Paveglio et al. 2018

Paper goal: to better understand where and how social vulnerability factors and wildfire risk intersect

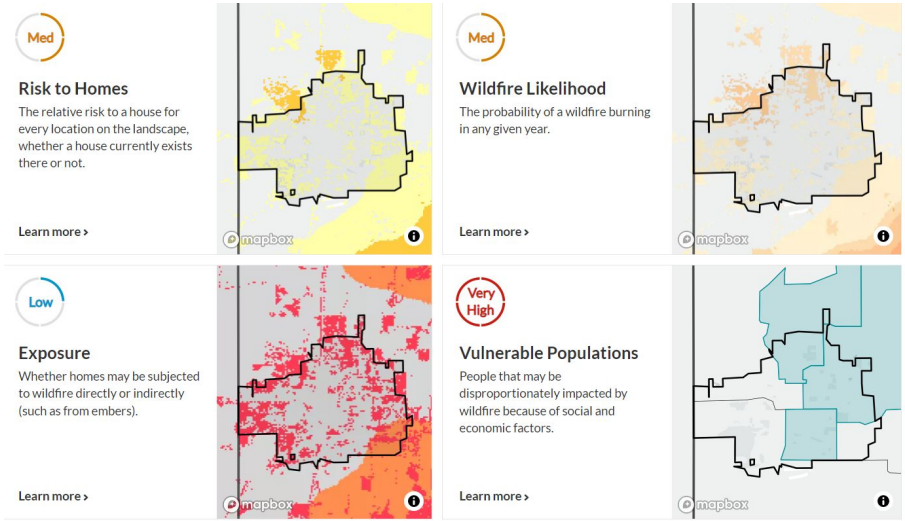
Social vulnerability: Which human populations are most at risk?

Exposure: Will the wildfire impact you?

Sensitivity: How deeply will it impact you?

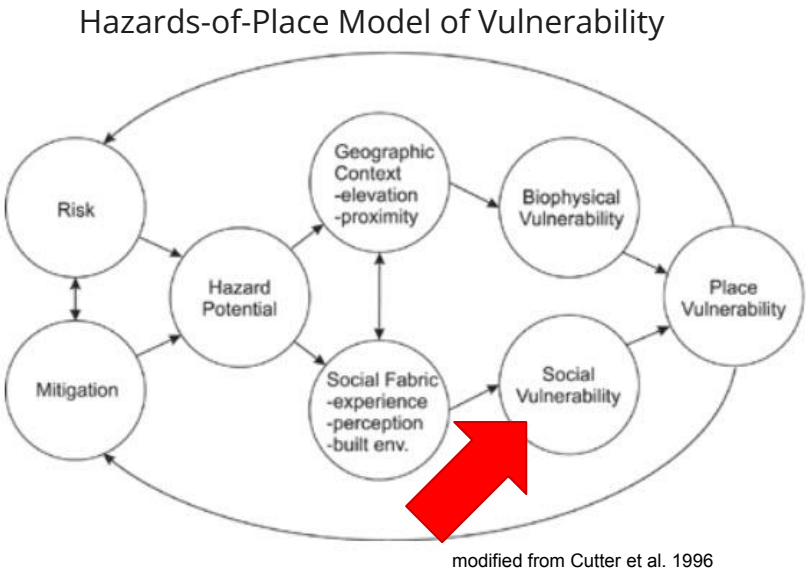
Adaptive capacity: Can you prevent it? If not, can you take action to make it less severe?

Paveglio 2018 (426)



Results of a search for Moscow ID in the Wildfire Risk to Communities tool

Calculating social vulnerability



modified from Cutter et al. 1996

Social Vulnerability index (Cutter 2017)

- Data: US Census, American Community Survey
- Not as effective below a census tract level - margins of error can be high
- Some variables used

Limitations of SOVI and other indexes for fire applications

- Generalized
- Using administrative boundaries
- Populations' values not included as a basis

