Assessing Wildfire and Populations at Risk in Santa Fe, New Mexico

User Guide, Methods, and Data Sources

Headwaters Economics | December 2017

Introduction

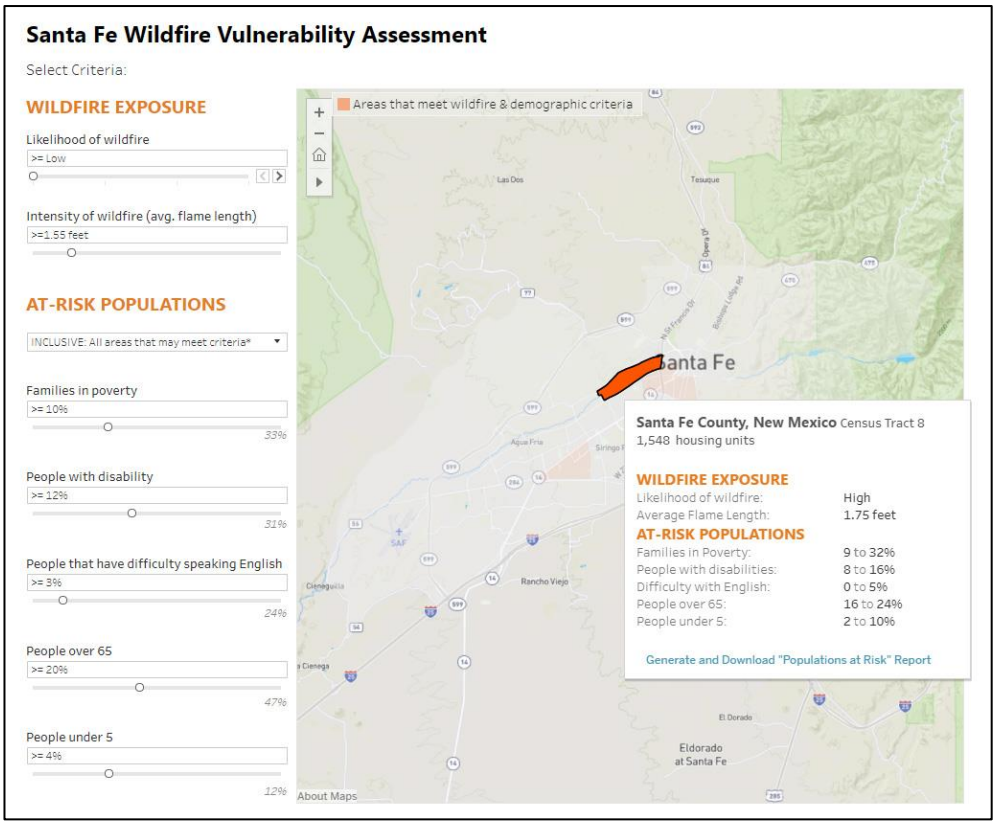
In partnership with the City of Santa Fe Fire Department and the U.S. Forest Service Rocky Mountain Research Station, Headwaters Economics produced a new tool that helps the city identify neighborhoods most at risk to wildfire that also are home to vulnerable populations, https://headwaterseconomics.org/wildfire/homes-risk/assessing-wildfire-and-populations-at-risk/

Inside this Document:

The tool is designed to help city staff, residents, and land managers understand where the highest risk of wildfire overlaps with populations that may have social, economic, and health disadvantages in order to more effectively and efficiently reduce risk. Understanding where populations are most vulnerable can help the City of Santa Fe prioritize resources before, during, and after wildfires.

For example, the tool can help:

- Target education and outreach to those areas most at risk from wildfire and to the most vulnerable populations.
- Customize education and outreach materials in multiple languages for neighborhoods that have low English proficiency and are at-risk from wildfire.
- Prioritize risk-reduction activities and mitigation funding based on the specific vulnerable population characteristics (for example, in less affluent neighborhoods).
- Develop wildfire response and operational plans for specific neighborhoods. For example, portions of the city with a higher proportion of disabled, elderly, or very young residents may require different evacuation plans.



This tool was created as part of the Community Planning Assistance for Wildfire (CPAW) program, which provides land use planning support to communities to reduce wildfire risk. The program is supported by the U.S. Forest Service, the LOR Foundation, and other private charitable foundations.

Methods and Data Sources

Wildfire Exposure
The two wildfire exposure variables were obtained from a national assessment completed by the U.S. Forest Service Rocky Mountain Research Station (RMRS).[1] In this work, wildfire simulation outputs from the national FSim wildfire simulation library[2] were analyzed with the XFire geoprocessing tools[3] to forecast average annual area burned for each census tract. The FSim wildfire simulation system is described in detail elsewhere.[4]

- Likelihood of wildfire is a relative measure of the long-term average area in the tract expected to burn per year from a large fire given landscape biophysical characteristics, contemporary weather, and ignition patterns. Census tracts are divided into four categories:
    - *low* (less than one standard deviation below the mean);
    - *medium* (mean to 1 standard deviation below the mean);
    - *medium-high* (mean to 1 standard deviation above the mean);
    - *high* (greater than 1 standard deviation above the mean).

