Fire

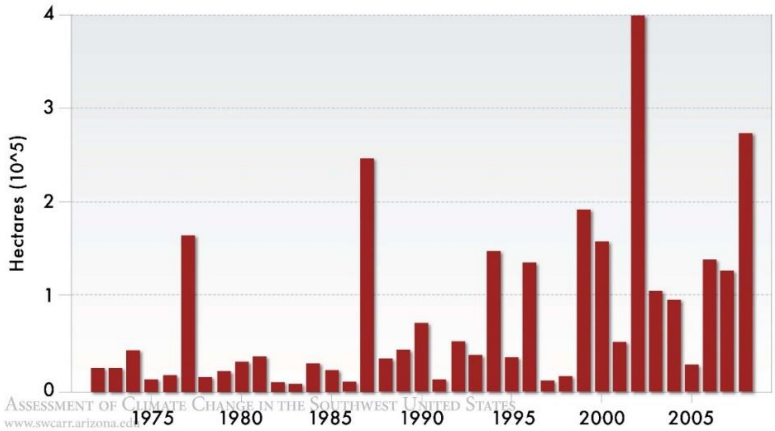
in the Intermountain Southwest

Wildfire is arguably the most visible impact of drought in the Intermountain Southwest region, and one of the key climate-related impacts affecting the cities and economies of the region, including Western Adaptation Alliance (WAA) communities. During the last several decades, acres burned by wildfires in the southwestern United States have increased three-fold[1]. The acreage of the largest wildland fires in the Southwest has increased from tens of thousands to *hundreds of thousands* of acres (see figure below). These changes in the sizes of wildfires are attributed to a combination of early snowmelt, increased temperatures[2], land management practices and other factors[3]. Fire severity has also increased, replacing entire forest stands, incinerating soils, and establishing the conditions for massive erosion[4]. These factors are amplified during severe drought years, during which large and intense fires can affect every state in the region.

KEY MESSAGES:

- Wildfires are becoming larger and more severe in the Intermountain Southwest, most notably during severe drought years.
- Wildfires impact cities by burning structures, threatening the lives of residents, and reducing air quality. They increase the risk of damaging landslides and the severity of post-fire floods, even months to years later.
- Proactive planning by cities and their partners in local watersheds can reduce wildfire risk and potential effects on urban water supplies and residents.

Wallow Fire, U.S. Forest Service



Above: Area of large (>1,000 acre [400 ha]) wildfires that burned lands dominated by forest and woodland and managed by the U.S. Bureau of Indian Affairs, U.S. National Park Service, and U.S. Forest Service in Arizona, California, Nevada, New Mexico, and Utah. Data from Westerling, Turner, Smithwick et al. (2011 online supplement); U.S. Department of the Interior (2008 fire data); and U.S. Department of Agriculture (https://fam.nwcg.gov/fam-web/kcfast/mnmenu.htm). Figure from Assessment of Climate Change in the Southwest U.S., Chapter 8.

Las Conchas Fire, 2011 Credit: National Interagency Fire Center

[1] Fleishman, E., J. Belnap, N. Cobb, C. A. F. Enquist, K. Ford, G. MacDonald, M. Pellant, T. Schoennagel, L. M. Schmit, M. Schwartz, S. v. Drunick, A. L. Westerling, A. Keyser, and R. Lucas. 2013. Natural Ecosystems. In G. Garfin, A. Jardine, R. Merideth, M. Black, and S. Leroy, editors. *Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment*. Island Press, Washington, DC, pp. 148-167. http://swcarr.arizona.edu/chapter/8

[2] Williams, A. P., C. D. Allen, A. K. Macalady, D. Griffin, C. A. Woodhouse, D. M. Meko, T. W. Swetnam, S. A. Rauscher, R. Seager, and H. D. Grissino-Mayer. 2013. Temperature as a potent driver of regional forest drought stress and tree mortality. Nature Climate Change 3:292-297.

[3] O'Connor, C. D., G. M. Garfin, D. A. Falk, and T. W. Swetnam. 2011. Human Pyrogeography: A New Synergy of Fire, Climate and People is Reshaping Ecosystems across the Globe. Geography Compass 5:329-350.

[4] Stephens, S., J. Agee, P. Fulé, M. North, W. Romme, T. Swetnam, and M. Turner. 2013. Managing forests and fire in changing climates. Science 342:41-42.

