

EXECUTIVE SUMMARY

During the summer and fall of 2018, wildfires were burning in multiple areas across the United States. In many ways, this was not unusual. Whether large or small, wildfires are a natural and frequent occurrence in many landscapes.

What made these wildfires unique, however, was the record-breaking statistics associated with many of them, most notably the devastating Camp Fire that began in November near Paradise, California, and ended as the deadliest and most destructive wildfire in California history. Headlines dominating major news outlets asked what more could be done to safely plan communities with wildfire in mind, and in some cases questioned whether we should be living in wildfire-prone areas at all.

PAS Report 594, *Planning the Wildland-Urban Interface*, seeks to address these timely questions by providing a comprehensive approach for planners to respond to the growing challenges posed by wildfires in our communities. This report is not only for western-based planning audiences that may commonly identify with the challenges of wildfire hazard, but for any planner confronting the increasing threat of wildfires in communities across the United States.

THE WILDLAND-URBAN INTERFACE

This PAS Report focuses on providing tools and strategies for planners working in the *wildland-urban interface*, or WUI (WOO-EE). The WUI refers to any developed area where conditions affecting the combustibility of natural and cultivated vegetation (*wildland fuels*) and structures or infrastructure (*built fuels*) allow for the ignition and spread of fire through these combined fuels. This combination of human development and vegetation is where wildfires have the greatest potential to result in negative impacts to communities, such as injuries and deaths, damage to structures and infrastructure, and loss of ecosystem services.

WUIs vary based on a number of factors at multiple scales, including the type and quantity of vegetation, topography, fire history, development patterns, and proximity to wildlands. Together, these factors collectively influence how a wildfire will affect an area. In other words, the WUI is not a fixed geographic location, but rather is based on a dynamic set of conditions—and planners have the ability to influence it.

The concept of the WUI emerged in the 1970s to denote the growing trends of more people moving into wildfire-

prone areas and more wildfires burning into communities. Wildfires in the WUI were initially viewed as a regionally specific problem. But a confluence of factors—including previous forest management and suppression policies, an increasing number of homes being built in wildland areas across the country, and a changing climate—have resulted in a WUI challenge that is now national in scope.

At least one-third of the current U.S. population lives in the WUI, and counties from coast to coast are continuing to experience WUI growth. Over the past two decades alone, WUI fires have significantly affected communities in states across the country, including Arizona, California, Colorado, Florida, Idaho, Kansas, Minnesota, New Mexico, Oklahoma, Oregon, South Carolina, Tennessee, and Washington. Economic, social, and environmental impacts vary locally, but often bring a host of short- and long-term consequences, costing millions of dollars and taking years to fully recover.

OPPORTUNITIES TO ADDRESS THE WUI THROUGH LAND-USE PLANNING

Tackling the challenges associated with wildfire impacts on communities has traditionally been within the purview of land management agencies and fire rescue and emergency services. Community preparedness efforts have primarily focused on improving response tactics to protect structures and residents, reducing hazardous fuels (i.e., vegetation) near a community, and educating residents through voluntary programs.

These are all essential activities to reduce wildfire risk in the WUI. But with structure losses continuing to increase and wildfire suppression costs skyrocketing—primarily attributed to WUI fires—it is critical for communities to expand their portfolio of solutions to include land-use planning.

Land-use planning decisions determine where communities are built and influence how vulnerable they are to wildfire. Planners are well positioned to address wildfire concerns during all phases of community planning and development—from creating community visions that incorporate safety and resilience goals to implementing finely crafted regulations that specify construction materials and plant selections on a site.

This PAS Report is designed to help planners understand where and how they fit into addressing the WUI through land-use planning strategies. It represents the evolution of 2005's PAS Report 529/530, *Planning for Wildfires*. This report includes new national policies and planning frameworks that have since emerged and influence the WUI, and it recognizes the latest science, best practices, and data that is driving a better understanding of the WUI and appropriate land-use solutions.

