Parcels & Hazard Layers in Emergency Preparedness and Response

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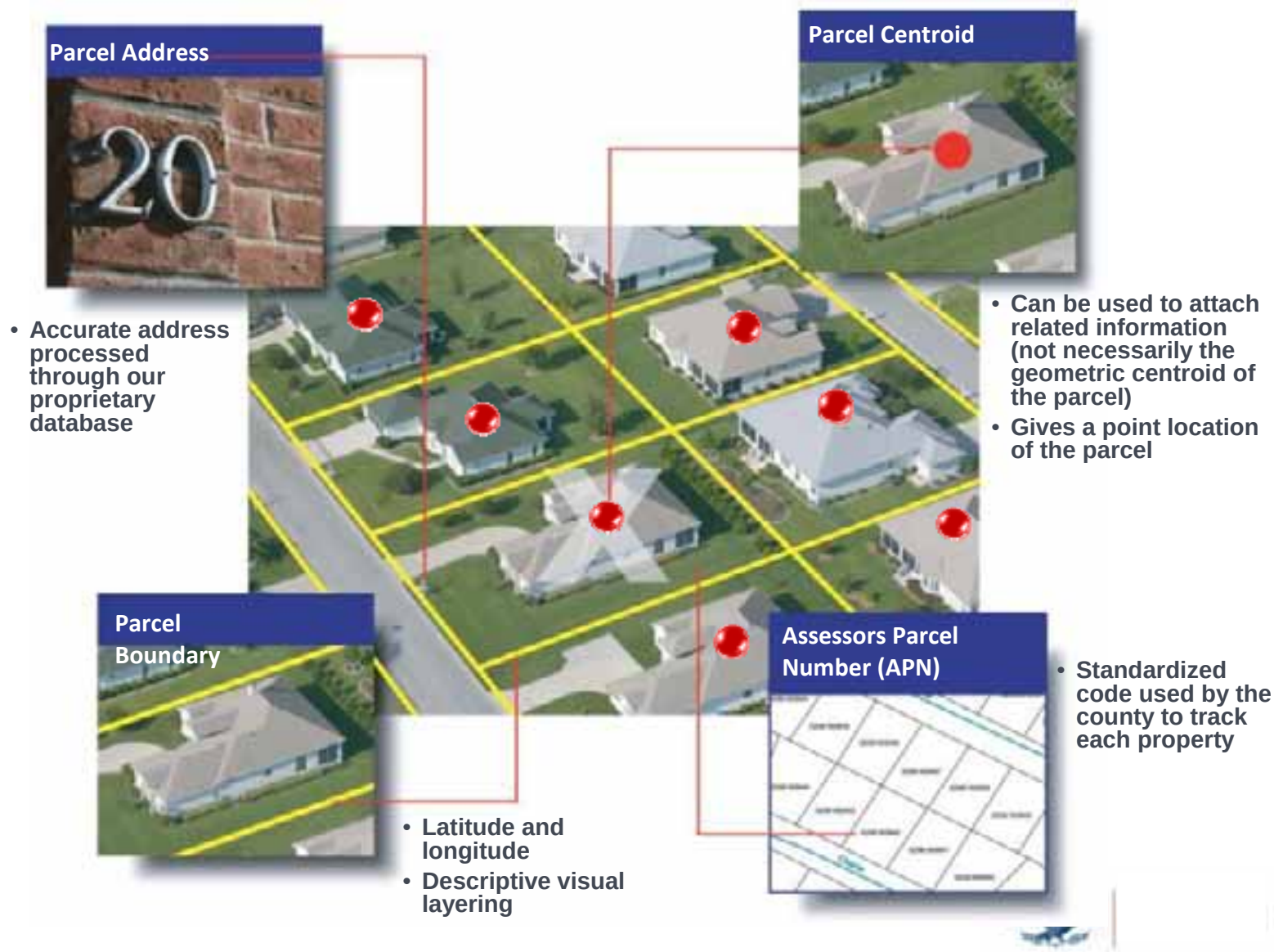
What is Parcel Data?

- Parcel boundary: the legal extents of each taxable U.S. property address
- Estimates: 144.3 million privately owned parcels in the U.S.
- Geospatial companies have converted and normalized 50-70 million parcels from state, county, city, and town sources
- FASS recently hit the 125+ million mark
- Rapidly being incorporated into applications to enhance:
  - Geocoding accuracy
  - Risk assessment
  - Risk concentration
  - Many other uses where granular precision is important

Parcels – The Relational Link

The defining elements of ParcelPoint® create a powerful data set for positional accuracy.



Parcels As The Relational Link

Geocode	
Latitude	25.898951
Longitude	-80.126806
Address Line	276 BAL BAY DR
City/State Zip	MIAMI BEACH FL 33154
PxPoint Data Set	PARCEL
Elevation, Slope, and Aspect	
Elevation (Feet)	1.31
Slope (Degrees)	0
Aspect	Flat
Mainland Determination & Distance	
Distance to Seaward Water Feature	101 feet
Seaward Water Feature Name	Biscayne Bay
Mainland: Yes or No	No
Coastal Storm Surge	
Risk Value	5
Risk Level	Extreme
Hurricane Landfall Probability	
% Tropical Storm Risk (Winds 39 - 73mph)	5.3
% Tropical Storm Risk (50-yr)	93.5
% Hurricane Risk (Cat 1-5 Storms)	1.6
% Hurricane Risk (50-yr)	56.3
% Intense Hurricane Risk (Cat 3-5 Storms)	0.4
% Intense Hurr. Risk (50-yr)	19.9
Flood Risk	
Flood Hazard Zone	AE
Undeveloped Coastal Barrier Area	COBRA_OUT
Special Flood Hazard Area (SFHA)	IN
Damaging Winds	
Straight Line Wind (SLW) Risk	Moderate
SLW Frequency	1 Event Every 4 - 6 Years
Hurricane Risk	Very High
Hurricane Frequency	1 Event Every 3 - 5 Years
Tornado Risk	Moderate
Tornado Frequency	1 Event every 5 - 8 Years
Sinkhole	
Risk	Low
Distance to Very High Sinkhole Risk	Greater than 10 miles
Wildfire Risk	
Brushfire Risk	Urban
Nearest high-risk value	Very High
Distance to High/Very High	> 1 mile

- The Parcel Identification Number (PIN) or Address links the physical parcel to real estate data; and
- Latitude/Longitude links the hazard risk and reg. compliance data to the parcel.

Parcel Information	
PIN:	**1222260022310**
Address Line:	**276 BAL BAY DR**
City/ State/ Zip:	**BAL HARBOUR FL 33154**
Latitude:	**25.898951**
Longitude:	**-80.126806**

PIN:	1222260022310
Property Address:	276 BAL BAY DR
Owner:	BEV SIEVERT
Land Value:	$9,892,934
Building Value:	$2,349,327
Market Value:	$12,242,261
Assessed Value:	$9,375,066
Adj Sq Footage:	9,988
Year Built:	1977
Bedrooms:	9
Baths:	10
Stories:	2
Living Units: 2	2
Adj Sq Footage:	9,988
Lot Size (Sq Ft):	46,279
Year Built:	1977
Construction:	Composite
Pool:	In Ground
Roof Cover:	Tile

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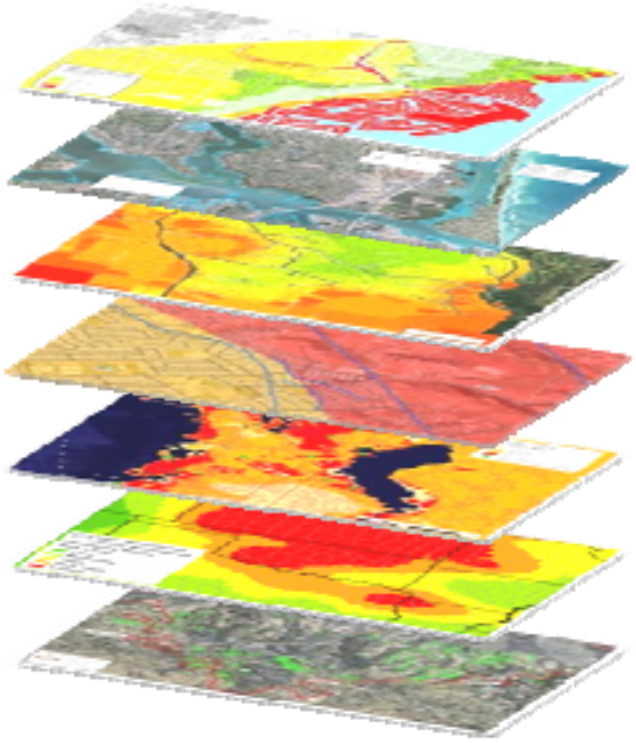
Granular Data For Preparedness Decision Making

