Flagstaff, Arizona: Leveraging Partnerships And Public Support To Tackle Growing Wildfire Concerns

Leaders in Wildfire Adaptation

Introduction

The City of Flagstaff has long been aware of the threat of catastrophic wildfires. Since the 1970s, local leaders have been advocating for stewardship and management of the region's ponderosa pine forests to reduce hazardous fuels and protect critical watersheds. Severe wildfire activity in recent years, coupled with a growing concern about the impacts from climate change, have reinforced the need for wildfire mitigation throughout the city and its surrounding landscapes.

As a result of Flagstaff's wildfire history, citizens and stakeholders have been promoting a number of ambitious multi-scalar efforts to reduce potential wildfire impacts. These efforts include the well-

Actively engaging the public in wildfire and forest health issues has been a key ingredient to building support for Flagstaff's mitigation efforts.
Photo credit: Mark Brehl, Flagstaff Fire Department

OVERVIEW

Wildfires across the American West are increasing in frequency, size, and severity. The impacts from climate change and increasing growth within the region's Wildland-Urban Interface (WUI), further exacerbate the risks from wildfires.

Urban areas in the West are increasingly responding to the challenges of wildfire risk management through unqiue land use planning tools which affect the pace, pattern, and scale of development. Flagstaff, Arizona is one of five communities profiled by Headwaters Economics in a report identifying some of these innovative land use planning strategies, including:

- The creation of the Greater Flagstaff Forest Partnership, a private-public collaboration to enhance community awareness on issues related to forest health and wildfire impacts, specifically related to the city's vast ponderosa pine forest.
- In 2012, city residents approved a $10 million bond to implement wildfire risk reduction measures and mitigate post-fire flooding impacts in nearby watersheds.
- A comprehensie 100 foot defensible space standard on all properties located within the WUI.

established Greater Flagstaff Forest Partnership, the voter-approved Flagstaff Watershed Protection Project, and the adoption and ongoing implementation of a uniquely tailored Wildland-Urban Interface (WUI) code. These efforts are reinforced through the city's sustainability and climate resiliency programs. The combination of active leaders, coordinated city departments, and an informed public that understands the community's wildfire risk provides a compelling example of progressive and widely supported community wildfire adaption efforts.

History of Wildfire in Flagstaff

An active history of wildfire in Flagstaff and its surrounding areas has led agencies and local residents to view this natural hazard as their city's largest urban threat. In 1977 for instance, the Radio Fire burned 4,600 acres and destroyed communications towers on nearby Mount Elden. In addition, the fire threatened a number of homes and prompted the evacuation of several residences. The scar of that blaze remains to this day and is a visible signature of the immediate dangers wildfires pose to the city.

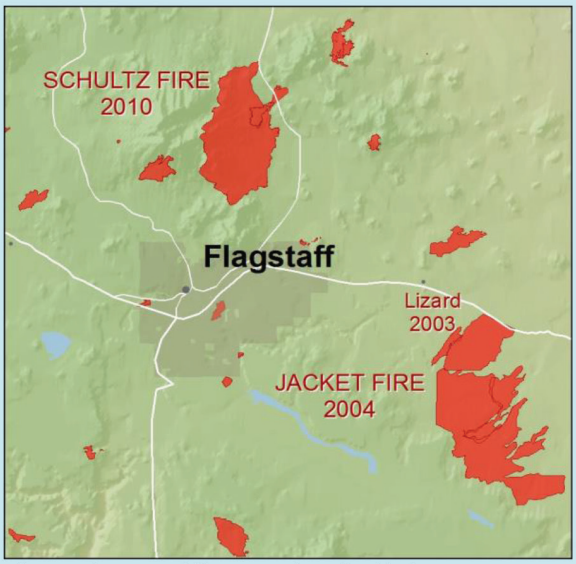
Subsequent wildfires during the next several decades reinforced local concerns about the risks of wildfires. Both the Horseshoe Fire and the Hochderffer Hills Fire in 1996 re-focused the public's attention on the plight and exposure of Flagstaff's forests to catastrophic wildfires, burning nearly 25,000 acres combined.[1] Several years later, the Pumpkin Fire (in 2000) resulted in severe local flooding events just north of the city. Fires have since continued, some of which have increased significantly in both their impacts and size.