The report is divided into two sections. Following an introductory chapter that introduces the WUI and outlines the scope of the report, Chapters 2 through 4 reflect the scope of the WUI as a widespread wildfire planning challenge and provide planners with an essential technical primer on wildfire basics. The second section, Chapters 5 through 7, focuses on planning solutions by providing a holistic framework and set of policy and regulatory strategies. A concluding chapter summarizes WUI trends and planners' roles in shaping better outcomes, while also acknowledging that more research can further enhance our understanding of this complex topic.

UNDERSTANDING THE WUI AND WILDFIRE BASICS

The WUI as a national issue has been decades in the making. It is often viewed as a product of two primary drivers, as explained in Chapter 2. First, previous development decisions have allowed or encouraged rapid growth into suburban, exurban, and rural areas without regard for the potential consequences of wildfire hazard. Second, land management policies at the beginning of this century were focused on excluding wildfires from the landscape, which led to an unnatural buildup of forest fuels in close proximity to development.

The latter driver has since evolved, with governmental and other agencies now taking a more balanced approach to ecosystem management and fire's natural role in the landscape. However, in many areas, the first driver—development in wildfire-prone areas—remains unchecked. This can be attributed to factors that continue to attract people to these areas, including privacy, a closer connection to nature, affordable or desirable housing locations, an increase in second home ownership, and access to recreational opportunities.

As a result of WUI growth trends, many undesirable environmental problems occur, such as habitat fragmentation and an increase in nonnative species. The most prominent and devastating effect, however, is the increased number of WUI fires that has been steadily on the rise across the country. To complicate matters, communities now face more un-

certainties related to future planning scenarios for wildfire. Climate change is expected to bring hotter temperatures and increasing drought conditions to more areas of the United States in future decades, creating additional planning and response challenges for fire managers. Adding urgency to the situation are other market-based responses, such as insurance carriers that are no longer willing to provide home insurance in some wildfire-prone areas.

The encouraging news is that the specific risk factors that lead to WUI fire disasters are well understood based on scientific research and analysis. Once planners understand the factors that influence fire behavior (fuel, weather, and topography), they can determine which factors they can influence. For example, planners can influence fuel sources by modifying the number of structures permitted in a subdivision or by requiring ignition-resistant construction materials. Chapter 3 outlines key wildfire science basics to provide planners with essential information to make appropriate mitigation decisions for vegetation, structures, and infrastructure.

Making informed decisions that target the WUI requires planners to understand where the WUI is. WUI spatial assessments are typically based on the distribution of housing units and vegetation within an area and can also include other development features such as critical infrastructure and facilities. The other key piece of information is the assessment of the level of wildfire risk or hazard that the community faces, addressed in Chapter 4. Wildfire *hazard* assessments identify local conditions related to vegetation, topography, and other factors, and display the potential likelihood and intensity of wildfires occurring within a defined area. Wildfire *risk* assessments are based on wildfire hazard and include the susceptibility of structures or other values within a defined area. Such assessments are typically displayed spatially using GIS layers or as static maps, and can identify conditions at the landscape, local, and parcel-level scales.

While the development of spatial assessments is undertaken by technical specialists, planners can use these different tools to communicate with elected officials, residents, and other stakeholders about their communities' relationships with wildfire and an acceptable level of risk. These tools also guide the development and implementation of effective WUI policies and regulations.

A WUI PLANNING FRAMEWORK

Identifying, developing, and implementing appropriate policies and regulations for the WUI may seem daunting—espe-

cially when trying to reverse trends that have occurred over decades. In addition, the multifaceted WUI topic engages a variety of stakeholders across local, state, and federal levels, including land managers, fire and emergency services, planners, developers, residents, elected officials, and industry professionals. This can add complexity to technical and community-based discussions when trying to find appropriate solutions while balancing different perspectives, ownership patterns, and interests. As a result, planners must take a comprehensive and collaborative approach to address challenges in the current WUI and ensure future development does not place more lives and property at risk.

Chapter 5 explains how planners can use a holistic WUI planning framework to create consistency between locally and regionally applicable plans and the regulations, policies, and public investment programs that are used to implement them. This framework also considers relevant state and federal policies that shape WUI planning efforts, such as national wildfire policies that emphasize a cohesive approach to wildfire management in communities, including land-use planning as a mitigation strategy.