US Census tract

- Subdivision of a county
- Average ~4000 residents
  - min: 1200, max: 8000

US Census block

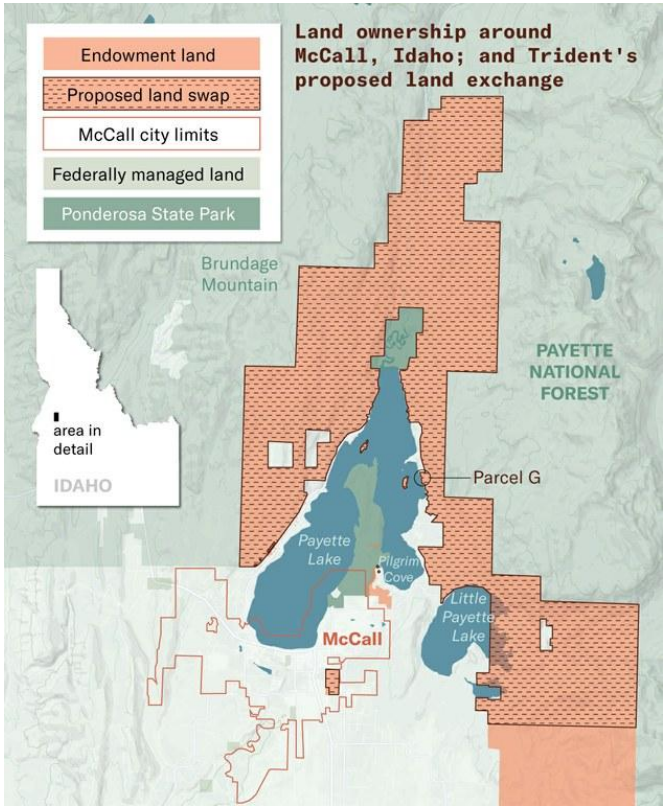
- Subdivision of tract
- Smallest unit with data available

Census blocks in Moscow, ID

Source: US Census website

Methods

- Self-reported survey responses
  - Primary homeowners: in-person
  - Secondary homeowners: mail survey
- Wildfire simulations
- Parcel data (McCall, Valley & Adams Co.)
- Datasets linked with geocoding
- Calculated expected residential losses from wildfire or E(RLW)
  - Probabilistic & monetary metric



Map of McCall & surrounding area. Note: Idaho Department of Lands rejected land swap in 2021. Source: High Country News

Demographics (mean)

- Income level: average 80-149k
- Close split between part (52.5%) & full-time (47.5%) residents
- Believed fire was likely to burn on private lands (81.44%)
  - … but not on their own private land (19.46%)

Results & implications

- Large standard deviations for sensitivity; E(RLW)
- Higher property value & income associated with higher vulnerability
- Differences in mitigation actions
  - Guardianship model

What's next?

- Test relationships between variables
- Explore risk at finer scales
- Focus on points where intent crosses into action
- Critical time for influence: initial decisions about where to live

