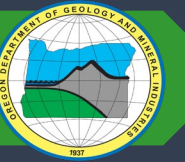
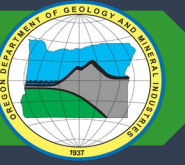


# A Systematic Approach to Building-Scale Geohazard Risk Assessments in Oregon

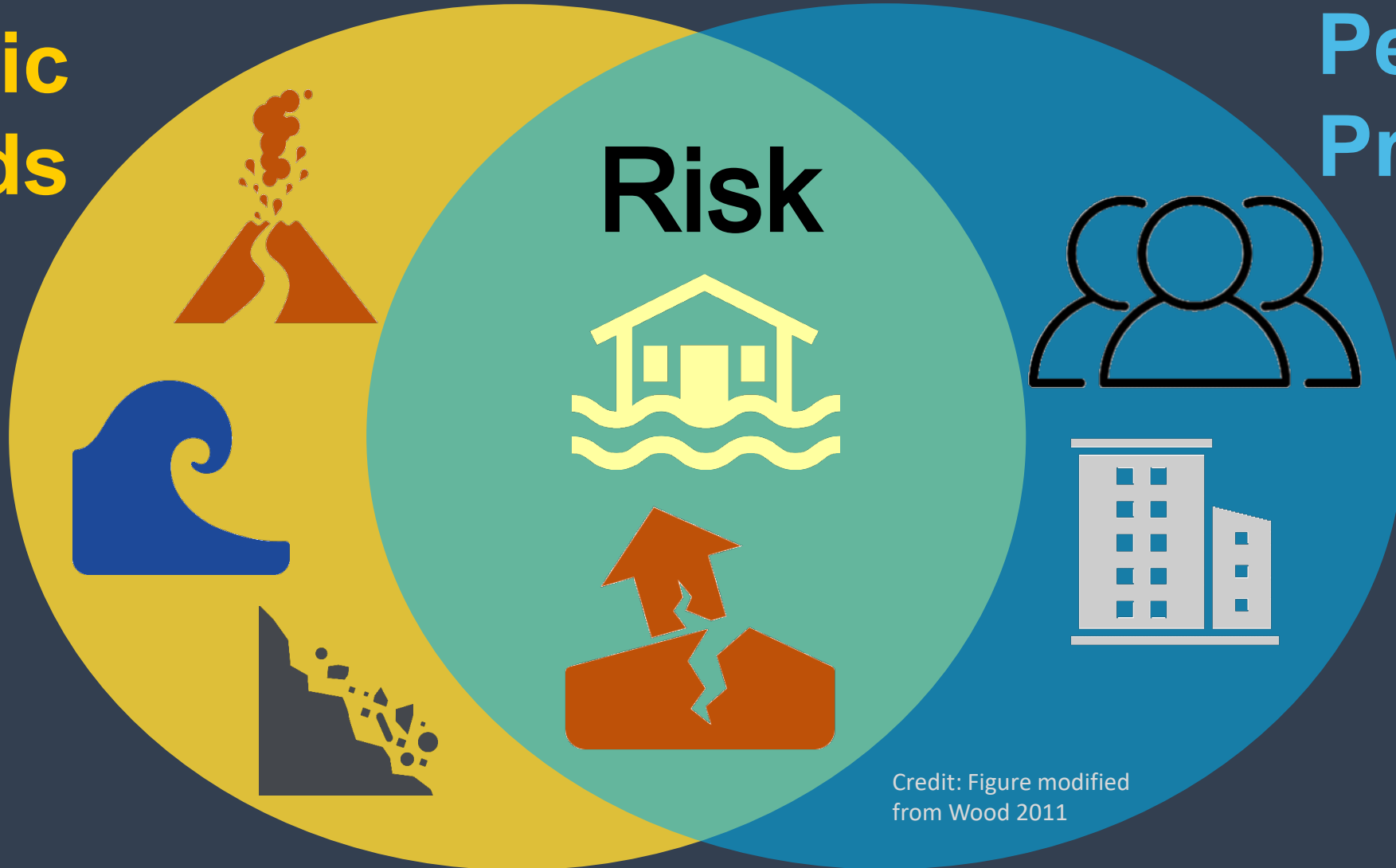
# KEY MESSAGES



- 1 Geohazard maps are now precise enough to make building-scale damage estimates *with the right tools*.
- 2 This isn't site-specific analysis. Don't oversell it.
- 3 Hitch your wagon to the natural hazard mitigation planning process; it's already there.
- 4 Doing this kind of work? Looking for advice? Reach out to DOGAMI.