  Each tract is assigned to a category relative to the other tracts in the study area (either City of Santa Fe or Greater Santa Fe area), which is selected by the person using the tool.

- Intensity of wildfire is the average expected intensity of wildfire based on simulated wildfire flame length in feet, accounting for biophysical characteristics, contemporary weather, and ignition patterns.

At-Risk Populations
The variables under "At-Risk Populations" are from the U.S. Census Bureau's latest release of the American Community Survey (ACS) five-year estimates, which represent the socioeconomic conditions during a five-year rolling survey period.[5]

- Families in poverty. Percentage of families in the census tract living below the poverty line. The Census defines a family as a group of two or more people who reside together and are related by birth, marriage, or adoption. The Census uses a set of income thresholds that vary by family size and composition to define who is poor.

- People with disability. Percentage of people in the tract estimated to have a disability, based on self-reporting questions in the American Community Survey.

- People that have difficulty speaking English. Percentage of people in the tract estimated to have difficulty speaking English based on self-reporting questions in the American Community Survey.

- People over 65. Percentage of people in the tract over the age of 65.

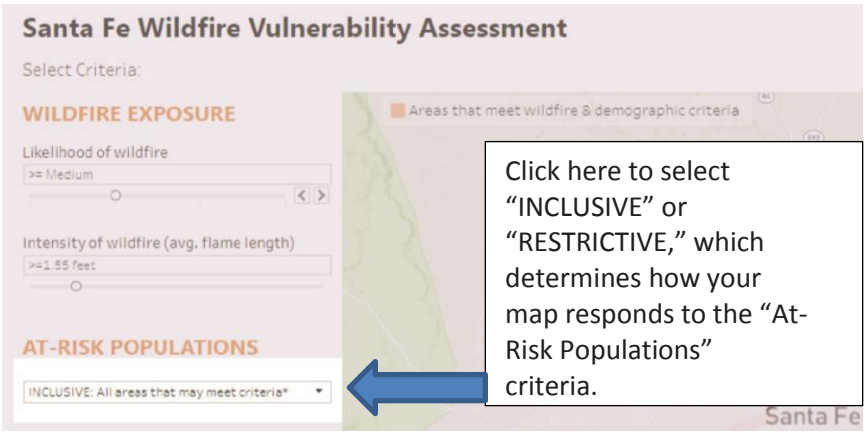
- People under 5. Percentage of people in the tract under the age of 5.

Tips for Using the Tool

The map display will automatically refresh as you change criteria under "Wildfire Exposure" and "At-Risk Populations." As you hover your mouse over the map, a text box with more information about the underlying census tract will appear.

Inclusive Versus Restrictive

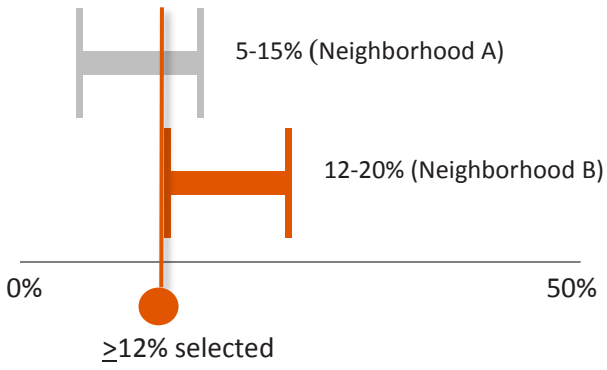
Because ACS data result from a survey, the results fall within a range of possible values. For example, a neighborhood may have between 5 percent and 15 percent of families living in poverty. Your "At-Risk Populations" criteria will act on either the lower or upper estimate, depending upon whether you select an "INCLUSIVE" or "RESTRICTIVE" map.



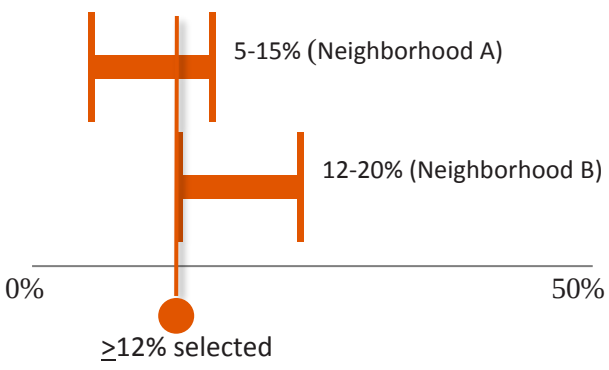
To understand how this works, visualize a neighborhood where the estimated share of families in poverty, based on the ACS survey results, is 5-15 percent (Neighborhood A), and another neighborhood where the share is 12-20 percent (Neighborhood B). What will happen if you set the poverty criteria to greater than or equal to 12 percent? (See the graphic below.)