Impacts of Wildfire on the City of Flagstaff

The scale of wildfires throughout Arizona has drawn attention to the myriad effects of such natural disasters, despite minimal structure loss. Closed highways, health warnings from smoke, flooding, and resident displacements are all common occurrences. Long-term recovery issues include post-fire flooding and impacts to the region's amenity-based economy. Negative outcomes tied to wildfire events include:

- **Catastrophic consequences.** In 2002, Arizona residents witnessed the devastating impacts wildfires could impose across the state. The Rodeo-Chediski Fire, located 125 miles southwest of Flagstaff, burned more than 468,000 acres—resulting in more than 50,000 evacuations in various towns and ultimately destroying over 480 structures. It was the largest fire in Arizona's recorded history, until 2011, when the Wallow Fire burned over 538,000 acres.
- **Recreational and visual amenities.** In 2004,

FLAGSTAFF, AZ
Major Wildfires, 2000-2013



The two largest wildfires are described below.

JACKET FIRE, 2004
17,218 Acres

Total Cost	$625K	Structures Threatened	3
Total Personnel	128	Structures Damaged	1
Firefighters Injured	8	Evacuations Caused	No

The Jacket fire was lightening caused. A major resource threatened by the fire was the high voltage powerline between Flagstaff and Pinnacle Peak.

SCHULTZ FIRE, 2010
15,304 Acres

Total Cost	$10M	Structures Threatened	5000+
Total Personnel	961	Structures Damaged	0
Firefighters Injured	3	Evacuations Caused	Yes

The Schultz fire, ignited by an abandoned campfire, threatened homes, powerlines, buried gas lines, roads, communication sites, the municipal water supply, and other resources. Heavy floods followed the fire, resulting in extensive damage to property downstream.

the Jacket Fire was one of the largest fires to burn within close proximity to Flagstaff. Located just 20 miles from the city, the Jacket Fire burned more than 17,000 acres and filled the sky with smoke for nearly two weeks. In 2010, the Schultz Fire started from an abandoned campfire in the San Francisco Peaks—an area treasured by Flagstaff locals for its beauty and recreation. The Schultz Fire burned more than 15,000 acres, degrading viewsheds and destroying popular recreation and archaeological sites. Although no structures were lost due to fire, more than 5,000 buildings and homes were threatened.

• **Post-fire flooding.** Following the Schultz Fire, post-fire flooding became a major issue causing a flash flood that killed a 12-year-old girl. In addition, the heavy ash debris flows and downstream erosion following the Schultz Fire damaged homes and critical infrastructure, including a major water pipeline. The Rural Policy Institute conducted a full cost estimate for the Schultz Fire/Flood and calculated suppression and recovery costs to total between $133 and $147 million. This accounted for official expenditures of government agencies and utilities, loss in personal wealth due to reduced property values, destruction of habitat, loss of life, structural damage and clean up, fire evacuation costs, flood insurance premiums and more.[2]

Flagstaff's ponderosa pine forest, currently the largest contiguous one on the planet, is in jeopardy due to climate change. Photo credit: Mark Brehl, Flagstaff Fire Department

How Flagstaff Is Addressing Wildfire Risk Through Land Use Planning and Regulations

Between its ongoing fire activity and projected future climate impacts, Flagstaff has many reasons to minimize wildfire risk in the surrounding forests and watersheds. While partnerships and public involvement form the cornerstone of these efforts, other wildfire risk reduction measures focus on specific growth policies along the city's expanding Wildland-Urban Interface (WUI).