- Coastal Storm Surge Risk
- Defining the Coast Line
- Wildfire Risk
- Earthquake Risk
- Florida Sinkhole Risk
- Damaging Winds and Hail Risk
- Risk Concentration Analysis



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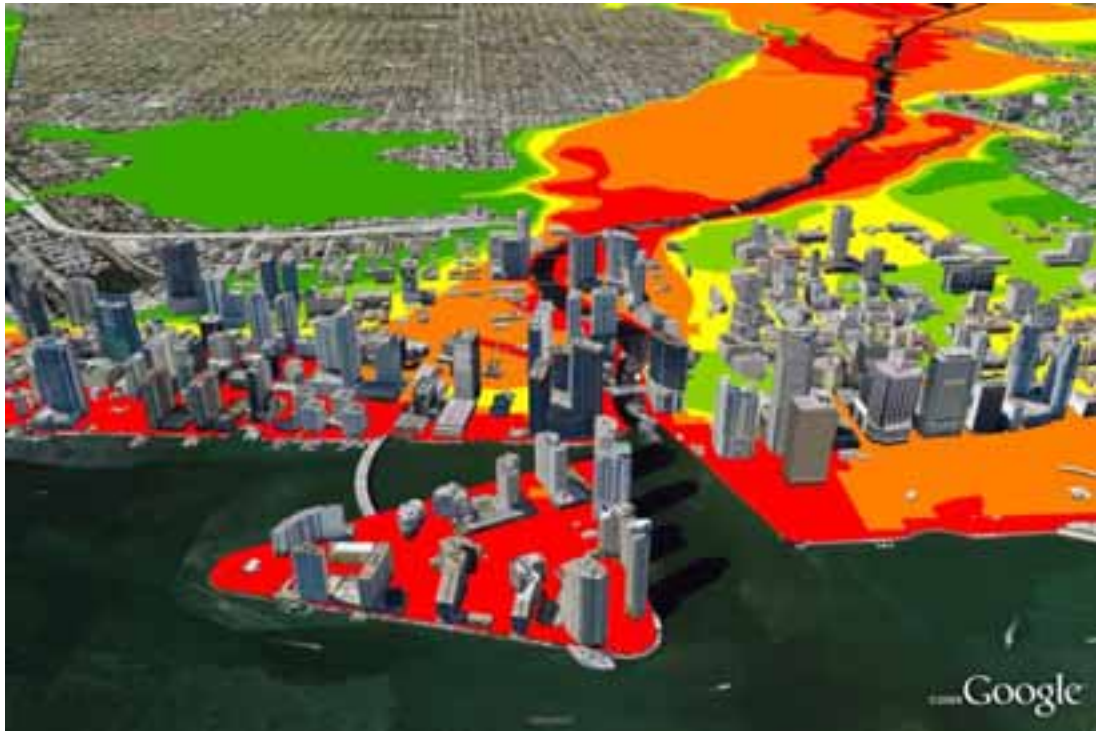
Case Study:
Structures At Risk From Surge Risk In Miami-Dade Co.

- First American and First American CoreLogic recently completed a survey of the top 13 coastal cities vulnerable to storm surge
- Miami was the Number 1 most vulnerable city in terms of exposed residential property value
- If a Category 5 hurricane hits Miami today, the cost of exposed residential property could be over $50B, and would affect 254,000+ properties in the area
- Miami was last impacted by a Hurricane in 1992 Hurricane Andrew causing $26.5B in damage

Category	Properties Affected	Residential Structure Value
Category 1	55,368	$19,796,055,135.00
Category 2	83,490	$25,180,236,289.00
Category 3	154,549	$35,669,062,572.00
Category 4	186,427	$42,670,083,295.00
Category 5	254,864	$53,633,764,539.00



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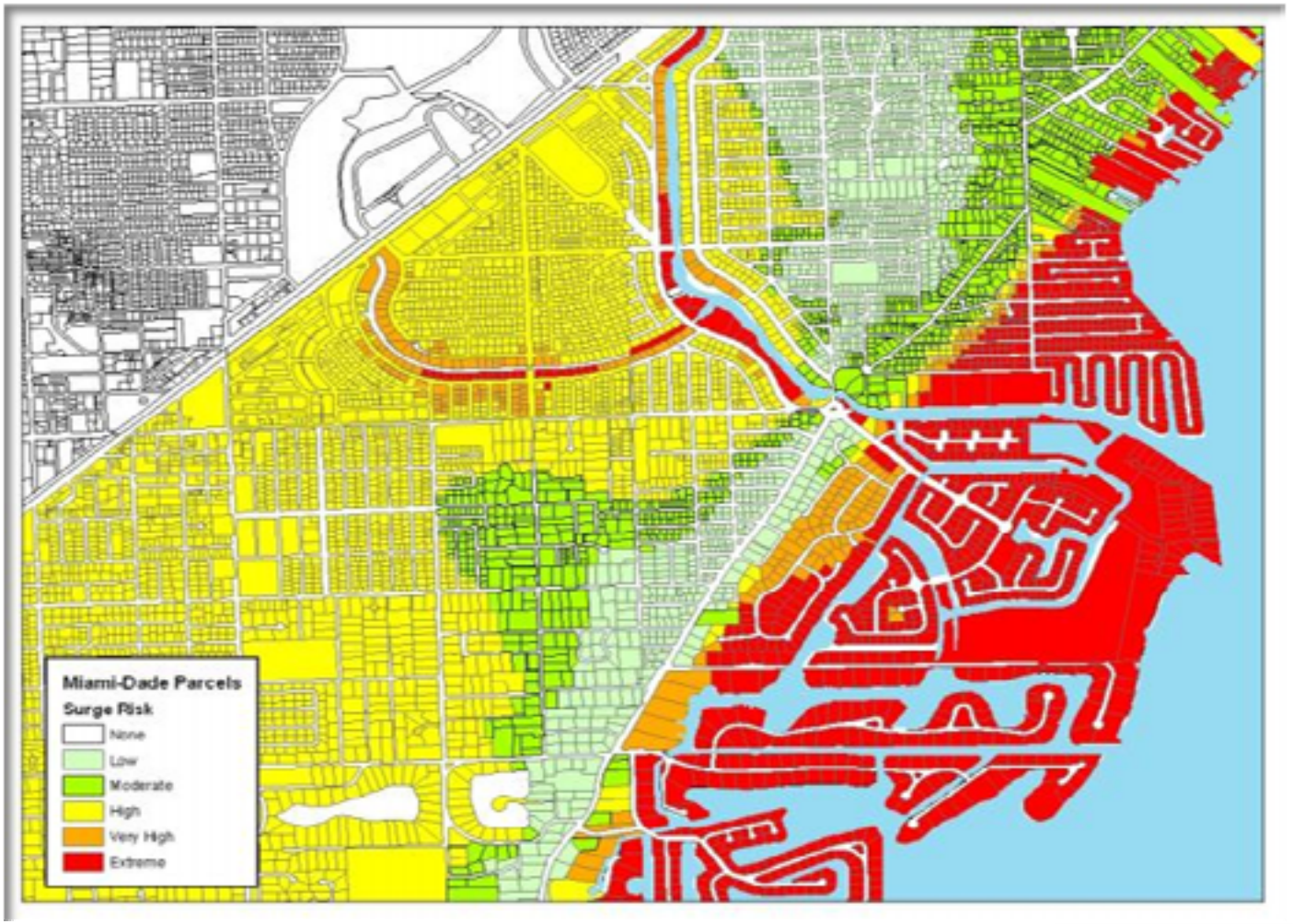
Parcel Level Storm Surge Risk In Miami