Acknowledgements: Funding by Urban Sustainability Directors Network. Narrative created by The University of Arizona and the Western Adaptation Alliance.

WILDLAND-URBAN INTERFACE

The draw of living in the woods is bringing more and more people to the wildland-urban interface (WUI)—the place where urban development meets wildland. As of 2002, in the western U.S., 38 percent of new home construction was in, or adjacent to, the WUI[a]. The WUI makes it easy for fire to jump from vegetation to structures and increases the risk of damage to structures and people. Creating "*defensible properties* – [where] the entire property is treated, border to border regardless of size, with no variation or zoning of treatment intensity throughout," is one way managers in Flagstaff protect neighborhoods in the WUI[b]. Another program helping communities in the WUI reduce fire risk is the *Firewise Communities Program*—a project of the National Fire Protection Association that offers solutions and tips for how homeowners can prepare their homes from the risk of wildfire.

Photo: A home in the WUI, impacted by the Hayman Fire in 2002. The main home survived thanks to the help of pre-treatment and bucket drops, but two guest houses and most of the nearby trees were lost. Credit: National Interagency Fire Center.

[a] U.S. Fire Administration. Fires in the Wildland/Urban Interface. 2002. Topical Fire Research Series, Vol. 2 Issue 16. http://nfa.usfa.dhs.gov/downloads/pdf/statistics/v2i16-508.pdf

[b] Personal communication with Paul Summerfelt, Wildland Fire Management Officer with City of Flagstaff

TACKLING THE CHALLENGE

Flagstaff Forest Protection Project. In November 2012, 74% of voters in the City of Flagstaff approved a bond measure to fund $10 million in forest treatments across approximately 13,500 acres of federal, state, city, and private lands, to reduce the risk of high-intensity "uncharacteristic" wildfire. A 2014 report shows that the $10 million investment, pledged by city voters, can save over $1 billion in estimated post-fire costs[5].

Forests to Faucets. In the aftermath of the devastating 2002 Hayman Fire in Colorado, Denver Water, whose reservoir system was affected by sediment, ash, and debris from the fire, partnered with the U.S. Forest Service to implement a $33 million forest treatment and watershed protection project, ensuring future water quality for Denver's 1.3 million residents.

New Mexico Water Funds. Still in the midst of a protracted drought, during the last 15 years northern New Mexico has been the site of some of the most severe and extensive wildfires on record. WAA cities, like Santa Fe, and other New Mexico cities and their partners, notably The Nature Conservancy, established water funds to help pay for forest restoration and, where possible, thinning, in order to protect forests and avoid impacts to urban drinking water supplies. The recently established Rio Grande Water Fund aims to generate funds for a multi-decade program of watershed restoration.

Northern Arizona Forest Fund. In the last dozen years, the forests of northeastern Arizona set records for the state's largest fires. These fires occurred, in part, in the watersheds that provide water to Phoenix, a city with a metropolitan area population of 4.3 million; the fires sent debris and sediment into drinking water supply reservoirs, and generated expenses for additional water treatment. The city's major water provider, Salt River Project, along with the National Forest Foundation, has embarked upon a program to fund watershed health treatments to reduce wildfire risk and limit erosion and sediment into Arizona streams, rivers, and reservoirs.

PREPARING FOR THE FUTURE

As people and fire come into contact more and more frequently, primarily through the wildland-urban interface, there will be an increasing need for partnerships to tackle the interlinked challenges of fire management and policy, forest ecosystem health, flood preparedness and control, and water and air quality. Numerous scientific studies project an increase in fire activity compared to recent historical baselines, partly due to attrition of snowpack by higher temperatures. Pro-active planning and decision making, to reduce the combustibility of the land, protect structures and neighborhoods, and increase the preparedness of citizens is essential. WAA cities, and their counterparts across the Intermountain Southwest, have made initial steps in the right direction. As the Flagstaff cost avoidance study shows, millions of dollars invested today can save billions of dollars and inestimable misery in the future.

[5] Arizona Rural Policy Institute. 2014. Flagstaff Watershed Protection Project Cost Avoidance Study. October 2014. Prepared for the Flagstaff Watershed Protection Project Monitoring Committee. Flagstaff, AZ: Northern Arizona University, 18 pp. http://cusp.ws/wp-content/uploads/2014/12/Final-FWPP-Cost-Avoidance-October-27.pdf

Acknowledgements: Funding by Urban Sustainability Directors Network. Narrative created by The University of Arizona and the Western Adaptation Alliance.