Collaborative Partnerships and Public Involvement Achieve Community-Based Resilience

Flagstaff is similar to Santa Fe, New Mexico and many other western communities that depend heavily on the health of their nearby watersheds for municipal drinking water. Flagstaff residents also enjoy the benefits of sustainable forests for recreational, aesthetic, and cultural values. Protecting these assets has been a huge driver for many of the city's long-term public-private partnerships who are committed to maintaining the overall health of the watershed.

Following the Schultz Fire and post-fire flooding, and 20 years of public engagement, the city's leadership seized an opportunity to put forward a ballot measure to fund hazardous fuel reduction treatments within at-risk watersheds. In November 2012, residents resoundingly approved a $10 million bond that provided funds to implement wildfire risk reduction measures and mitigate post-fire flooding impacts within the Rio de Flag and Lake Mary watersheds (the majority of which lies on federal land). The voter-approved bond resulted in the formation of the Flagstaff Watershed Protection Project—a collaborative effort between the state of Arizona, City of Flagstaff, and Coconino National Forest. Since its approval, additional funds have been raised and project planning and monitoring is underway. Treatment work, however, such as prescribed burns and forest thinning, will take several

Prescribed fire is one of the many fire reduction strategies that the Greater Flagstaff Forest Partnership promotes. Prescribed fire helps mitigate future catastrophic losses by reducing extra fuels such as needle litter and forest understory.
Photo credit: Mark Brehl, Flagstaff Fire Department

years to implement. More details about the project's history and current activities are available in the white paper, *Flagstaff Watershed Protection Project: Creating Solutions through Community Partnerships.*[3]

At least 19 years of dedicated collaborative work set the stage for voter-approval of Flagstaff's watershed protection bond, an ambigious $10 million initiative to fund wildfire risk reduction measures and mitigate post-fire flooding impacts within local watersheds.

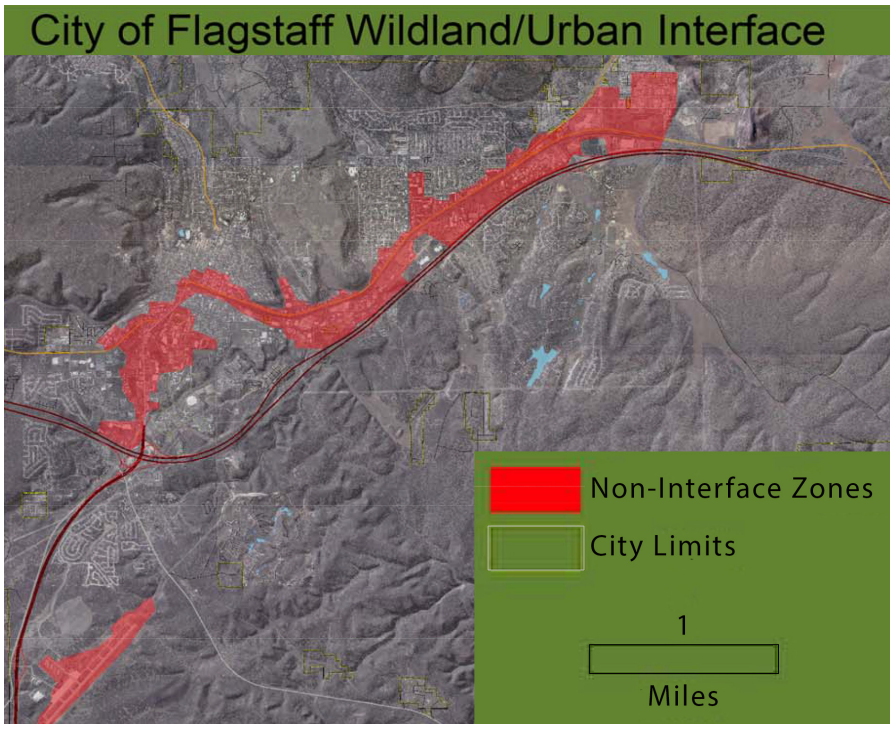
As a precursor to the funded bond measure to reduce community wildfire risk, the Greater Flagstaff Forest Partnership (GFFP) was established in the late 1990s as a way to focus community attention on issues related to forest health and wildfire impacts.[4] In particular, the GFFP is concerned with restoring the surrounding ponderosa pine forests, reducing the probability of catastrophic fire, and acting as a vehicle to test and share forest restoration information among private and public stakeholders. GFFP works across an 180,000 acre area within Coconino County. Partners are from local, state, regional, and national environmental, governmental, and business organizations, including the Flagstaff Fire Department, Four Forests Restoration Initiative (4FRI) Collaborative, Arizona State Forestry Division, Arizona Prescribed Fire Council, and the Ecological Restoration Institute—Northern Arizona University's nationally recognized program focusing on the application of scientific knowledge to solve the problem of unnaturally severe wildfire and degraded forest health. GFFP is also a member of the Fire Adapted Communities Learning Network.