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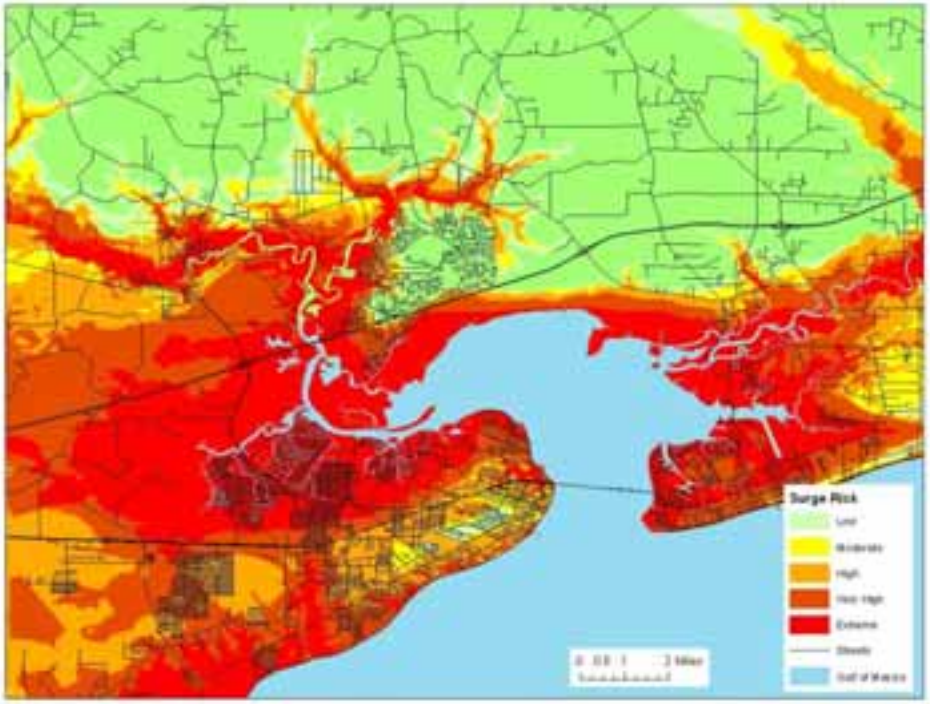
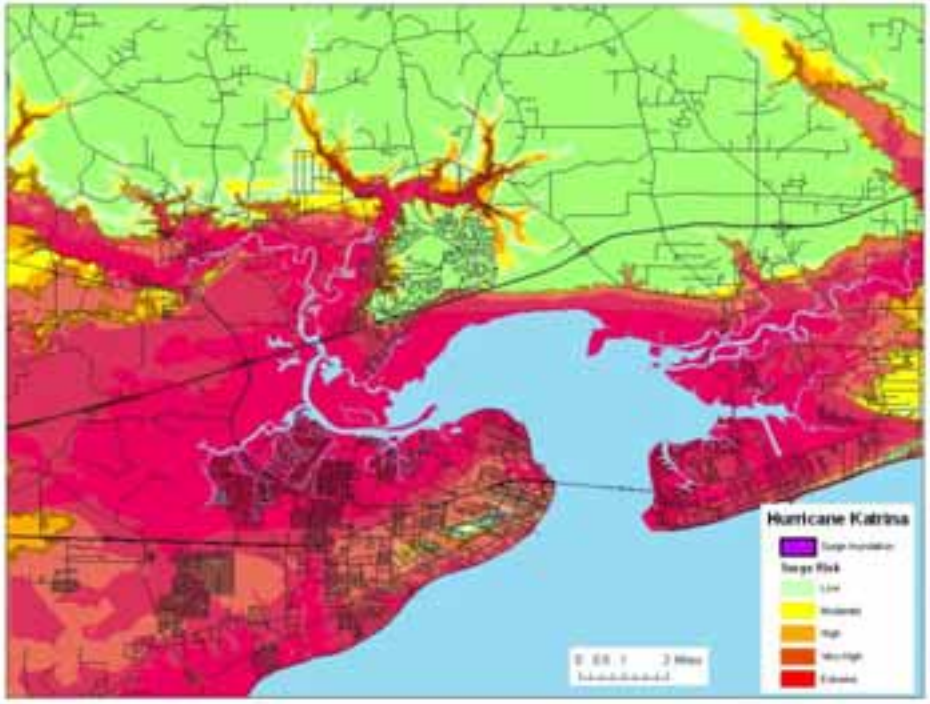
Katrina Storm Surge - Hamilton County, MS



Predicted Surge Levels



Actual Surge Level

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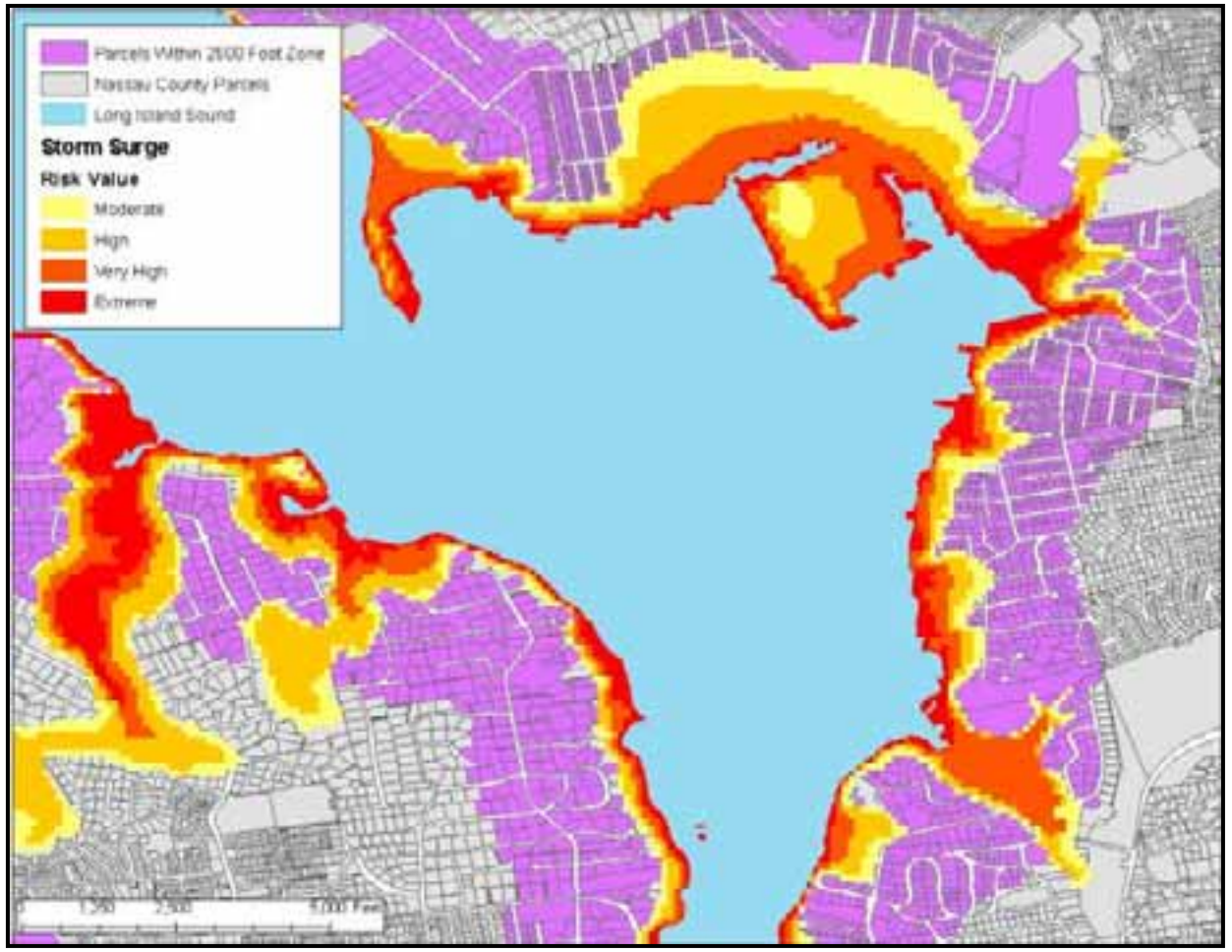
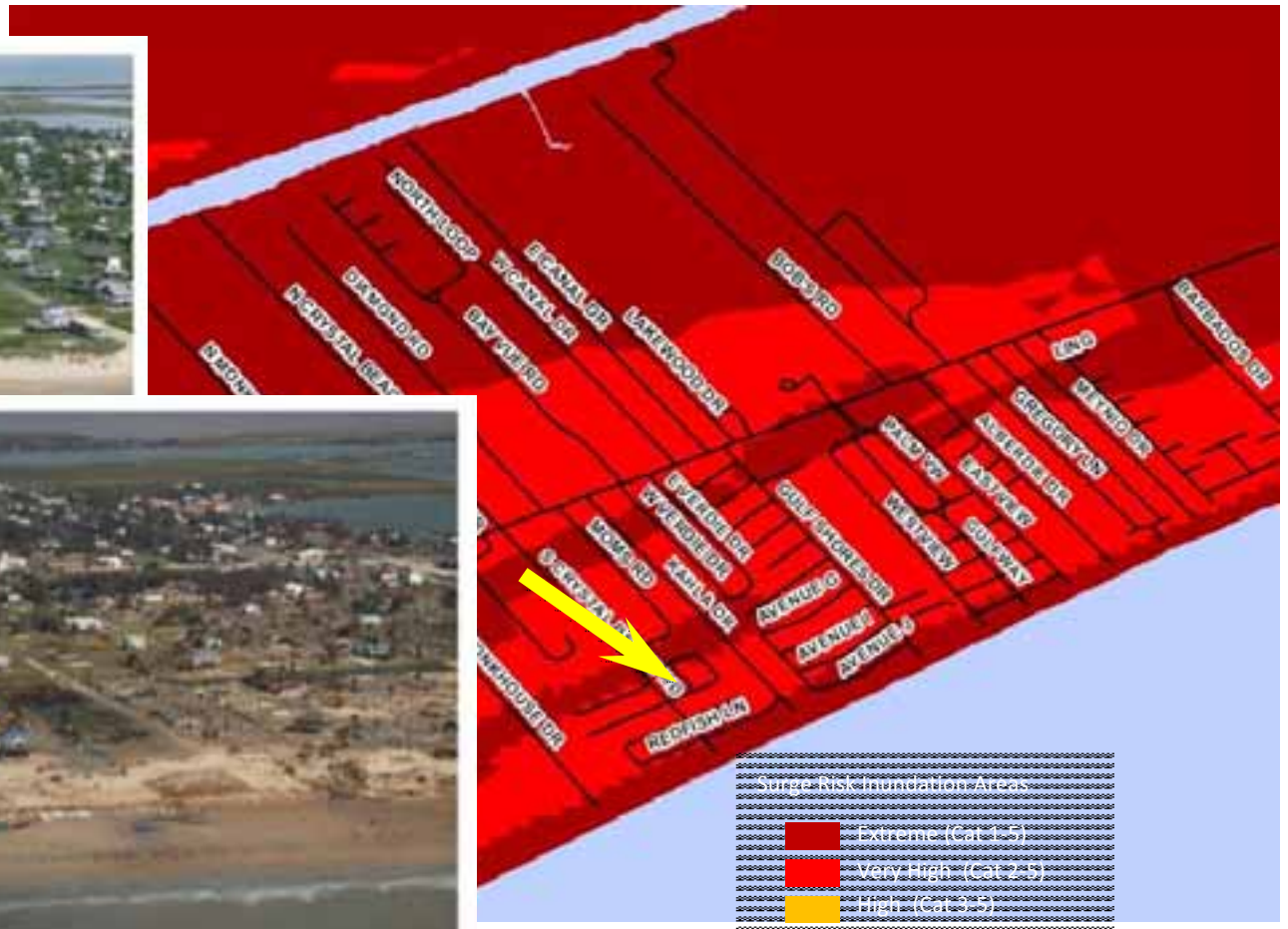
Parcels Within 2500 Feet Of The Coast Not in a Surge Risk Zone



