

# Science

## B R I E F I N G

February 13, 2014

## ADAPTATION FOR WILDLAND AQUATIC RESOURCES

### BACKGROUND

Climate change is altering the amount, timing, and quality of water we receive from winter snow pack. In turn, the resulting effects on forest and aquatic ecosystems of the Mountain West are cascading into further shifts in water supply to downstream farms and cities. As mountain streams change, so too will forests. Fire will play an increasingly important role in shaping forest and stream ecosystems as the climate changes. Historic observations show increased dryness accompanying more widespread fire and forest die-off. These events punctuate gradual changes to ecosystems and sometimes generate stepwise changes.

### RESEARCH

**Research Activity:** Scientists at RMRS developed a framework to describe how fire and climate change work together to affect forest and fish communities. Their [technical report](#) (Luce *et al.* 2012) addresses the physical processes, biological interactions (including interactions of fish populations with wildfire), and management decisions.

**Management Implications:** To safeguard valuable natural resources, climate vulnerability assessments need to account for fire in their calculus. Learning how to adapt will come from testing, probing, and pushing this framework and then proposing new ideas.



*Changes in mountain precipitation have important implications for winter snowpack and future water availability.*



*Climate change is expected to increase the risk, severity, and frequency of forest fires, such as this one near the Boise River in Idaho.*

### KEY FINDINGS

- The biophysical template of forest and stream ecosystems will determine much of their future response to fire.
- Successful adaptation to a changing climate will require resource managers to learn how to respond quickly and insightfully as many unknown and unforeseen events associated with climate change unfold.
- Developing adaptation responses that span multiple management considerations could be substantially more difficult than addressing any one of them; however, there are adaptation steps with the potential for cross-resource benefits.
- Identifying, planning, and implementing adaptations that do not force tradeoffs among multiple values and resources will require an understanding of the climate change processes and consideration of the relative uncertainties and sensitivities these resources face under a changing climate.

### ADDITIONAL INFORMATION

- Luce, C., P. Morgan, K. Dwire, D. Isaak, Z. Holden, B. Rieman. 2012. Climate change, forests, fire, water, and fish: Building resilient landscapes, streams, and managers. Gen. Tech. Rep. RMRS-GTR-290. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 207 p.

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