Since its inception, GFFP has played a significant role in developing and assisting wildfire mitigation efforts, including the development of a Community Wildfire Protection Plan (CWPP) that was built off a previous Flagstaff Area Wildfire Risk Assessment in 2000. This preliminary effort to evaluate the city's wildfire risk identified various approaches to restore natural ecosystem structure, function, and composition in the ponderosa pine forests, promoted proactive forest management measures, and advanced the Flagstaff Watershed Protection Project goals, described below.

Planning and Regulatory Approaches Boost Flagstaff's Wildfire Risk Reduction Activities

In addition to landscape scale activities, Flagstaff has a number of regulations and planning policies in place to increase resident and community safety. For instance, the WUI codes are designed to reduce the risks from wildfire to life and property. WUI codes provide a set of wildfire mitigation development standards, including structure density and location, building materials and construction, vegetation management, emergency vehicle access, water supply, and fire protection.

In 2008, Flagstaff adopted the International Code Council's International Wildland-Urban Interface Code (IWUIC) with local amendments. In advance of Flagstaff



The International Code Council's International Wildland-Urban Interface Code requires a jurisdiction to map the WUI in order to define where the code is legally applicable. Although the City of Flagstaff considers the entire city to be at risk for wildfire, for the purposes of their WUI code, the city determined its WUI boundaries include everything within city limits except those areas shaded in red (which include the downtown urban corridor and airport). Image source: Flagstaff Fire Department

adopting its WUI code however, the Flagstaff Fire Department took many steps to ensure a smooth and successful adoption process. For example, during the 1990s, the fire department personnel started working closely with the city's Community Development Department staff to develop an administrative procedure requiring hazard mitigation on all properties prior to development. This laid the foundational groundwork for provisions in the code that would later be seen as a natural evolution in regulations rather than an abrupt imposition of new requirements on property development.

The Flagstaff Fire Department also prioritized stakeholder outreach that included extensive discussions with the homebuilders association, local real estate and insurance agents, community leaders, engineering firms, developers, and others. Public comments were received and many were integrated into the final code. In some cases these suggestions were even more stringent than the model IWUIC being used as the basis for Flagstaff's WUI code—which ultimately led to subsequent IWUIC code versions being updated to reflect Flagstaff's amendments.

Finally, Flagstaff's WUI code adoption process occurred in tandem with adherence to the 2006 International Fire Code (IFC)—a more general fire code that protects public health, safety, and welfare from hazards or fire, explosions, or dangerous conditions in buildings, structures, and on city premises. Several provisions of Flagstaff's IFC complement their WUI code, such as the requirement for non-combustible roof coverings, which have been shown to significantly reduce ignitability of structures during wildfires.[5]

Coordination of Wildfire Risk Reduction Measures with Environmental Resource Preservation

