Protecting Front Range Forest Watersheds from High-Severity Wildfires

An Abstract of the 2007 Pinchot Institute Assessment Report

Impacts of the 1996 Buffalo Creek Fire and the 2002 Hayman Fire illustrate the threat of severe wildfires to Colorado Front Range communities and water supplies. Extensive restoration work has been done, but storms still carry sediment and debris into Strontia Springs and Cheesman Reservoirs. The annual cost to maintain and rehabilitate these reservoirs is enormous.

Severe wildfires can impose heavy impacts on watershed function and water infrastructures like ditches, pipelines, and reservoirs. Soil heating creates water-repellent soils that exhibit rapid runoff, severe soil erosion and sediment movement, and organic debris flows in post-fire storms. The probability of severe wildfires is growing, as the average annual number of Colorado wildfires has risen from 457 in the 1960s to over 2,700 today, and the average cumulative acres burned has risen from 8,170 to over 97,400.

The population of Colorado is also rapidly increasing. It grew by 31 percent in the 1990s (third fastest in the USA), now numbers 4.7 million, and is projected to reach 8 million people by 2050. Ten contiguous Front Range counties contain 81 percent of the state's entire population.

The seven major Front Range water providers are Aurora, Boulder, Colorado Springs, Denver Water, Fort Collins, Northern Colorado, and Westminster. These providers draw their water supply from 10 source watersheds in the mountains, which collectively provide two-thirds of Colorado's population with drinking water. Many cities, towns, and villages in the mountains also depend on the 10 source watersheds.

The Pinchot Institute assessed risks and potential impacts of severe wildfires to source watersheds in 10 counties (Boulder, Clear Creek, Douglas, El Paso, Gilpin, Grand, Jefferson, Larimer, Park, Teller). They found that a buildup of forest fuels join with increasingly flammable forest conditions caused by drought, aging trees, and beetle kill to create unprecedented hazards of severe wildfires to Front Range water supplies. The analysis focused on:

- Forest wildfire hazards
- Fire regimes of the various forest types
- Land ownership patterns
- Soil erodibility and erosion hazards
- Water infrastructure in source watersheds

Severe wildfires pose an immediate threat to water infrastructure ***and*** an even greater post-fire threat to watershed function and water infrastructure through floods, sediment, and debris flows. Substantial parts of each source watershed exhibit high to extreme wildfire hazards and high to extreme soil erodibility. Many reservoirs, pipelines, and ditches are located in zones of high to extreme forest wildfire hazards.

If watersheds are not protected through forest treatments, excessive sediment and debris loads can destroy reservoirs as a functional part of the water-supply system. Climate change may further increase wildfire severity in the future. The only alternative to forest treatments is to install costly structures like sediment basins, which require heavy maintenance, to keep sediment and debris out of reservoirs.

Water providers can leverage public policy to reduce threats of severe wildfires to Front Range water supplies. One way to exercise this leverage is through coordinated development and implementation of Critical Watershed-Wildfire Protection Plans for each vital source watershed. Modeled after Community Wildfire Protection Plans, these watershed plans would likely be supported by key stakeholders and be readily implemented. Elements of successful Critical Watershed-Wildfire Protection Plans would include:

- Engagement of federal, state, and local government agencies
- Open participation of all interested parties
- Preparation of base maps showing key terrain, vegetation, and infrastructure features
- Assessment of forest fuels, wildfire hazards, and potential impacts on water supply factors
- A prioritized action plan to reduce fuel hazards including roles, timelines, and funding needs

LeMaster, D.C.; Shao, G.; Donnay, J. 2007. Protecting Front Range forest watersheds from high-severity wildfires. An assessment by the Pinchot Inst. for Conservation funded by the Front Range Fuels Treatment Partnership, 47 p.