The Greater Santa Fe Fireshed Coalition

BRIEFING PAPERS

Post-Fire Impacts

THE TRUE COST OF WILDFIRE

In the U.S. over 12 million acres of former forestland are now treeless due to wildfire and post-fire effects. Post-fire processes—erosion, flooding, invasive species incursion and loss of watershed function—can last for decades, and have profound impacts on species reliant on intact forests and on communities far outside the fire boundary. The complete cost of wildfire, including fatalities, injuries, property losses, post-fire flooding, air and water quality damages, healthcare costs, business impacts, and infrastructure shutdowns is anywhere from 2 to 30 times greater than the suppression costs. For example, the 2010 Schultz Fire in Arizona cost up to $137 million dollars after the fire was contained because of post-fire flooding, reduced property values, habitat destruction, and other post-fire expenses. Homeowners, businesses, and local government agencies pay almost half of the costs of wildfire and post wildfire flooding.

Flooding after the Dog Head Fire, New Mexico. Photo:Z. Evans.

POST FIRE IMPACTS

- Flooding and debris flows after a wildfire can cause more destruction than the fire itself
- High severity wildfires kill trees, shrubs, and grass and make soil water-repellent
- In New Mexico, wildfires are often followed by heavy monsoon rains and this combination can cause disastrous flooding
- Moderate rainfall after a low and moderate wildfire in the Santa Fe watershed could easily cover the emergency valve filling 39% of McClure Reservoir with sediment – a key source for our city's water.

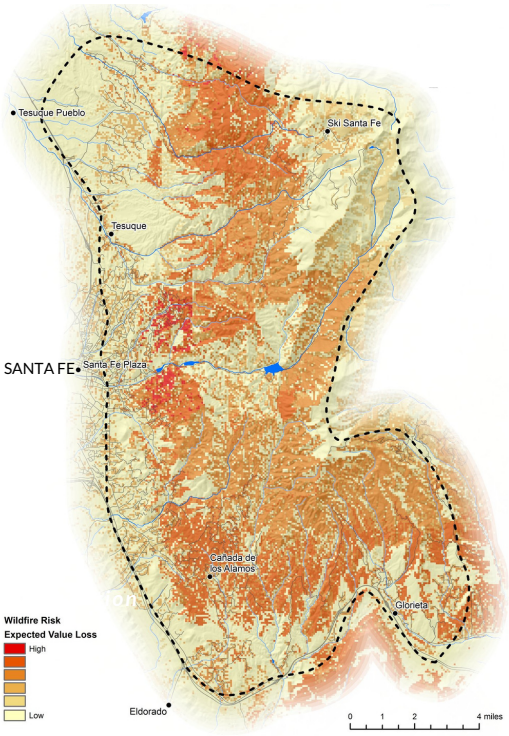
A severe wildfire in the mountains above Santa Fe would be dangerous, but flooding after the fire might be even more hazardous. Rainfall following a moderate to high severity fire can produce flooding and debris flows (high-density slurries of water, rock fragments, soil, and mud). This is because the rain intercepting canopy has been removed, as well as tree roots, shrubs, and grasses that hold the soil in place in areas where slopes have been stable in the past. Severe wildfires can make soil hydrophobic (or water repellent) so rain cannot infiltrate the soil, resulting in an increase of runoff leading to erosion after a wildfire, which can be more than 100 times greater than pre-fire conditions. The most destructive debris flows occur in areas of steep slopes that have been stripped of vegetation from high severity wildfire. New Mexico's dry and windy fire season (spring and early summer) is usually followed by the moist monsoon season which can help end the fire season, but those heavy rains can also fall on freshly burned soil, triggering debris flow events. The flood that destroyed Dixon's Orchard after the 2011 Las Conchas Fire is an unfortunate example of the power of post-fire debris flows (https://www.youtube.com/watch?v=9bjrSiUN8fA).

Erosion in Santa Clara from the Las Conchas Fire (left). Photo: Zander Evans

POST FIRE IMPACTS

EFFECTS ON DRINKING WATER

When debris flows carry soil and sediment into reservoirs or lakes used for drinking water they degrade water quality and threaten water infrastructure. The 2011 Las Conchas Fire put so much ash, sediment, and other impurities in the Rio Grande that Albuquerque had to shut off its water intake system. Similarly, Santa Clara Canyon was devastated by post-fire debris flows and has been closed to recreation since 2011. Ongoing research by Manuel Lopez at the US Geological Survey (USGS) modeled the potential impact of a common rainfall event following a moderate to high severity wildfire in the upper Santa Fe watershed. The resulting debris flow would fill 39% of McClure Reservoir with sediment and cover the emergency release valve. McClure Reservoir provides on average 40% of Santa Fe's annual water use, an irreplaceable natural resource. Debris flows would not only put stress on the city's water allotments but would pose a hazard to structures and commodities downstream for years to follow. Pre-wildfire assessments help forest managers identify areas that are at risk of flooding and debris flows so that they can be prioritized for treatments to reduce wildfire severity – and hence post-fire flood risk. The Santa Fe Fireshed risk assessment (www.santafefireshed.org/s/WRA.pdf) includes detailed maps of debris flow risk (left). Red indicates high risk areas.



WHAT IS BEING DONE?

The best way to avoid post-fire impacts is by preventing high severity fires. Our forests evolved with fire and need fire to be healthy, but most forests in our watershed are adapted to low severity fire. Cutting small trees to thin the forest and lighting controlled burns can bring back low severity "good" fire. Wildfire mitigation steps like this that aim to restore healthy forests for plants and wildlife reduce the threat of high severity fire and the risk of post fire flooding and debris flow.

Post-fire debris flows can move large boulders.

If a high severity fire did occur, the US Forest Service would use the Burned Area Emergency Response program to try to stabilize slopes and protect people, homes, and infrastructure downstream. Forests and engineered structures can be designed to slow runoff, cause localized ponding, and store eroded sediment. For example, dead trees can be cut down and laid along the contour of the slope to create a natural barrier.

For more resources about the science on post fire impacts visit:
www.santafefireshed.org/briefing-papers
The After Wildfire website: www.afterwildfirenm.org
State of the Knowledge about Post-Fire Response:
https://goo.gl/QYL11A

This briefing paper was developed based on research by Manuel Lopez and the Burned Area Learning Network and was produced by the Forest Stewards Guild.

For more more information and to see all the briefing papers visit us at:

www.santafefireshed.org

The Greater Santa Fe Fireshed Coalition is a partnership of agencies, private organizations, and concerned citizens who are working to build resilient ecosystems, protect watersheds, and reduce wildfire risk to the forests and communities in and around Santa Fe.