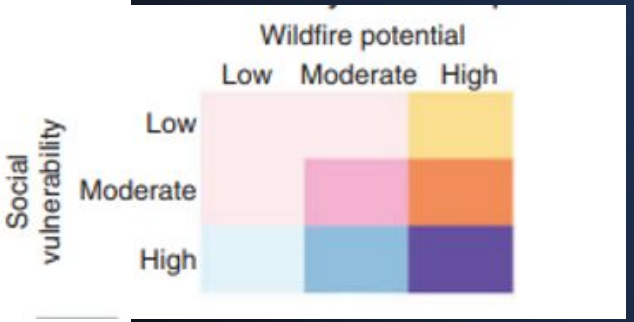
Questions

- It is mostly the case that certain humans create conditions that expose certain other humans to additional hazard. How does the “facilitation” of a “fire-adapted” WUI perpetuate environmental injustices and social vulnerabilities that are not addressed in these studies? (Sasha)
- How can the concept of risk be mobilized to prioritize values that are not solely economic? Could we broaden the definition of “risk”, leading to a different idea of what fire “adaptation” means? (Sasha)
- Heterogeneity at finer scales and homogeneity at broader scales may both be true. At what scale does wildfire go from a social-environmental problem to a problem of social-environmental (in)justice? (Jack)
- Previous studies show second homeowners are less likely to mitigate on their non-primary properties. Were they aware of the risks? (And is being aware of a risk enough to drive action? Why or why not?) (Dalyna)
- Was it more difficult to reach second homeowners? Did homeowners reach out with any questions if they didn’t understand the survey? (Dalyna)
- What other values could be incorporated into the E(RLW) metric? Is it realistic to quantitatively analyze other values that could be affected in a wildfire? Could percentage of net worth be useful? (Ian)
- How objectively do residents in the WUI represent their own efforts to reduce fuel loads on their property? (Ian)
- What might have influenced the correlation between high-value property and high vulnerability to wildfire? How does this contrast with traditional hazard literature? (Greyson)
- Paveglio et al mentions the possibility using taxation as a discincentive for private property owners to promote mitigation activities (436). Should the same be done for part-time homeowners or even the entire population?(Greyson)

Wigtil et al. 2016
Places where wildfire potential and social vulnerability coincide in the coterminous United States

Objectives

- Combine wildfire potential & social vulnerability via a social vulnerability index derived from census data
- Are social vulnerability and wildfire potential related?
- Relative incidence rates of vulnerability in“typologies”



Methods

Data

- Socioeconomic and demographic data from Census (2010) + American Community Survey (06-10)
- Biophysical data - grid (7 ha) of wildfire potential from USFS (2012)

