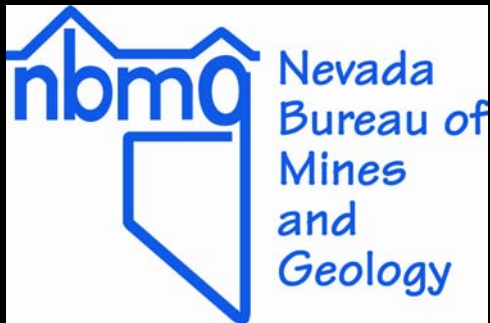
Information about Nevada earthquakes and what you can do:

Nevada Bureau of Mines and Geology

www.nbmg.unr.edu

Nevada Seismological Laboratory

www.seismo.unr.edu



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