Crystal Beach (Bolivar Peninsula)



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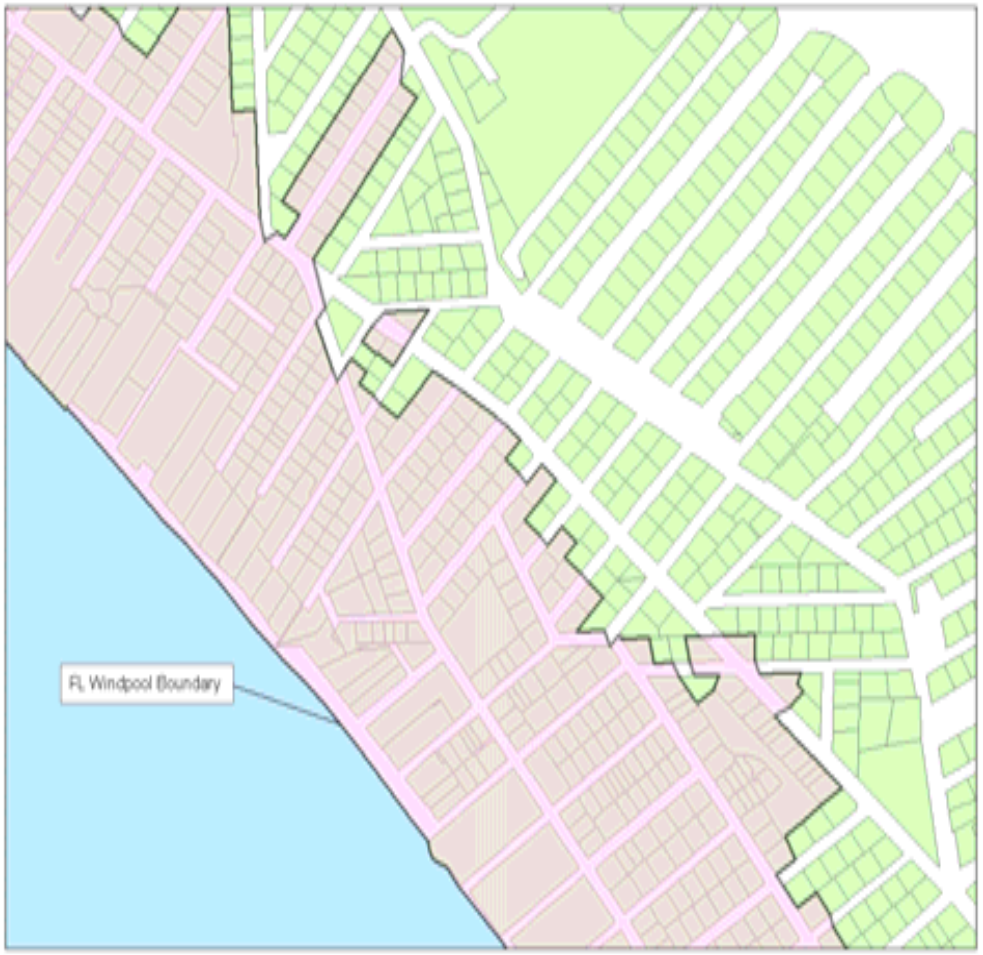
Windpool Features

- Automates look-up process for determining a property's eligibility for Windpool credits.
- Converted the detailed and often confusing/conflicting text tables to power our automated Windpool assignment engine.
- Nine Gulf and Eastern Atlantic States (AL, FL, GA, LA, MS, NC, SC, NJ and TX) offer Windpool tax credits to insurance companies.



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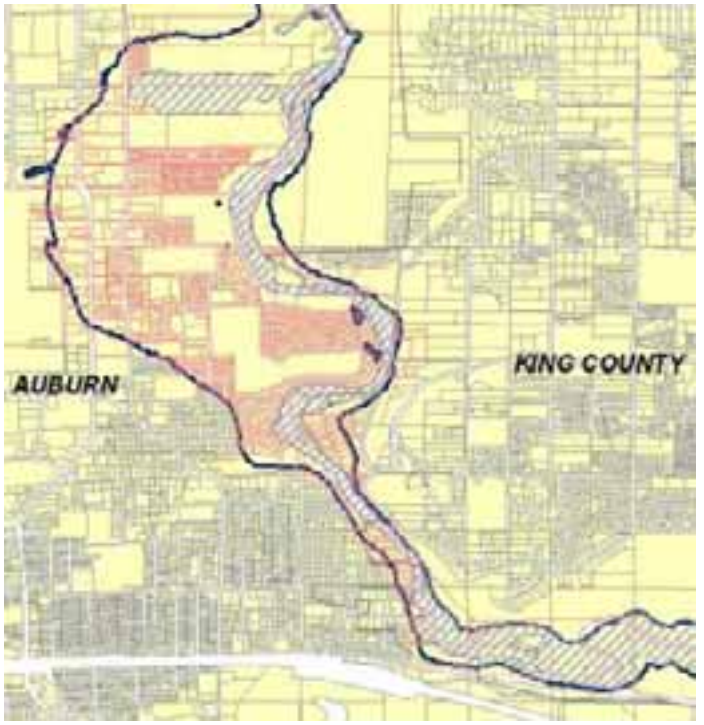
Howard Hanson Dam

- Corps of Engineers labels the dam as “unsafe”
- “Unsafe” applies to >5% of all USA dams
- Applying remedial efforts
  - Levee augmentation
  - Behind dam draw-downs

Two Analyses (#1)

- Levee failure:
- 13,900 cf/s
- Model floods 15 mi^2 and 3,600 parcels
- $21 billion of property.
- 98% commercial property



Two Analyses (#2)

- Maximum possible controlled release from dam
- 20,000 cf/s
- 20 mi2 and >5,000 parcels
- $30 billion of property
- 98% commercial

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Applying the Concepts
FRS vs. FZD

Northwestern edge of Findley, OH flood (2007)

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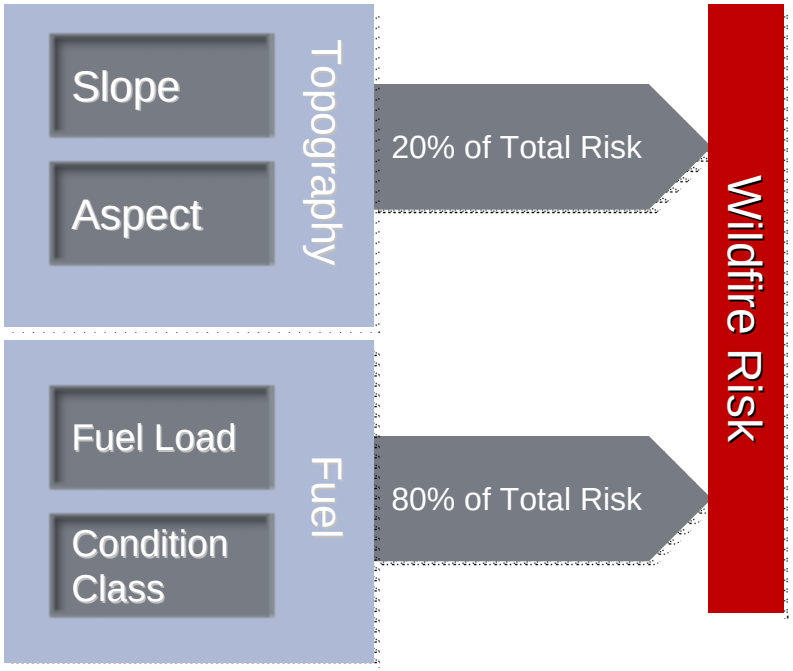
Wildfire Risk at a Granular Level