Collectively managing the preservation of natural resources alongside wildfire risk reduction measures is a complicated process. As part of Flagstaff's Zoning Code, for instance, a Resource Protection Overlay Zone is included, which requires compliance with standards to ensure the protection of natural resources, including floodplains, steep slopes, and forests.[6] These standards also are intended to help "manage healthy and sustainable forests to reduce fire risk." To avoid conflicts between preserving trees for resource protection and removing trees for wildfire risk reduction, the city clearly states in its regulatory and planning documents that Flagstaff's WUI code applies before the application of resource protection standards. This ensures that all future developments appropriately reduce wildfire risk prior to the application of resource protection standards. Resource protection standards are also applied subsequent to the implementation of the CWPP, the citywide Forest Stewardship Plan, and Vegetation Management Plan (which is a refinement of the citywide Forest Stewardship Plan for site specific operations to implement the WUI code on a development site).[7] Together, the WUI code and resource protection standards closely couple one another to provide a comprehensive vegetation management approach on properties throughout the city.

In addition, Flagstaff's

Flagstaff's WUI code requires removal of snags and other hazard trees threatening public safety or property. Where no threat exists, these trees are typically retained as valuable wildlife habitat. Photo credit: Mark Brehl, Flagstaff Fire Department

Environmental Planning and Conservation Section of the Regional Plan 2030 reflects the city's effort to address both wildfire risk and ecological health and provide guidance on how to best manage these closely related concerns.[8] The policies within the plan focus on: investments in forest health and watershed protection measures; public awareness of the region's ponderosa pine forest; protection, conservation, and ecological restoration of diverse ecosystems; and support for cooperative efforts for forest health initiatives or practices. For example, the Climate Change and Adaptation subsection within the Regional Plan lists wildfire mitigation activities, such as individual preparation measures for homes and community investments in forest health and watershed protection, as ways to reduce present and predicted wildfire risks. The Ecosystem Health subsection discusses the connection between declines in forest health, high-intensity wildfires, and post-fire flooding. In addition, this subsection mentions ongoing cooperative watershed protection efforts such as the Greater Flagstaff Forest Partnership and Four Forests Restoration Initiative. Having these policies in place signifies the importance of wildfire as part of future land use and development decision making processes. They also provide staff with a reference point when preparing planning reports for the City Council to help maintain community-wide support and momentum for wildfire mitigation and forest health projects.

Flagstaff Prepares for Wildfire Risks and the Impacts of Climate Change

While residents may still be coping with post-fire impacts from previous wildfires, future climate challenges present significant concerns for the Flagstaff community. Climate experts warn the American Southwest can expect a rise in overall temperatures, in some cases by more than 3° F by 2100, with higher increases seen during the summer months. Snowpack and spring/early summer runoff are also projected to decrease in a warmer climate. Droughts are likely to become more intense and last for a longer period of time—up to 12 years or more. All of these factors may alter local fire behavior through changes in fuel condition (e.g., fuel moisture), fuel loading, and ignitions. Short- and long-term ecosystem changes may vary based on the ecosystem's response to climate change. For example, climate change may initially accelerate catastrophic wildfire activity, but this may decrease in the long-term future depending on the type of replacement vegetation that returns.

Key documents underscore the links between climate change, forest health, and wildfire. For example, the Flagstaff Regional Plan 2030 discusses drought, wildfire, and tree mortality as part of its climate adaptation section. The City of Flagstaff also conducted a Resiliency and Preparedness study in 2012 that listed a suite of potential climate impacts to the city's operations, including:

- an increase in demand on city resources able to respond to wildfire events;
- an increase in frequency and duration of forest closures and related tourism;
- an increase in frequency and number of threatened structures; and,
- a loss of long-term water storage.[9]

Key Takeaways

Diverse stakeholder involvement. The successes in Flagstaff—the Flagstaff Watershed Protection Project and an innovative WUI code, among many others—were

the result of years of collaboration, capacity building, outreach, public education, visible action, and proven results. These events may be marked by milestones such as voter approval of a bond or the City Council's code adoption, but the ongoing commitment by stakeholders to reduce community wildfire risk plays a key role in maintaining forward momentum. Each successive step was built on decades of conversations with stakeholders, teachable moments, information sharing, and the successful demonstration of projects. Dedicated leadership from the Greater Flagstaff Forest Partnership, Flagstaff Fire Department, and academic partners, such as the Ecological Restoration Institute, also provide consistent and trusted sources of information and resources for the public. In this sense, no project is an isolated success and no leader is an isolated change maker. Every part of Flagstaff's wildfire adaptation activities is linked to previous efforts, and today's successes stand on the shoulders of others before them.