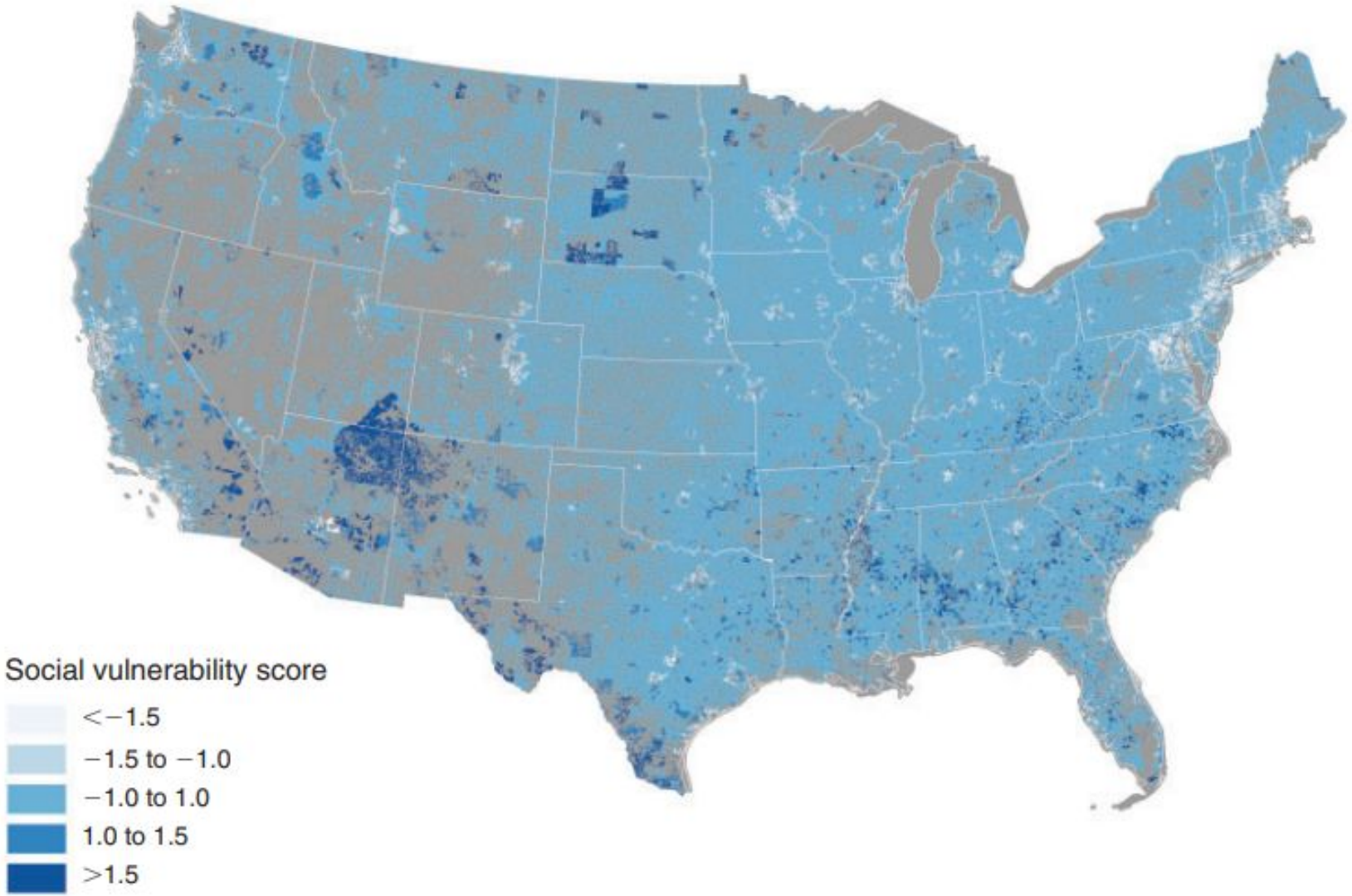
Analysis

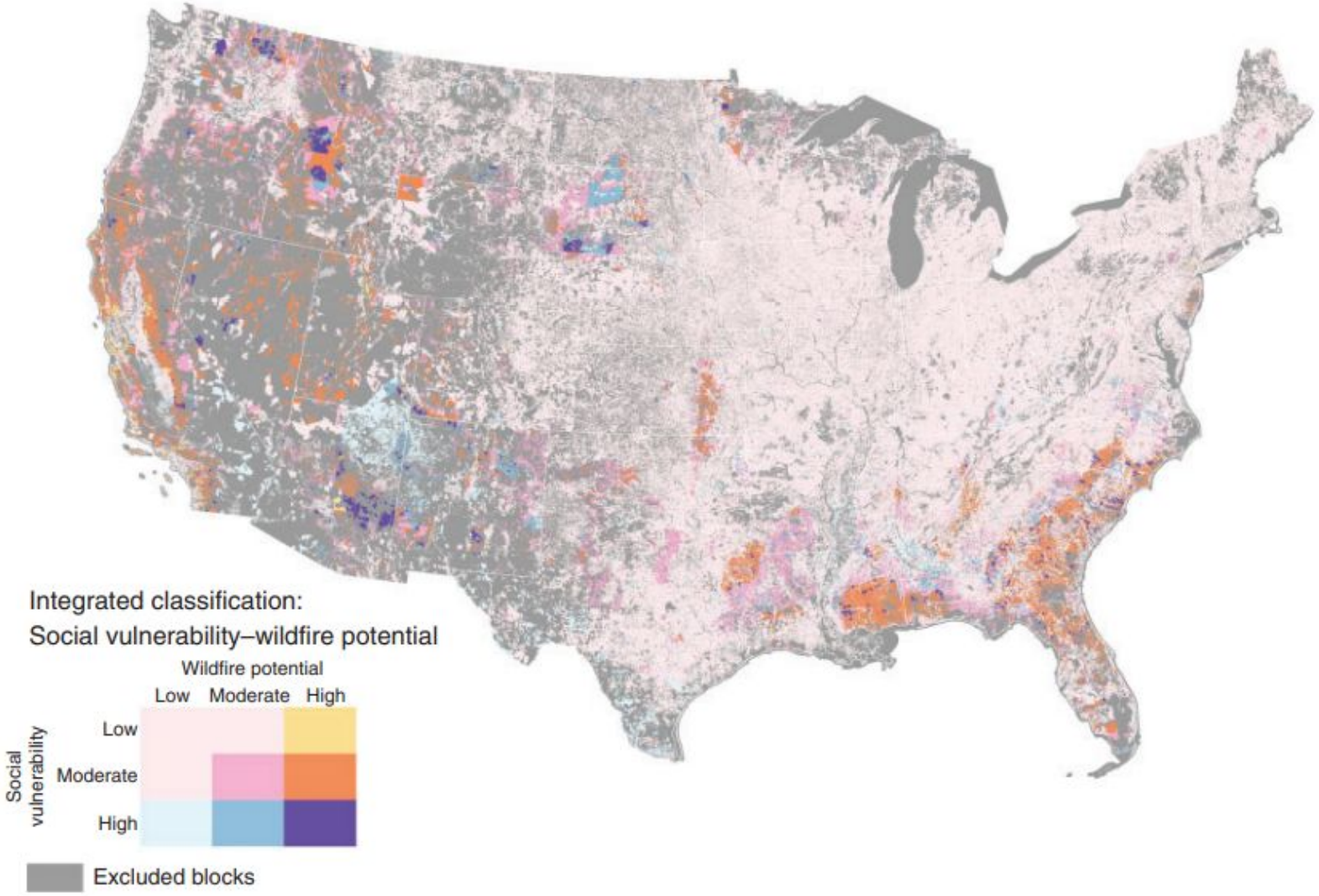
- Principle Components Analysis on social vulnerability variables from census data (Tables 1 & 2)
- Tested relationship between social vulnerability and wildfire potential - typologies actual vs expected
- Summarized data by state