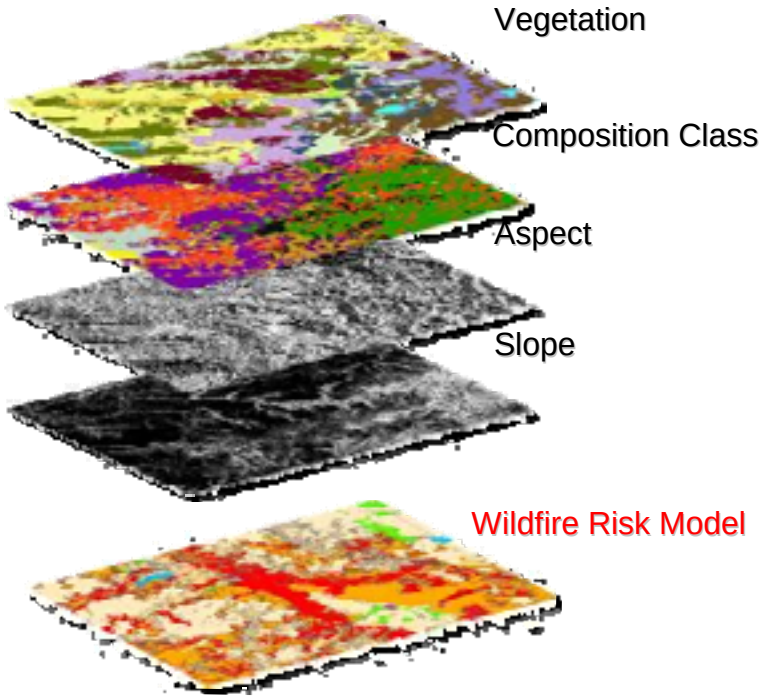
- Wildfire risk scores can be assigned at the parcel level with a combination of
  - Wildfire Risk Zone of the insured address
  - Distance in feet to the nearest high or very high risk zone for properties located in low or moderate risk zones
  - Distance in feet to the Wildland-Urban Interface (WUI)
  - A composite score ranging from 0 to 100 for Wildfire Risk

Wildfire Risk Determination

Data Elements

- Digital Elevation Model (DEM)
- Satellite Imagery
- Vegetation Condition Class data





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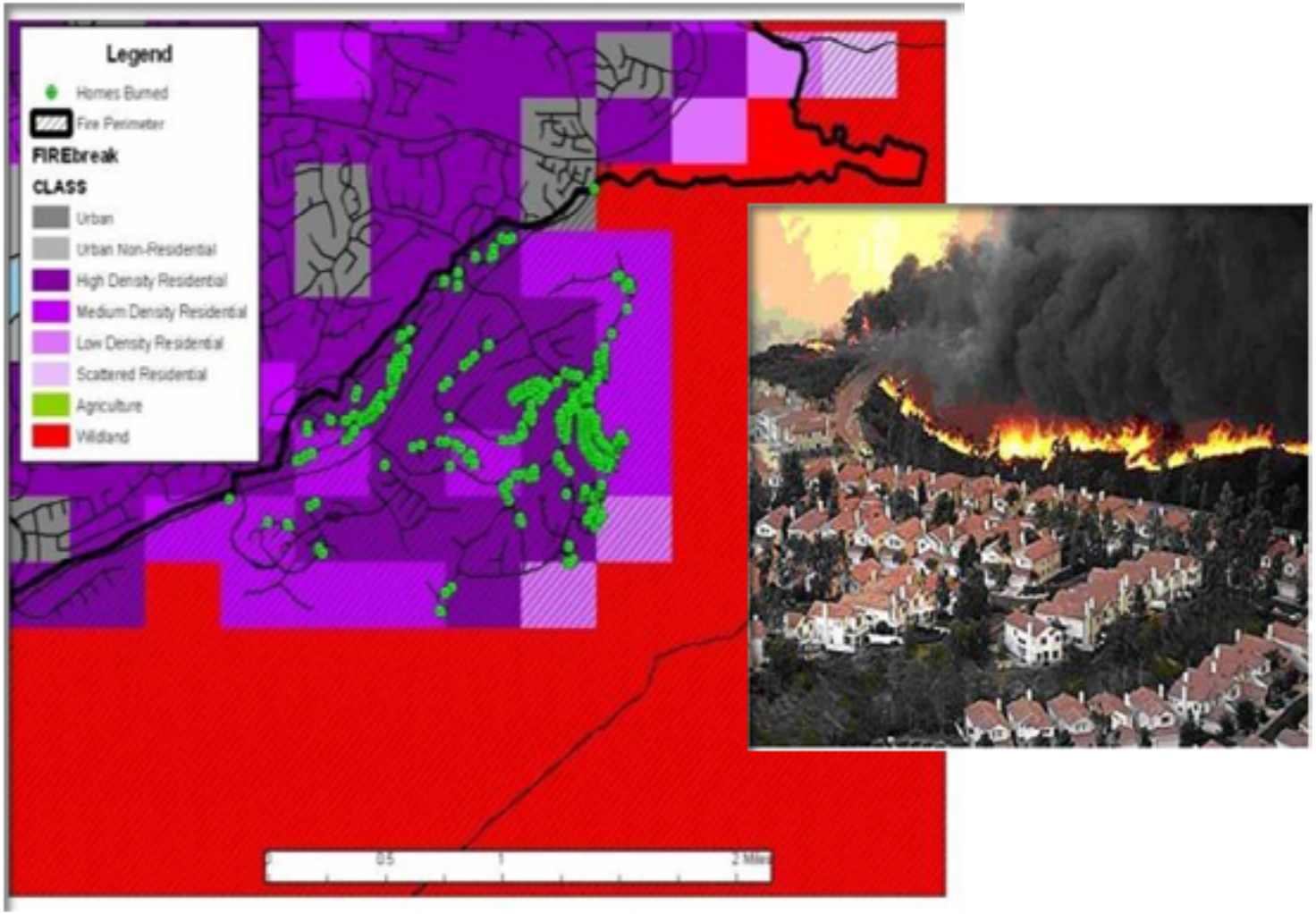
Wildland/Urban Interface (WUI)



2003 Cedar Fire – San Diego

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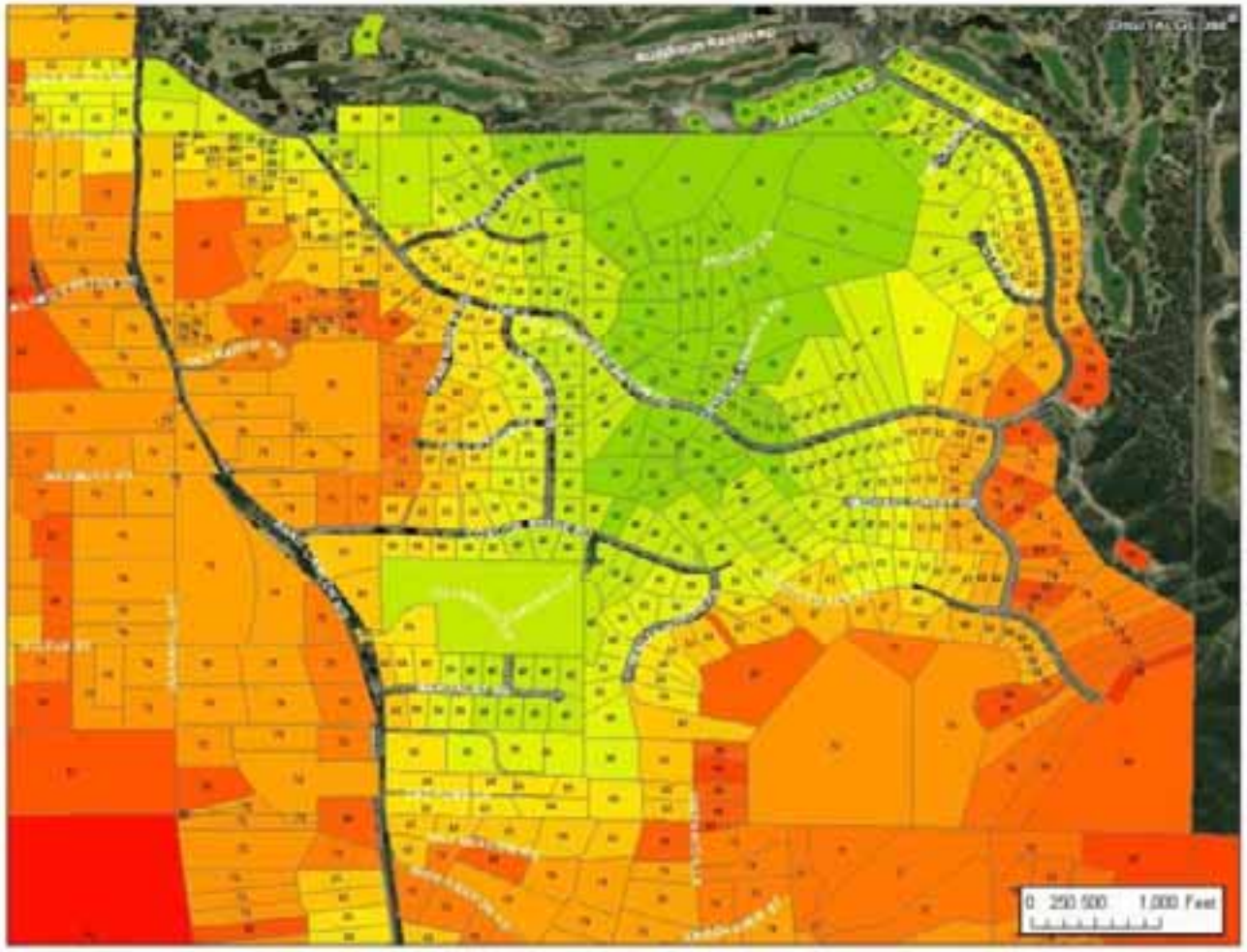
Robinson Ranch, Canyon County, CA Property Risk Scores