## Geologic Hazards

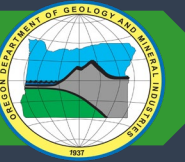


## People & Property

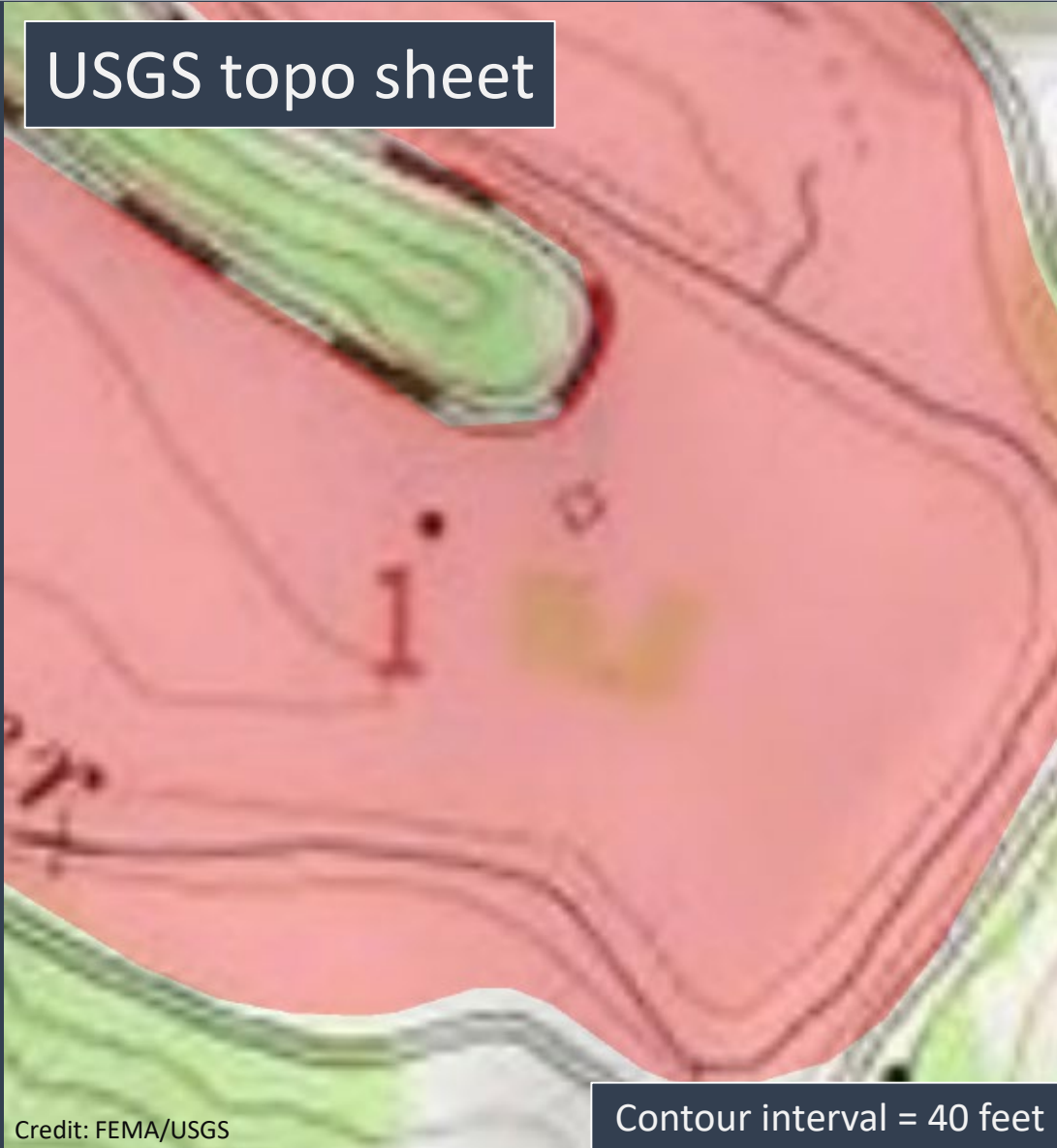
Credit: Figure modified  
from Wood 2011

# MORE PRECISE FLOOD HAZARD MAPPING

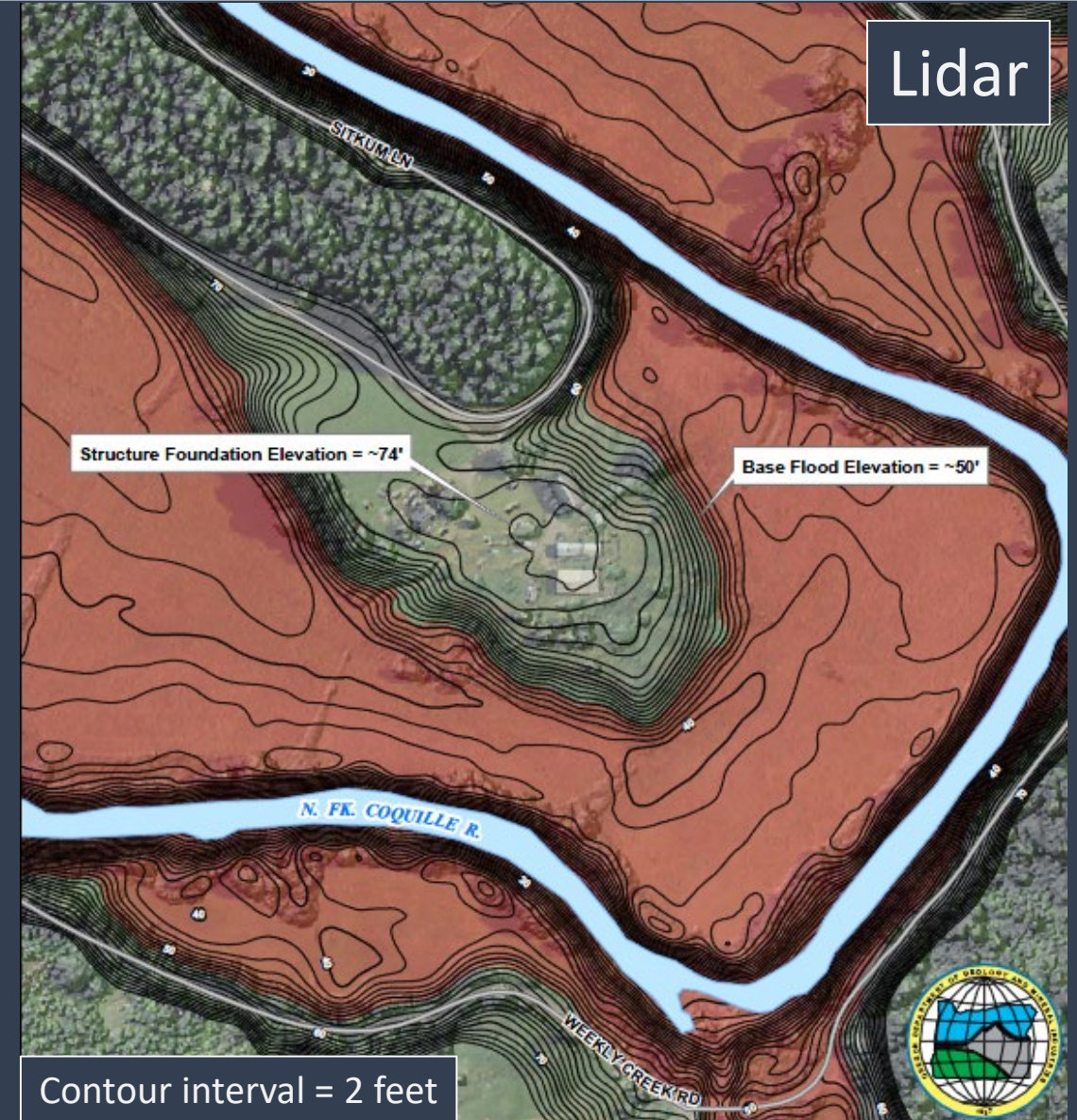
Oregon Department of Geology  
and Mineral Industries