Results/Key Takeaways

- Map outputs
  - Map of social vulnerability (Fig 1)
  - Map of SV + Fire Risk (Fig 4)
- Findings
  - High Wildfire/High SV affects:
    - California, North Carolina, Florida, South Carolina, Georgia, New Jersey and New York (number of houses)
    - 372,000 housing units in the US (0.3%)

- Discussion/conclusion
  - Increasing Fire risk, decreasing social vulnerability (in WUI)
  - SE US
  - Much of the High fire/Social Vulnerability housing not found in WUI (40%) – underestimating vulnerability in some communities?


Social vulnerability score
<−1.5
−1.5 to −1.0
−1.0 to 1.0
1.0 to 1.5
>1.5

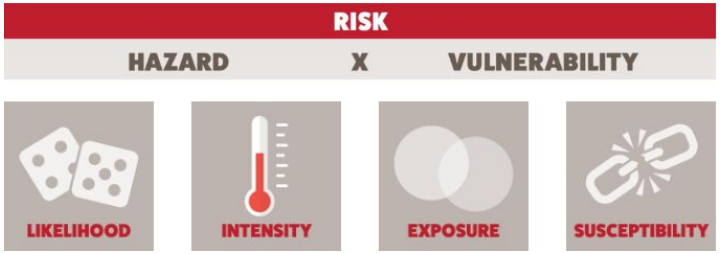

Integrated classification:
Social vulnerability–wildfire potential
Wildfire potential
Low
Moderate
High
Social vulnerability
Low
Moderate
High
Excluded blocks