Parcel level granularity

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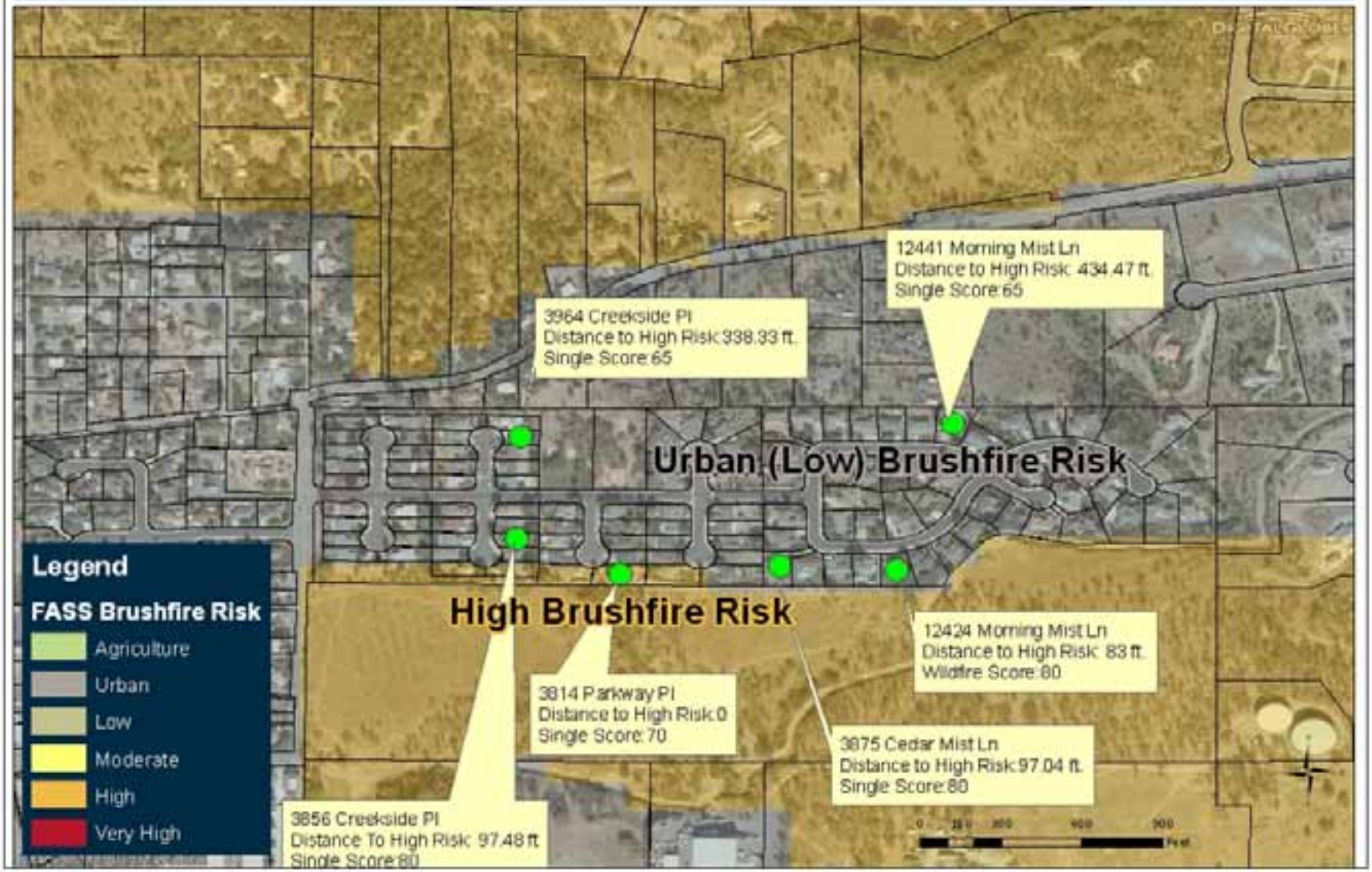
Brushfire Risk Examples For Auburn, California



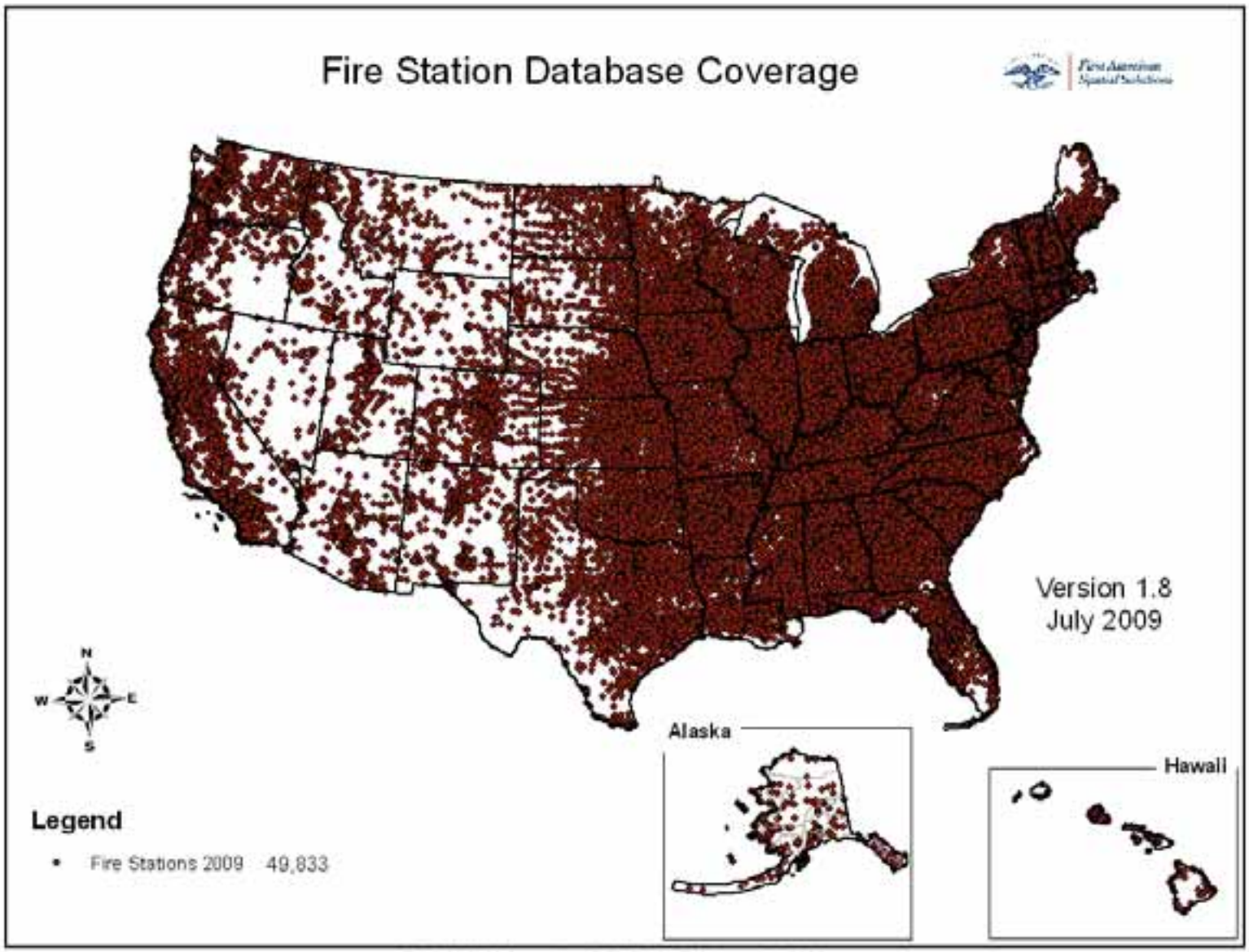
Additional Wildfire Elements

Examples Include:

- Distance to Fire Station
- Road Accessibility
- Humidity
- Seasonal Drought Conditions
- Wind Hazard Zones
- Bark Beetle Infestation

Alaska
Arizona
California
Colorado
Florida
Idaho
Montana
Nevada
New Mexico
Oklahoma
Oregon
Texas
Utah
Washington
Wyoming

Fire Station Database Coverage



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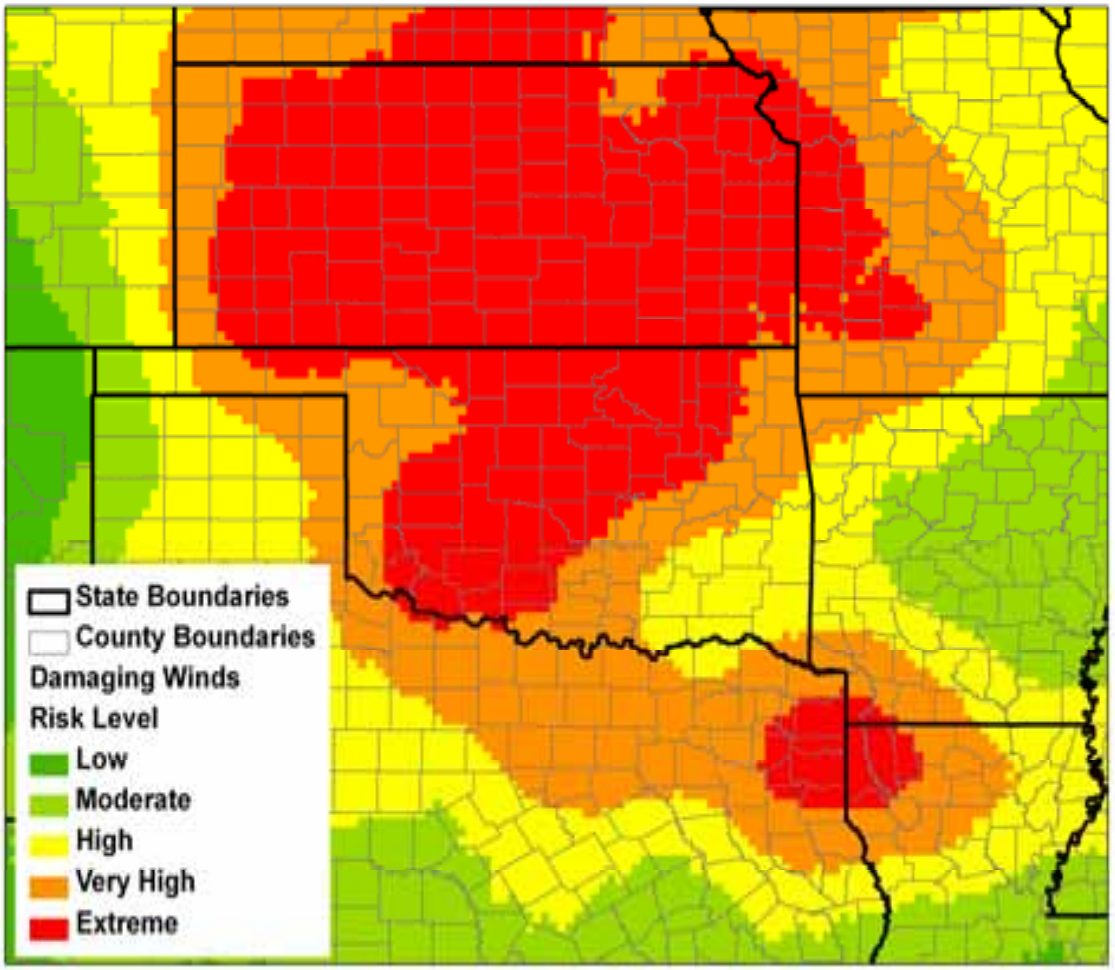
Damaging Winds & Hail

Identifies risk areas in large cities, counties, and states.

Geographic coverage for 48 contiguous states and Washington D.C.

High resolution positional accuracy.

Wind events modeled and aggregated into 10 km square grid cells.



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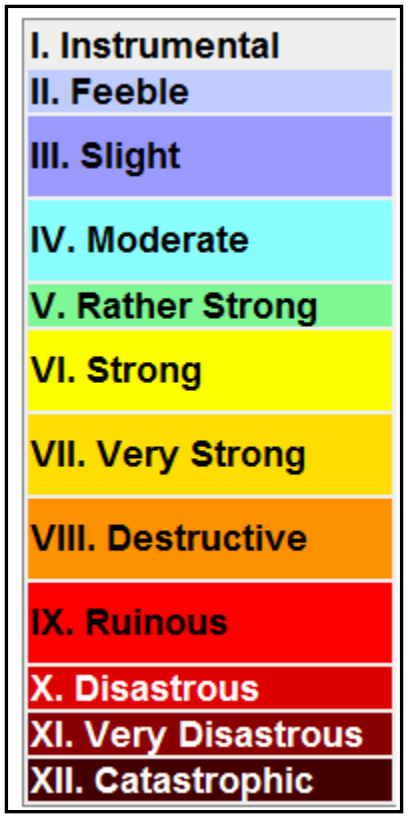
Earthquake Risk

- Most models assign risk at a gross level of granularity
- Some risk models have “maps” of MMI

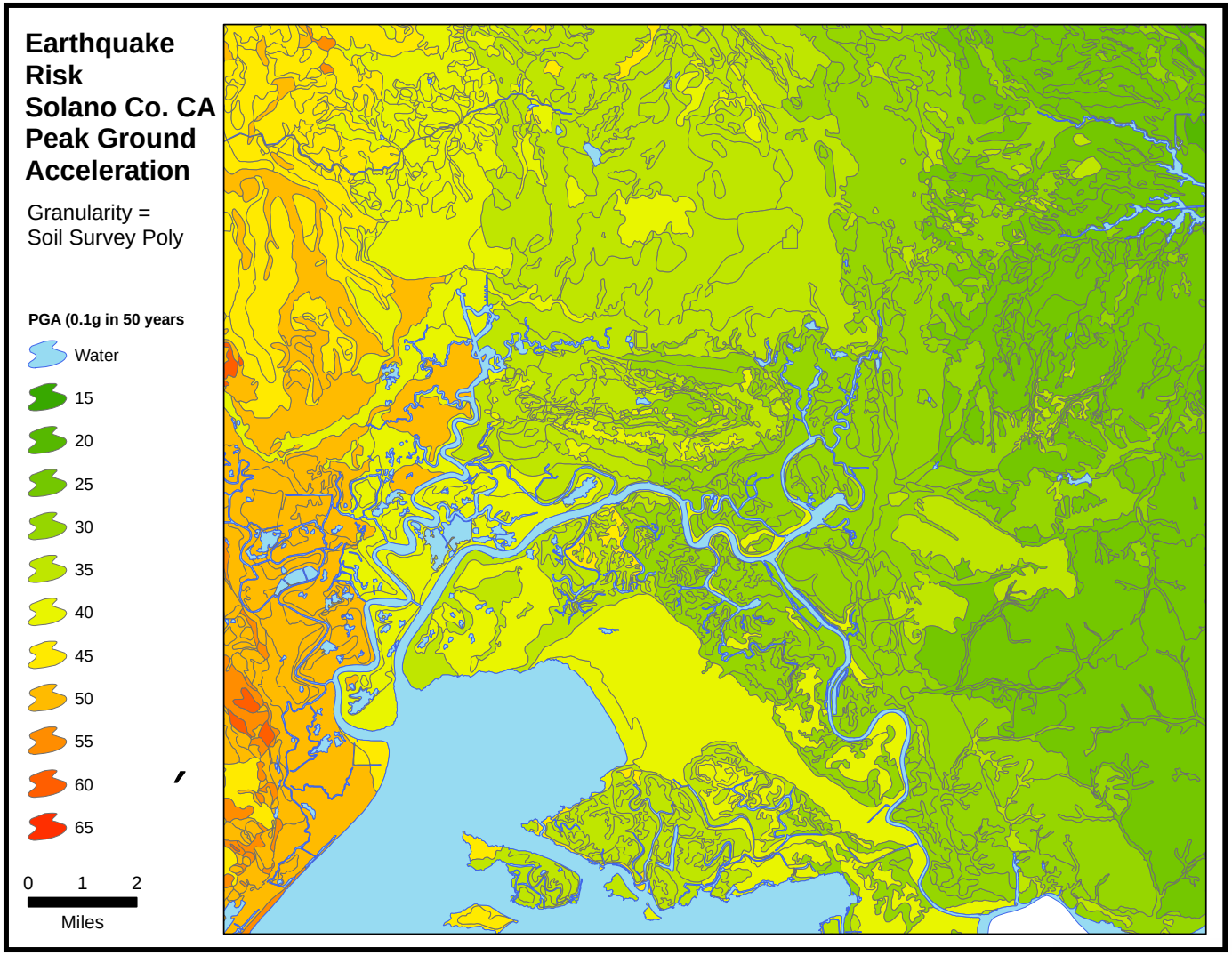


Difficult to stand; furniture broken; damage negligible in building of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures

U.S.G.S

- Produces a grid of points
- Show the probability of different levels of Peak Ground Acceleration (PGA) in 50 years
- Common measure is 0.10*g*
- Corresponds to MMI of VII
- Can be used to assign probabilities at a very granular level
- Soil Survey polygons
- Produces a “PGA Risk Score”

PGA (0.10*g*) Probability

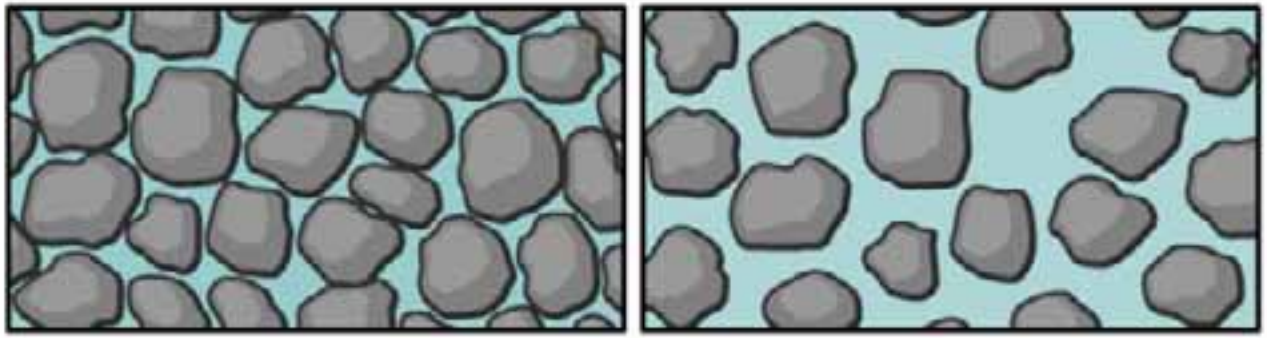


Additional Factors

- Given a specific earthquake and similar structures
- Damage will vary based on the surface materials underneath the structure
- Two factors
  - Liquefaction
  - Strength of substrate

Soil Liquefaction

•Soil liquefaction describes the behavior of soils that, when loaded, suddenly suffer a transition from a solid state to a liquefied state, or having the consistency of a heavy liquid.



Normally, water fills the spaces between sediment grains, but the grains touch, and friction holds the sediment together.

Liquefaction increases the water-filled spaces between grains, allowing the sediment to flow like a liquid.

Strength of Substrate

- Most soils are not subject to liquefaction
- Some have properties that impart a “jello-like” quality during earthquakes
- Damage results are similar
- Marina District in San Francisco

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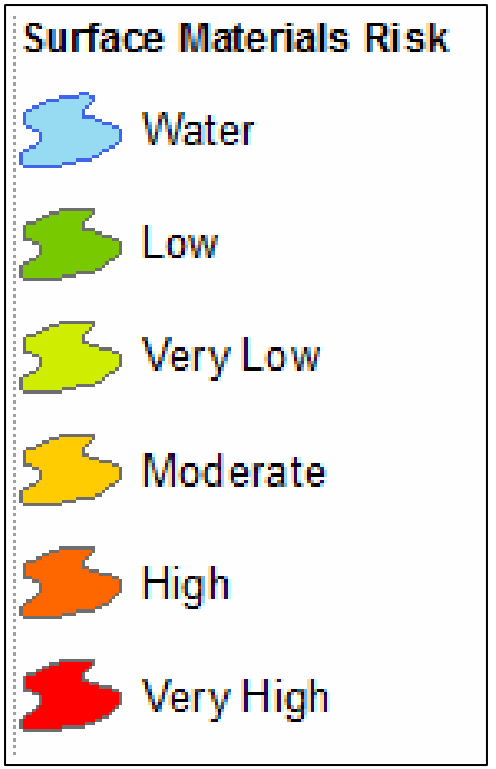
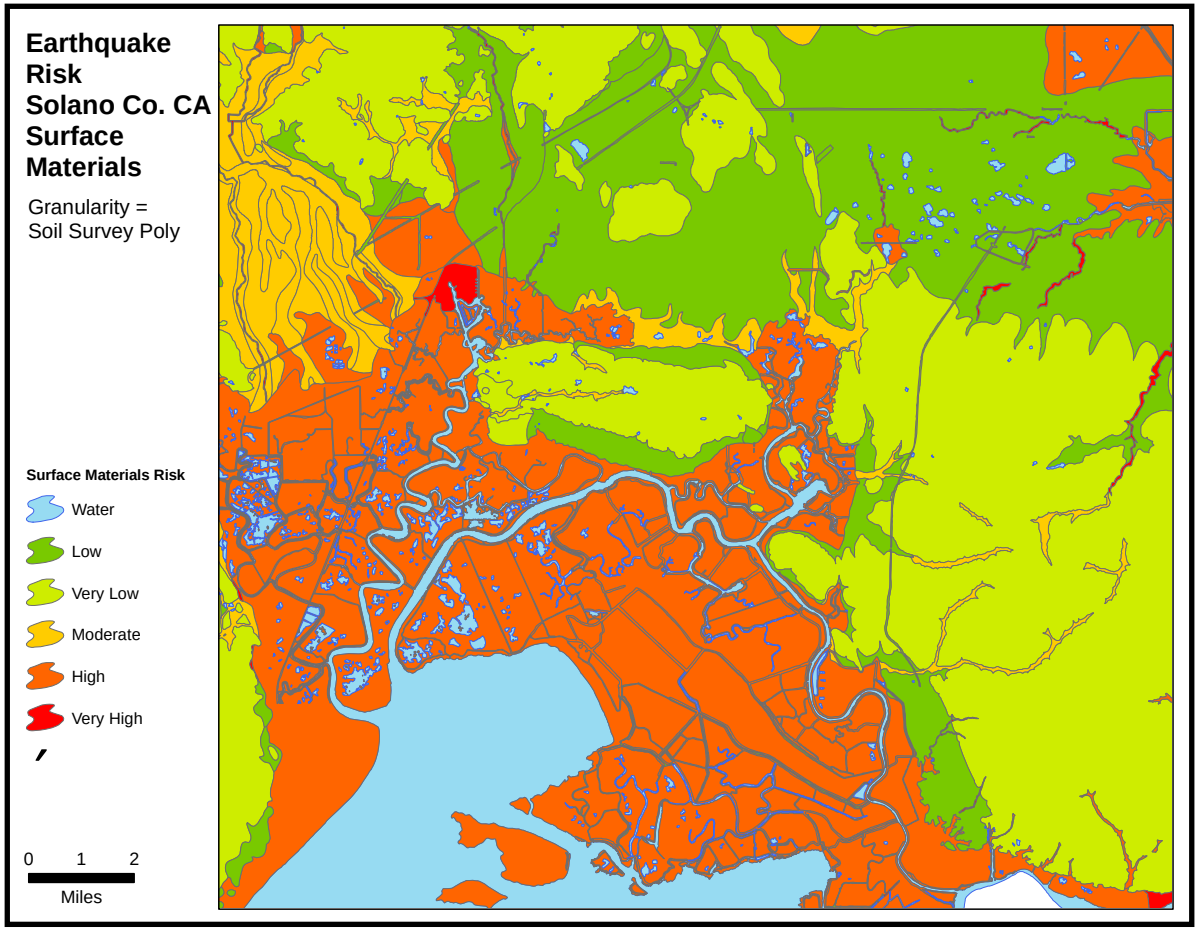
Additional Factors

- Adds an additional risk factor
- A “Surface Materials” index
- Low to very high



Earthquake Risk



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CONCLUSIONS

- Increasing precision = increasing spatial granularity.
- The best way to prepare for disasters is to know the areas of maximum impact with precision.
- Even large disaster footprints can be extremely granular.
- Areas within the general disaster footprint can be immune to impact.
- Single sources of data speed implementation, decision making and responsiveness.
- With reverse geocoding and parcel level analysis, you will know where you are even if where you are isn't there any more.

QUESTIONS?

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