Local networks of communication assist in community success. Success also occurs through engagement and coordination with multiple stakeholders—from the local resident to the City Council. Similarly, the Community Development Department works closely with the Fire Department. In addition, the Sustainability and Environmental Management Section has increased its staffing capacity to ensure cross-communication with other city departments, including support for wildfire management and forest health activities. A group of engaged citizens provides ongoing input to guide local planning decisions. In this way, a constant network of communication, feedback, and integration of information supports community decision making efforts.

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Key Resources

Websites	
Fire Department	http://www.flagstaff.az.gov/index.aspx?NID=2977
Comprehensive Planning	http://www.flagstaff.az.gov/index.aspx?nid=1342
Sustainability and Environmental Management	http://flagstaff.az.gov/index.aspx?NID=921
Documents	
Greater Flagstaff Area Community Wildfire Protection Plan	http://gffp.org/wp-content/uploads/2015/09/Combined-2012-CWPP-Review-Report.pdf
Multi-Jurisdictional Hazard Mitigation Plan	http://www.coconino.az.gov/index.aspx-?NID=1376
City of Flagstaff Zoning Code	http://www.flagstaff.az.gov/index.aspx?nid=1416
City of Flagstaff Regional 2013 Plan	http://www.flagstaff.az.gov/index.aspx?NID=2945
Municipal Sustainability Plan	http://flagstaff.az.gov/DocumentCenter/Home/View/14041
Wildland-Urban Interface Code Adoption, "How to avoid the agony"	http://www.flagstaff.az.gov/DocumentCenter/Home/View/12911
City of Flagstaff Resiliency and Preparedness Study	http://www.flagstaff.az.gov/DocumentCenter/Home/View/38841
Flagstaff Watershed Protection Project: Creating Solutions Through Community Partnerships	http://nau.edu/ERI/Banner/Flagstaff-Watershed-Protection-Project--Creating-Solutions-through-Community-Partnerships/
Other Resources	
Wildland Fire Management	http://www.wildfirepartners.org/
Greater Flagstaff Forests Partnership	https://bouldercolorado.gov/
Flagstaff Watershed Protection Project	http://www.flagstaffwatershedprotection.org/
Ecological Restoration Institute	http://nau.edu/eri/

References

1.NC State University. Community Response to Wildland Fire Threats. Steelman, T. and Kunkel, G. 2003. Available online: https://www.ncsu.edu/project/wildfire/Arizona/FlagstaffCaseStudy.pdf.

2. The report, A Full Cost Accounting of the 2010 Schultz Fire, was published by the Ecological Restoration Institute. Available online: http://nau.edu/eri/banner/schulz-fire/.

3. Published by the Ecological Restoration Institute. Available online: http://nau.edu/ERI/Banner/Flagstaff-Watershed-Protection-Project--Creating-Solutions-through-Community-Partnerships/.

4. Available online: http://gffp.org/.

5. Wood shake roof coverings are prohibited, with the exception of decorative accent coverings or historical buildings as reviewed and approved by the Community Development Department and Fire Department.

6. Described in further detail in the Flagstaff Zoning Code Division 10-50.90: Resource Protection Standards.

7. Described in further detail in the Flagstaff Zoning Code Appendix 5.020: Implementation of the Flagstaff Fire Department Firewise Process.

8. Flagstaff Regional Plan: 2030 Place Matters. 2014. Available online: http://www.flagstaff.az.gov/DocumentCenter/View/43827.

9. City of Flagstaff Resiliency and Preparedness Study. 2012. Available online: http://www.mayorsinnovation.org/images/uploads/pdf/9_-_City_of_Flagstaff_Resiliency_and_Preparedness_Study_September_2012_20121001134212552 8.pdf.