



wildfirerisk.org

# **Today: Data, Science, and Methods**







BACKGROUND INFO

## CURRENT DATA PRODUCTS

# FUTURE ADDITIONS & ENHANCEMENTS



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A website with interactive data and maps to help communities understand, explore, and reduce wildfire risk.

- Directed by Congress in 2018
  Consolidated Appropriations Act
- Nationwide maps & data with consistent methods.
- Searchable by community, county, state.
- Published April 2020 at www.wildfirerisk.org
- Primary end users include state and local elected officials, land use planners, fire managers, and fire collaboratives



# Nationally consistent data and risk metrics

Available nationwide: communities, counties, states

Grounded in the best available science

Easy to use and includes resources for action

Not fine-scale: for comparing among rather than within

Not locally calibrated

Not predictive, does not include climate projections

Not a replacement for other assessments



# THE TEAM







- Washington Office Fire & Aviation
- Rocky Mountain Research Station

SHEADWATERS ECONOMICS





PYROLOGYX

## THE SCIENCE AND DATA TEAM





## **DATA DEVELOPMENT TIMELINE**



## WHAT ARE THE COMPONENTS OF RISK?







# **MAPPING RISK: METHODS AND INPUTS**



ERC from downscaled, gridded weather datasets from Matt Jolly, RMRS, approx. past 20 years Winds from carefully-selected RAWS stations, 1 in each of in 136 "pyromes" in the US



# **DOWNSCALING NATIONAL DATASETS**

#### Chelan

## Spokane

## 270m pixels

Wildfire Likelihood

0 to 1-in-10,000

1-in-22 to 1-in-8

L-in-10,000 to 1-in-4,643 1-in-4,643 to 1-in-2,154 1-in-2,154 to 1-in-1,000 1-in-1,000 to 1-in-464 1-in-464 to 1-in-215 1-in-215 to 1-in-100 1-in-100 to 1-in-46 1-in-46 to 1-in-22

0







# **DOWNSCALING NATIONAL DATASETS**

#### Chelan

## Spokane

## 30m pixels









## **DOWNSCALING NATIONAL DATASETS**

#### Chelan

## Spokane





## **MAPPING EXPOSURE TO HOMES**



LandScan USA Population Database (2017) from Oak Ridge National Lab, converted to a 30m-resolution relative housing unit density raster



## WHAT ABOUT SUSCEPTIBILITY?



The Risk to Homes data integrate wildfire likelihood and wildfire intensity from simulation modeling. These two risk components represent wildfire hazard. To translate this into terms specific to the effect of fire on homes, *Wildfire Risk to Communities* uses a generalized concept of susceptibility for all homes. In other words, *Wildfire Risk to Communities* assumes all homes that encounter wildfire will be damaged, and the degree of damage is directly related to wildfire intensity. *Wildfire Risk to Communities* does not account for homes that may have been mitigated.



# WHAT ABOUT SUSCEPTIBILITY?









# WHAT IS A COMMUNITY?

- Community = U.S. Census Bureau 2018 Places Dataset
  - Includes legally bounded incorporated places (cities, boroughs, towns, villages, etc.)
  - Also includes unincorporated Census Designated Places (CDPs)
  - Total of 29,318 across the 50 U.S. states
- Counties
  - U.S. Census Bureau 2018 Counties and equivalents
  - Total of 3,141 across the 50 U.S. states
- States
  - U.S. Census Bureau 2018 States and equivalents
  - Total of 51, including all 50 U.S. states plus the District of Columbia



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# **MAPS & DATA INCLUDED:**

April

# Interactive Webpages

Risk to Homes

Wildfire Likelihood

Exposure Type

Vulnerable Populations

# For Download (GIS, tabular)

- Risk to Homes
- Wildfire Likelihood
- Exposure Type

April

- Conditional Flame Length
- Flame Length Exceedance Probability 4 ft
- Flame Length Exceedance Probability 8 ft
- Conditional Risk to Homes
- Wildfire Hazard Potential







# WILDFIRE LIKELIHOOD



- Annual burn probability from FSim modeling
- Represents annual likelihood of a specific location (pixel) burning in a given year
- Circa 2015 conditions
- Modeled at 270m-resolution
- Upsampled to 30m-resolution



the probability of wildfire starting and spreading

# **CONDITIONAL FLAME LENGTH**



- Most likely flame length if a fire occurs
- Average measure of wildfire intensity
- Calculated from Mean Fire Intensity, which is produced by FSim
- Flame length in feet is more relatable than intensity in kW/m



INTENSITY the energy released by a wildfire

## FLAIVIE LEINGTH EXCEEDANCE PROBABILITY -

#### EET



- Chance of flames > 4 ft if a fire occurs
- Represents likelihood of moderate to high fire intensity
- 4 foot flames are considered the limit of what hand crews can effectively control



INTENSITY the energy released

by a wildfire

## FLAWE LENGTH EXCEEDANCE PROBABILITY -

#### 



- Chance of flames > 8 ft if a fire occurs
- Represents likelihood of high fire intensity
- 8 foot flames are considered the limit of what mechanical equipment can effectively control



INTENSITY the energy released

by a wildfire

# **EXPOSURE TYPE**



- Delineates where homes would be:
  - Directly exposed
  - Indirectly exposed
  - Not exposed
- Based on where fuels are mapped as burnable vs. nonburnable by LANDFIRE
- Indirectly exposed areas are within 1 mile of contiguous burnable fuels (~1200 acres)



EXPOSURE the spatial overla of wildfire and communities

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EXPOSURE the spatial overla of wildfire and

# **CONDITIONAL RISK TO POTENTIAL STRU**



 Represents wildfire consequences if a fire occurs

INTENSITY

by a wildfire

e energy released

whether a

community may be

harmed by wild

- Like "conditional Net Value Change" (cNVC) just for homes
- Assumes a home on every pixel





# **RISK TO HOMES**





- Risk to potential structures
- For every pixel: "What would the relative risk to a house be if one existed here?"
- Integrates:
  - wildfire likelihood
  - conditional risk to potential structures
- Like "expected Net Value Change" (eNVC) just for homes



# WILDFIRE HAZARD POTENTIAL



 Quantifies the relative potential for wildfire that may be difficult to control

wildfire starting

and spreadly

the energy release

by a wildfire

- Integrates likelihood and intensity
- Includes other factors including:
  - Ignition density of small fires
  - Relative resistance to control for different fuel types
- Has been published as a national product at 270m in 2012, 2014, and 2018



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## **DATA DEVELOPMENT TIMELINE**

Delivered



WILDFIRE RISK TO COMMUNITIES

# **MAPS & DATA INCLUDED:**



# Interactive Webpages

April

Wildfire Likelihood

April

Exposure Type

Vulnerable Populations

**FBD** August

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- Conditional Flame Length
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- Conditional Risk to Homes
- Wildfire Hazard Potential
- Housing Unit Density
- Expected Annual Housing Unit Exposure
- Annual Housing Unit Risk
- Annual Source of Housing Unit Exposure
- Conditional Source of Housing Unit Exposure



# **ADDITIONS AND ENHANCEMENTS**





# **ADDITIONS AND ENHANCEMENTS**



## **Community Zones**

- Polygons that try to associate homes with the closest community "core" area defined by the Census Places
- Uses a travel time algorithm
- Will allow for community data summaries by
  - Community Core
  - Community Zone (includes core and nearby populated areas)



# Questions? Comments?





# Thank You!



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