USGS topo sheet



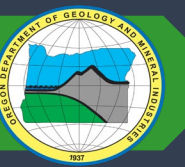
Lidar





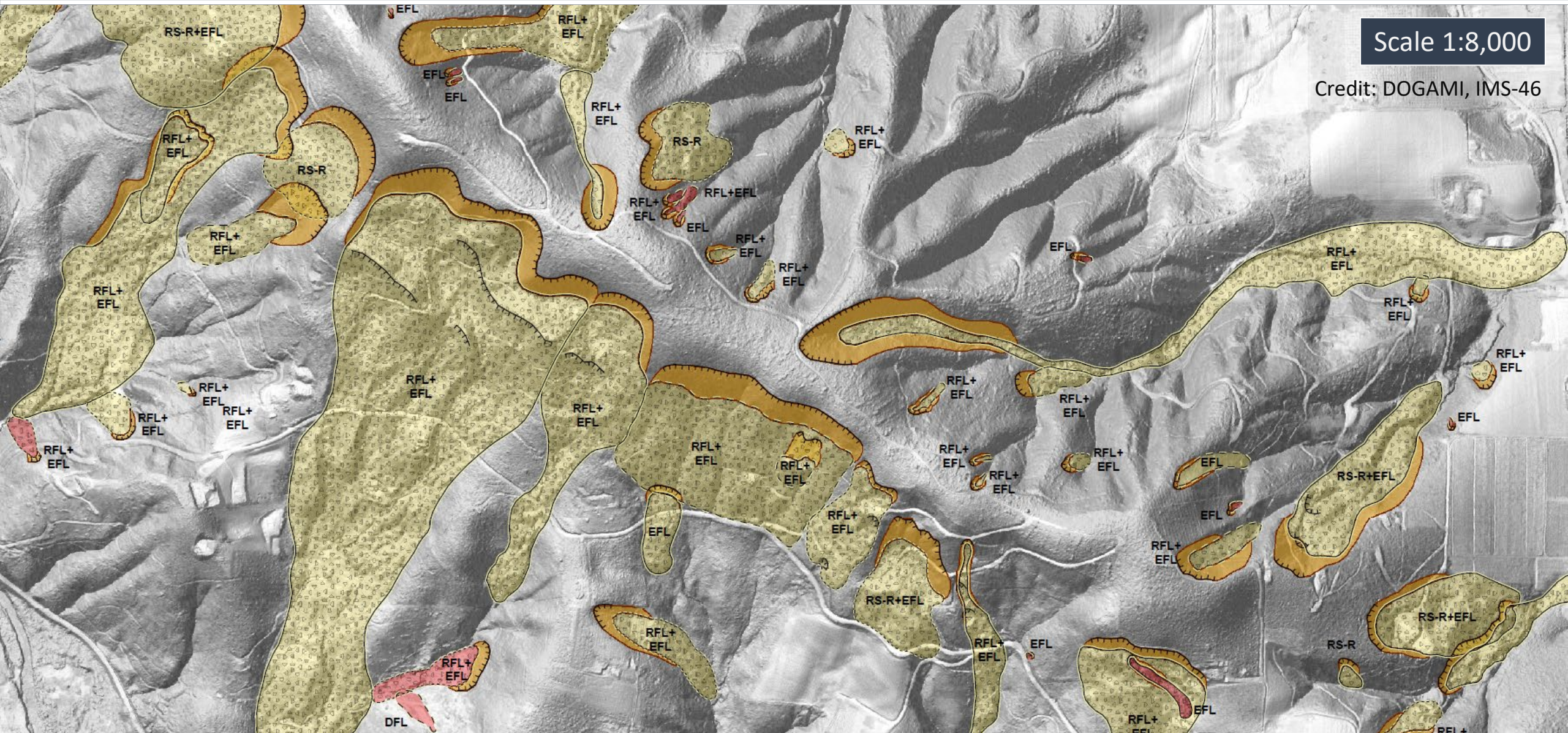
# MORE PRECISE LANDSLIDE HAZARD MAPPING

Oregon Department of Geology  
and Mineral Industries

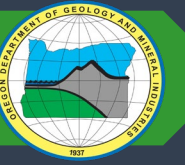


Scale 1:8,000

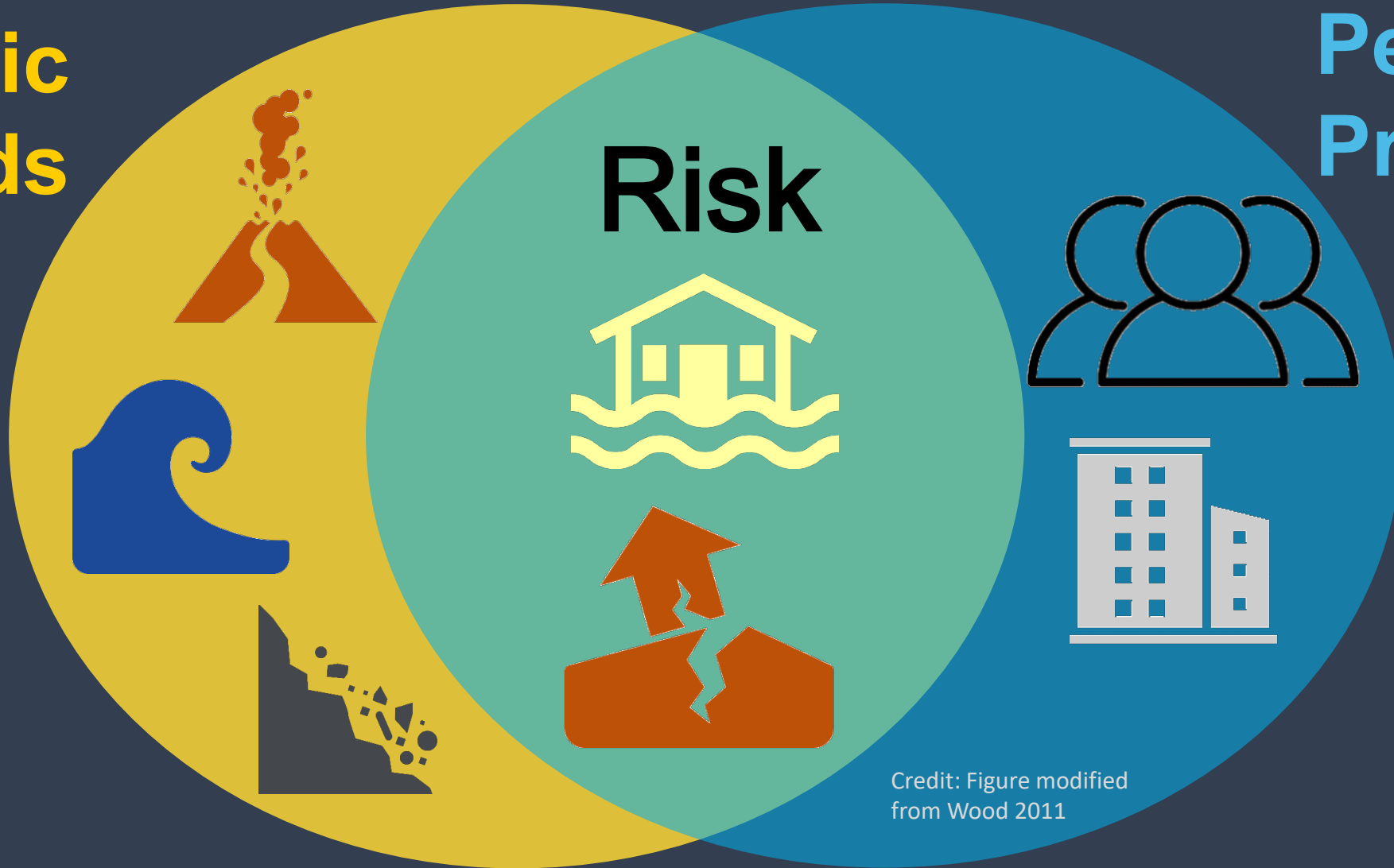
Credit: DOGAMI, IMS-46







## Geologic Hazards

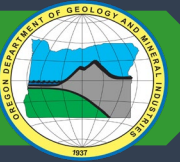


## People & Property

Credit: Figure modified  
from Wood 2011

# BUILDINGS – LEVERAGING ASSESSOR DATA

Oregon Department of Geology  
and Mineral Industries



City of Seaside, Oregon



\$5 billion in building  
assets in Clatsop  
County, Oregon

## Building Occupancy Type

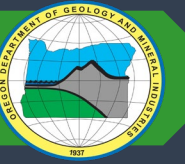
- Residential
- Commerical/Industrial
- Public/Non-Profit
- Agricultural/Utility

Credit: DOGAMI



# POPULATION – PUTTING PEOPLE IN BUILDINGS

Oregon Department of Geology  
and Mineral Industries



City of Seaside, Oregon



Blue buildings are home  
to permanent residents

Population is prorated to  
buildings from census blocks  
based on square footage

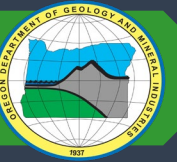
Clatsop County's total  
population is 37,000