A "**RESTRICTIVE**" map will not include Neighborhood A, since you cannot say with certainty that more than 12 percent of the families live in poverty (the true value may be as low as 5 percent). Neighborhood B would be selected, since its entire range is greater than 12 percent. An "**INCLUSIVE**" map would include both Neighborhood B and Neighborhood A, since it is possible that more than 12 percent of families live in poverty in Neighborhood A. (The true value may be as high as 15 percent.)

RESTRICTIVE: Only neighborhoods that *definitely* have at least 12% are selected (Neighborhood B).



INCLUSIVE: Any neighborhood that *may* have at least 12% is selected (both Neighborhoods A & B).

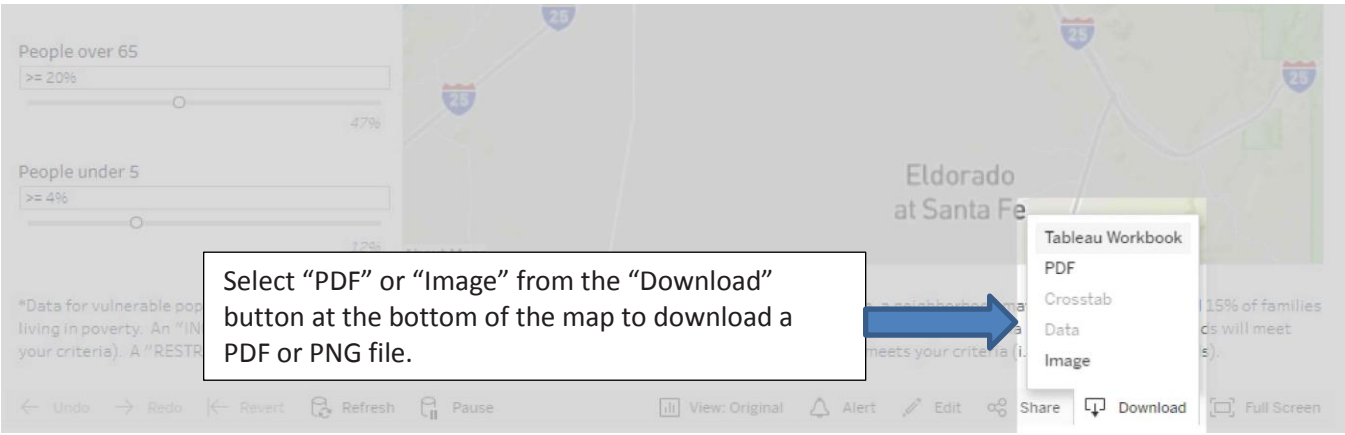


Populations at Risk Report
If you click on a tract, you have the option to run a *Populations at Risk* (PAR) report for that census tract. The PAR report will be generated in Excel and download to your computer automatically. The report will provide detailed socioeconomic information about vulnerable populations in the selected census tract. (Visit https://headwaterseconomics.org/tools/populations-at-risk/ to generate free, custom reports for any location.)

Downloading and Exporting from the Map
The map tool allows users to export data and images in several formats.

- Shapefile. To download a shapefile of the data, click on "Data as GIS Shapefile" underneath the map. The shapefile will contain attributes of all wildfire exposure criteria and at-risk populations criteria for each census tract displayed in the interactive tool.

- PDF or Image. To export the map as a PDF or a PNG (image), find the "Download" button on the toolbar below the map. Select PDF or Image. The map or image will download to your computer. A pop-up box will alert you when the download is complete. The export will include the map with selected tracts and a list of the criteria selected.



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About Headwaters Economics
Headwaters Economics is an independent, nonprofit research group that assists the public and elected officials in making informed choices about land management and community development decisions, https://headwaterseconomics.org/.

End Notes

[1] Ager AA, Palaiologou P, Evers C, Day MA, and Ringo C. In prep. Assessment of wildfire transmission from national forests to communities in the Western United States. *Journal of Environmental Management*.

[2] Short KC, Finney MA, Scott JH, Gilbertson-Day JW, and Grenfell IC. 2016. Spatial dataset of probabilistic wildfire risk components for the conterminous United States. Fort Collins, CO: Forest Service Research Data Archive. https://doi.org/10.2737/RDS-2016-0034

[3] Ager AA, Bunzel K, Day MA, Evers C, and Palaiologou P. Unpublished report. XFire: Geospatial framework for characterizing transboundary wildfire risk to communities.

[4] Finney MA, McHugh CW, Grenfell IC, Riley KL, and Short KC. 2011. A simulation of probabilistic wildfire risk components for the continental United States. *Stochastic Environmental Research and Risk Assessment* 25: 973-1000. http://www.treesearch.fs.fed.us/pubs/39312

[5] U.S. Department of Commerce. 2016. Census Bureau, American Community Survey Office, Washington, D.C.