The comprehensive plan is one of the most fundamental planning tools that planners can leverage for addressing the WUI. This plan should include policies that address existing development and future growth in the WUI, community safety, accessibility and circulation patterns, natural systems, and post-disaster recovery. However, it may be easy to overlook other plans that also link land-use planning with wildfire risk reduction. Hazard mitigation plans, community wildfire protection plans, open space management plans, watershed plans, and capital improvement plans are all examples of functional plans that also support WUI planning by incorporating land-use strategies into short- and long-term local activities. In addition, neighborhood, district, and other subarea plans can advance the goals of the comprehensive plan by offering additional detail at a more granular scale. Chapter 6 examines how comprehensive plans, functional plans, and subarea plans taken together provide an opportunity to reinforce wildfire risk reduction objectives and ensure that WUI hazard mitigation strategies do not conflict with other community priorities.

While myriad plans serve as the policy foundation for addressing the WUI, regulations provide communities with the legal means to implement these policies—the focus of Chapter 7. WUI regulations can address both existing and future development in the WUI—including structures and attachments, roads and other infrastructure, landscaping, current and future land uses, and additional development features.

While a variety of regulatory options exist, this report focuses on five fundamental tools that are commonly used to regulate land development within the WUI: subdivision, zoning, fire, building, and WUI regulations. Collectively, these tools can be implemented at a full range of scales: from the larger community-level scale, through the neighborhood or subdivision scale, down to the individual building or lot scale. They provide planners with a menu of options for reducing risk through different interventions, such as locating specific uses away from wildfire hazard areas, creating effective landscaping ordinances that are compatible with multiple objectives, and ensuring communities have safe evacuation routes. Understanding this range of options is also helpful if there are local constraints on amending state codes, or when communities have a preferred method of organization within their municipal codes.

Strategies drawn from other community successes and research can support planners in their pursuit of developing, adopting, and implementing plans and regulations for the WUI. Taking incremental steps, tapping into existing resources, and working with other professionals are a few of the examples highlighted throughout this report. In addition, case study examples provide lessons on how different communities are tackling WUI planning, offering guidance and information to help planners roll up their sleeves and get started.

CONCLUSION

According to the National Interagency Coordination Center's annual wildfire statistics report (2019), in 2018, a total of 25,790 structures were destroyed by wildfire. This included more than 18,000 residences, many of them lost during the Camp, Woolsey, and Carr Fires in California.

In some respects, this was seen as an anomaly year—from 1999 to the present, an average of 2,701 residential structures have been lost annually to wildfire. But fire experts are increasingly questioning whether recent fire years are a sign of what's to come. Expanding development patterns that fail to include mitigation for wildfire, combined with a higher number of human ignitions and rising global temperatures, are calling for a serious reevaluation of development and public safety in the WUI.

Planning, preparing, and adapting communities to wildfire is an ongoing and collaborative process. Fire adaptation in the WUI involves engaging community members and stakeholders in understanding and implementing strategies to mitigate wildfire risk in order to safely coexist with

wildland fire. Pursuing fire adaptation helps communities understand their wildfire risk and collectively take actions to mitigate this risk.

Although not all wildfire risk can be eliminated, it is based on a set of well-understood factors. Land-use planning interventions, such as changes to the location and type of development, can address many risk factors during and after the development process, helping communities avoid devastating outcomes and accepting fire as part of the landscape.

To help achieve fire adaptation, planners need to familiarize themselves with the WUI. Wildfires in the WUI result in devastating impacts to people, places, landscapes, and other areas that residents cherish—and some of these impacts can last for decades. This PAS Report not only argues for a greater need to rethink the WUI, but it offers tangible planning solutions that range from details at the building scale to community-wide changes. It primes planners to meaningfully engage with fire departments, federal and state agencies, elected officials, land managers, residents, and other stakeholders to identify and implement land-use solutions that complement other efforts.

In many ways, the existence of the WUI may be inevitable. Humans will always seek a relationship with nature and will want to live near forests, grasslands, and other wildlands. But intentional actions by planners to mitigate negative consequences in the built environment, including the effects of destructive wildfires on our communities, are an essential responsibility to ensure a safe and resilient future.