Credit: DOGAMI



# BUILDING VULNERABILITY IS NOT UNIFORM

Oregon Department of Geology  
and Mineral Industries



City of Seaside, Oregon

OREGON

Seismic  
building codes

No code

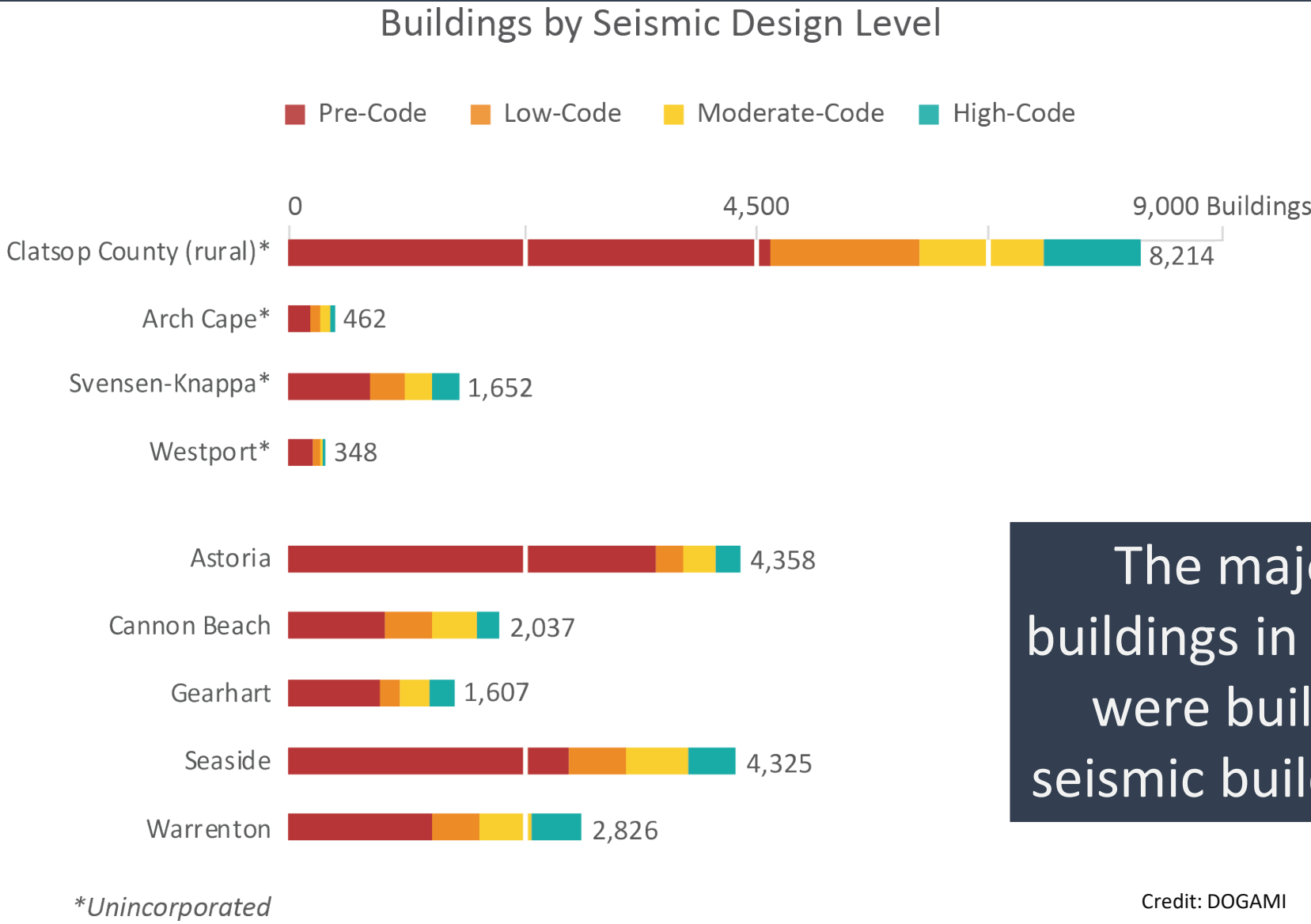
Minimal standards

Medium standards

Highest standards

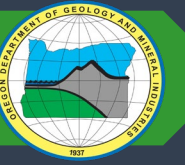
Credit: DOGAMI

# BUILDING VULNERABILITY IS NOT UNIFORM

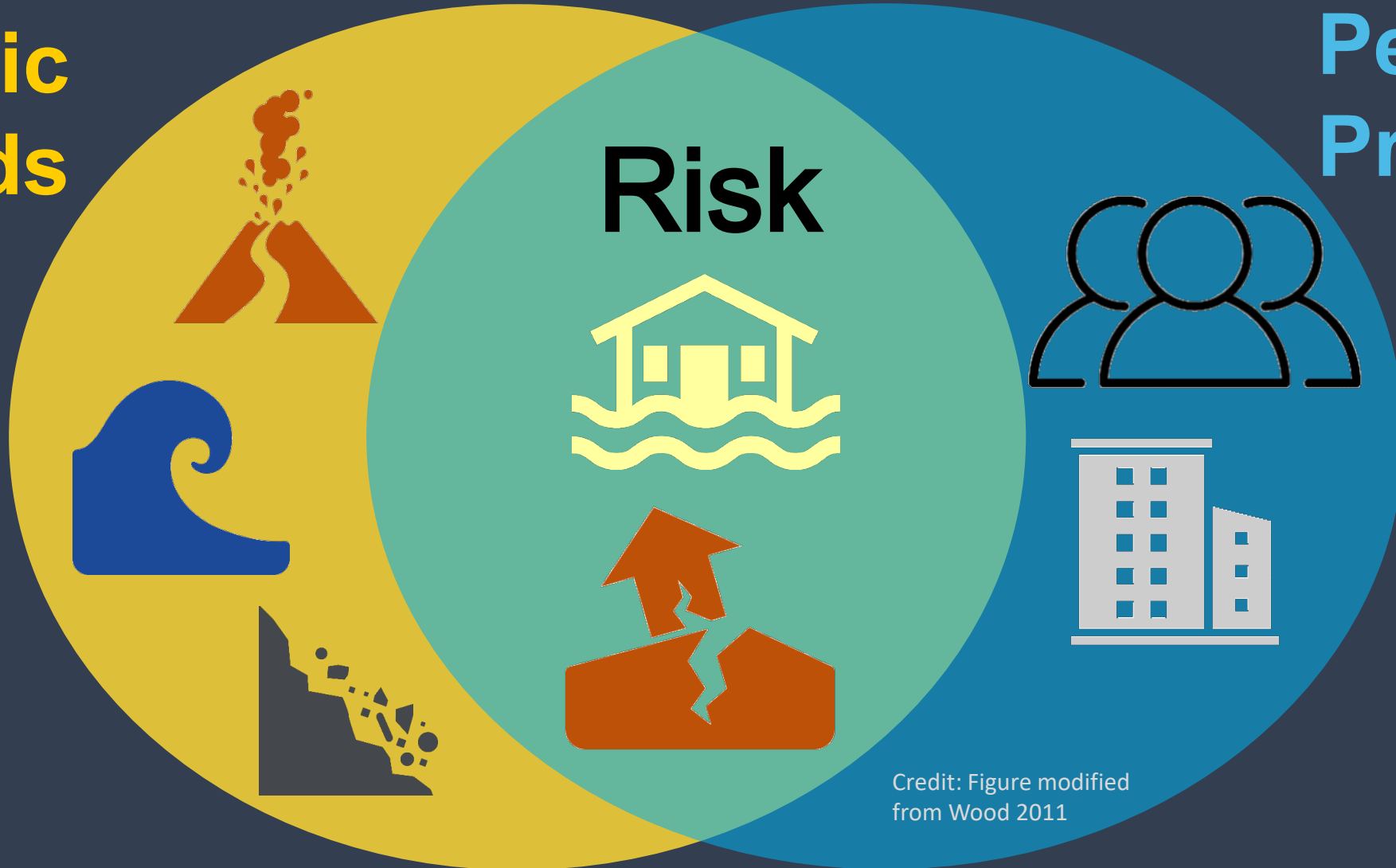


The majority of  
buildings in the county  
were built before  
seismic building codes





## Geologic Hazards



## People & Property

Credit: Figure modified  
from Wood 2011

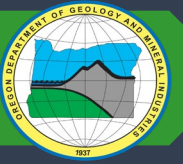
# RISK IN TERMS OF EXPOSURE - TSUNAMI





# RISK IN TERMS OF EXPOSURE - TSUNAMI

Oregon Department of Geology  
and Mineral Industries



Percentage of Building Value Exposed to Tsunami

Tsunami Sizes

Small Medium Large X-Large XX-Large

Exposure percentage

0%

50%

100%



\*Unincorporated

Credit: DOGAMI

**Clatsop County tsunami exposure: medium scenario, Cascadia Subduction Zone M9.0**

Buildings exposed:

**8,810**

Value of exposed buildings:

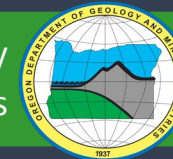
**\$1.7 billion or 34%**

Potentially displaced population:

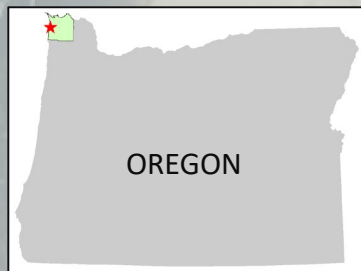
**11,300 or 31%**

# RISK IN TERMS OF DAMAGE - EARTHQUAKE

Oregon Department of Geology  
and Mineral Industries



City of Seaside, Oregon



Earthquake  
shaking damage

< 25% damage

25%-50% damage

50%-75% damage

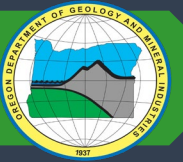
> 75% damage

Credit: DOGAMI

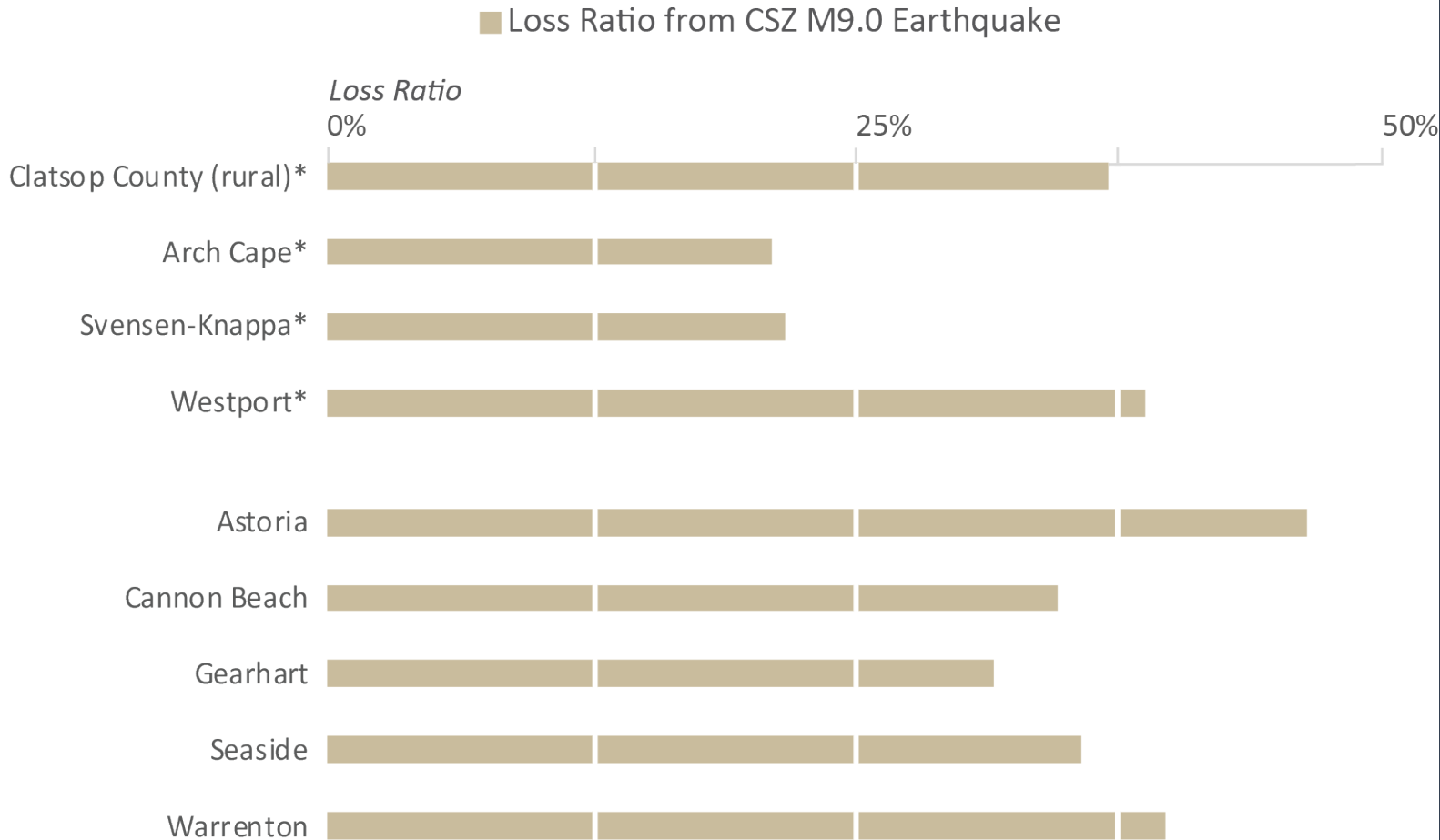


# RISK IN TERMS OF DAMAGE - EARTHQUAKE

Oregon Department of Geology  
and Mineral Industries



## Total Building Value Loss Ratio from M 9.0 Earthquake



\*Unincorporated

Credit: DOGAMI

## Clatsop County M9.0 CSZ earthquake damage

*\*areas outside tsunami zone\*\**

Red-tagged buildings:

**5,000**

Yellow-tagged buildings:

**1,300**

Estimated building damage:

**\$1.2 billion or 25%**

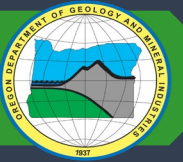
Potentially displaced population:

**7,000 or 19%**

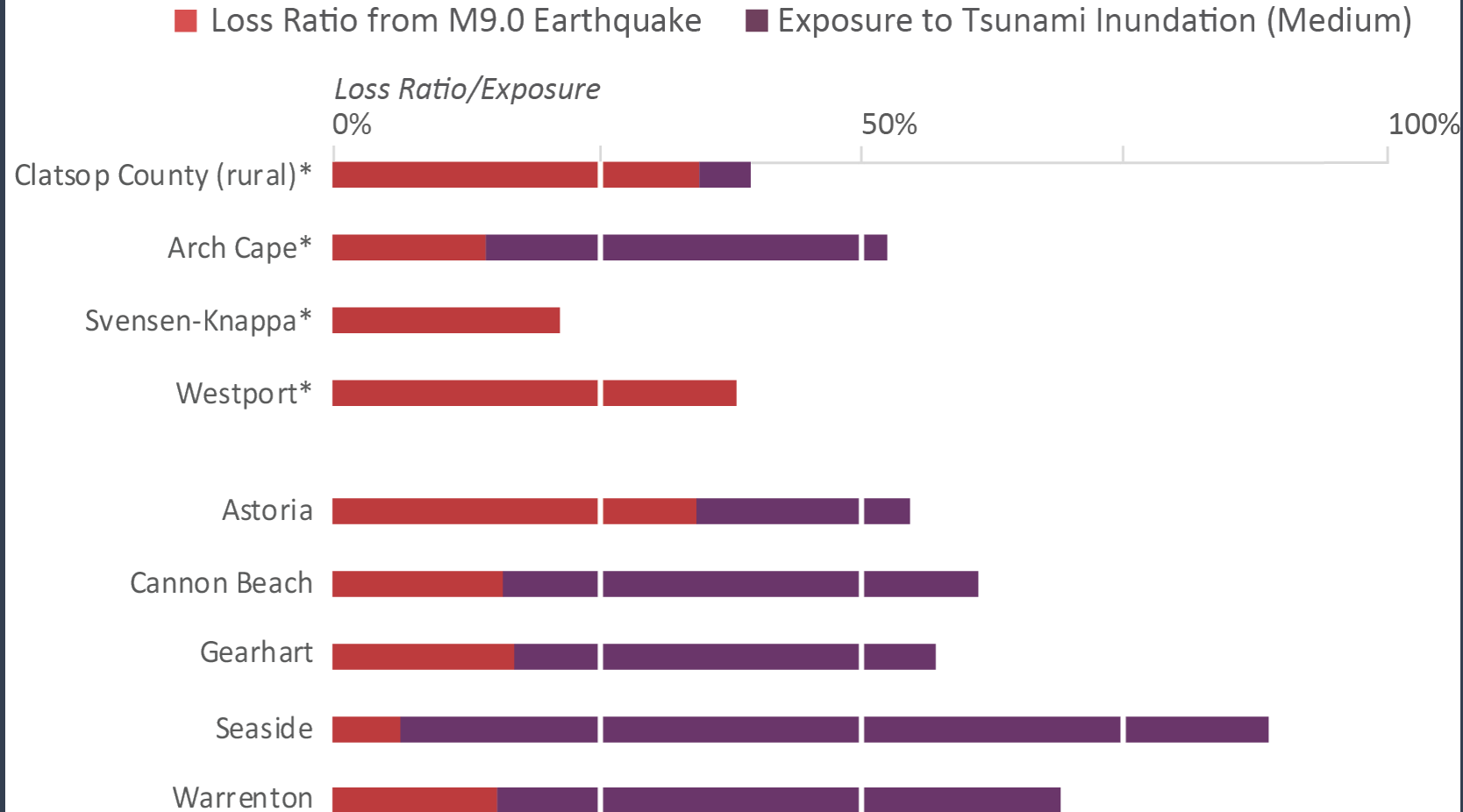
Shaking and ground failure  
damage *is only part of the story*  
in Clatsop County.

# RISK IN TERMS OF COMBINED HAZARDS

Oregon Department of Geology  
and Mineral Industries



## Earthquake and Tsunami Building Damage



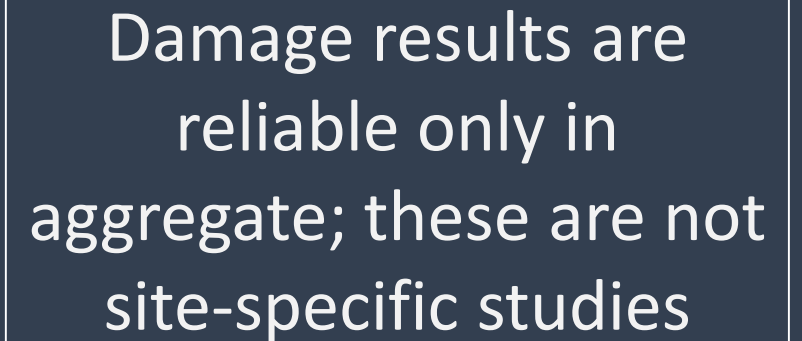
\*Unincorporated

Credit: DOGAMI

Assumes that  
tsunami exposure is  
100% damage

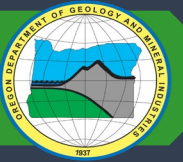
New tsunami damage  
models will refine this  
assumption





# COMPLEMENT THE NATURAL HAZARD MITIGATION PLAN

Oregon Department of Geology  
and Mineral Industries



**Lidar Acquisition** → **Geohazard Mapping** → **Risk Assessments** → **Natural Hazard Mitigation Plan**

DOGAMI has pegged its mapping and risk assessment priorities to the 5-year natural hazard mitigation planning process.

State, tribal, and local governments must develop a hazard mitigation plan as a condition for receiving FEMA disaster assistance grants.

## CLATSOP COUNTY Natural Hazards Mitigation Plan

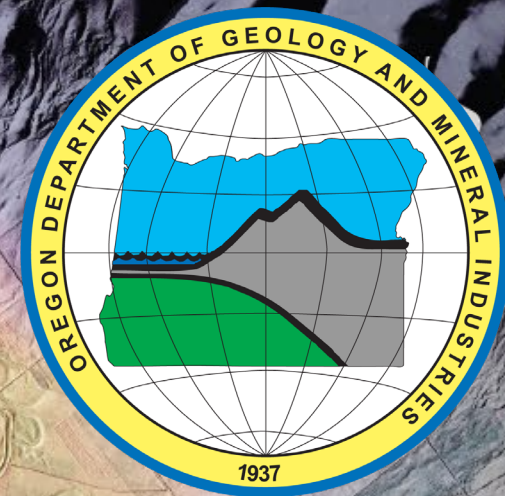


APRIL 2015

### PREPARED BY:

CLATSOP COUNTY  
CITY OF ASTORIA  
CITY OF CANNON BEACH  
CITY OF GEARHART  
CITY OF SEASIDE  
CITY OF WARRENTON





# Contact Information

## Principal Investigator

Jed Roberts, Flood Hazard Coordinator

*[jed.roberts@oregon.gov](mailto:jed.roberts@oregon.gov)*

## Lead Author of Risk Assessment

Matt Williams, Geohazards Analyst

*[matt.williams@oregon.gov](mailto:matt.williams@oregon.gov)*