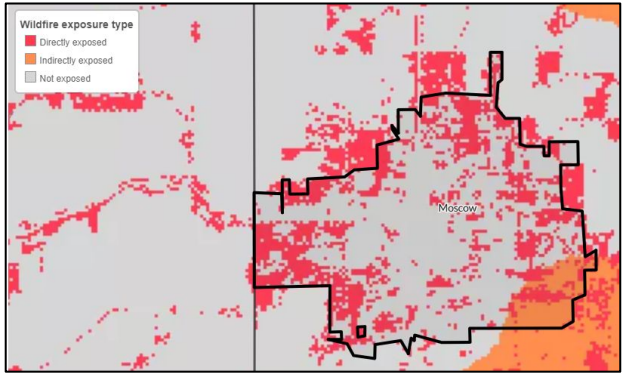
Questions

- Witgil et al.'s finding that wildfire potential is negatively correlated with social vulnerability suggests to me that high wildfire potential, as human risk, is not cost prohibitive to low social vulnerability WUI expansion. Does this mean that WUI wildfire suppression can be understood as a form of 'transfer payment' whereby government income and resources are redistributed to areas of low vulnerability (higher capital) without the expectation of goods and services in return? (Jack)
- More practical follow up question: If firefighting/suppression is a federal transfer payment that socializes the development of high risk/low vulnerability areas, what's the argument against categorizing high fire potential WUI as a tax block in order to pay their fair share of the firefighting costs? (Jack)
- The respondents were either Hispanic or Native American that only spoke their native language; was there any translator for these individuals? If there wasn't a translator, at this time was there important information that was not correctly understood? More generally, of the 32,000 of 131 million that weren't included in this study, I wondered how the results would have been affected by this inclusion? (Dalyna)
- Witgil et al modeled a broad-scale study across the US, while Paveglio et al conducted a fine-scale study of one city in Idaho. What kind of scale is most appropriate to address social vulnerability to wildfire, especially given the non-localized costs of smoke exposure and tax-payer-subsidized mitigation and suppression efforts? (Sasha)
- Witigel et al evaluated the entire coterminous U.S, including WUI and non-WUI, areas. Does this scale lead to a loss of definition social vulnurability for small communities who do not reflect the greater population? What are the drawbacks of modeling social vulnerability using entirely second order data? (Greyson)
- "Although social vulnerability indices can efficiently describe broad-scale vulnerability, they also can fail to capture more localized information related to exposure, sensitivity and adaptive capacity…" Did you notice any areas within the social vulnerability & wildfire risk map (Figure 4) that had results you did not expect? If you are familiar with the area, what are the "localized" factors that may have been overlooked in this broad scale analysis? (Ian)

WILDFIRE RISK TO COMMUNITIES

- **Likelihood** - annual probability of wildfire burning in a specific location
- **Intensity** - measure of the energy expected from a wildfire (think of flame lengths)
- **Exposure** - spatial coincidence of wildfire likelihood and intensity with communities
- **Susceptibility** - propensity of a home or community to be damaged if a wildfire
- Mapping tools + information on key topics

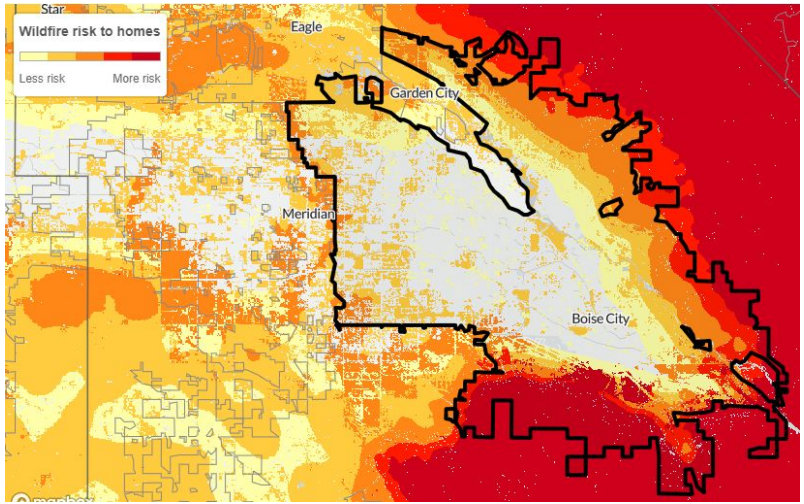




Questions

- What were your observations regarding scale and useful information in the interactive mapping tools? Large population centers vs smaller rural communities? (Ian)

- When looking at the methods page I was somewhat unclear on how often and in what ways the data is updated. It appears the social vulnerability data is from 2016-2020, changes from the pandemic? (Andrew)



WILDFIRE RISK TO COMMUNITIES

Creation: 2018, H.R. 1625: Wildfire Severity Mapping section
Goal: Publish publicly-available geospatial products showing wildfire hazard and risk across U.S. with a focus on communities

Data sources:

- LANDFIRE satellite data
- National Weather Services
- US Census
- LandScan USA Population Database

Partners:

- US Forest Service
- Missoula FireLab
- Headwaters Economics
- Pyrologix

Methods:

- used LANDFIRE data to map fire risk
- used LandScan & census for population density
- used FSim to find different measures of hazard (risk to structures; wildfire hazard potential)

Source: WFRC Populated Areas white paper