

Land Use Planning Approaches in the Wildland-Urban Interface

*An analysis of four western states:
California, Colorado, Montana, and Washington*



Image credit: Molly Mowery

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Acronyms

Note that some acronyms listed below are unique to each state, as specified throughout the report.

AB	Assembly Bill
APA	American Planning Association
ARM	Administrative Rules of the State of Montana
CAL FIRE	California Department of Forestry and Fire Protection
Cal OES	California Governor's Office of Emergency Services
CO-WRAP	Colorado Wildfire Risk Assessment Portal
CPAW	Community Planning Assistance for Wildfire
C.R.S.	Colorado Revised Statutes
CSFS	Colorado State Forest Service
CWPC	Community Wildfire Planning Center
CWPP	Community Wildfire Protection Plan
DNR	Department of Natural Resources
DNRC	Department of Natural Resources and Conservation
DOLA	Department of Local Affairs
FAIR	Fair Access to Insurance Requirements
FEMA	Federal Emergency Management Agency
FRA	Federal Responsibility Area
FRAP	Fire and Resource Assessment Program
GC	Government Code
ICC	International Code Council
IWUIC	International Wildland-Urban interface Code
LRA	Local Responsibility Area
MCA	Montana Code Annotated
NFPA	National Fire Protection Association
NOAA	National Oceanic and Atmospheric Administration
NWCG	National Wildfire Coordinating Group
OPR	Governor's Office of Planning and Research
PRC	Public Resources Code
PUD	Planned Unit Development
RCW	Revised Code of Washington
RHNA	Regional Housing Needs Allocation
RMRS	Rocky Mountain Research Station
SB	Senate Bill
SEPA	State Environmental Policy Act
SRA	State Responsibility Area
VHFHSZ	Very High Fire Hazard Severity Zone
WAC	Washington Administrative Code
WUI	Wildland-Urban Interface



EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The year 2020 brought distressing headlines to communities across the United States—many of which related to the emergence of the novel coronavirus and its widespread impacts on public health and local economies. For western states, devastating news also included record-breaking wildfires at a scale not experienced before by many communities. Impacts were wide-ranging and severe, including:

- The rapid and nearly complete destruction of entire towns, such as Malden, Washington, and Phoenix and Talent, Oregon (Morlin and Baker 2020)
- A record-breaking four million acres burned, 10,488 structures damaged or destroyed, and 31 fatalities in California (CDP 2020)
- The closure of Interstate 70 in Colorado which resulted in lost revenues and delayed deliveries of food and other goods (Herman 2020)
- Weeks of hazardous air quality that exceeded the maximum limits of air quality monitoring systems along the West Coast (Carlsen et al. 2020)

Questions from news agencies, elected leaders, hazard mitigation professionals, and scientists began to focus on whether these wildfires are a sign of the future and what else can be done to change course. Are the conditions that set up this year's rapid rate of fire spread and extreme fire behavior a result of climate change? Should we be focused on better management of our forests or improvements to hardening structures? Are there wildfire hazard areas that are simply too risky to continue allowing development to occur?

Comprehensive solutions are required across multiple scales and disciplines to address such questions. Reducing the threat of hazards must move beyond either/or discussions (e.g., investments in fuel management or home hardening) and instead acknowledge that land managers, elected officials, policymakers, first responders, land use planners, developers, and residents *all* play a role in wildfire solutions. While roles and responsibilities will vary, a shared understanding of common goals is critical. This report acknowledges that working holistically toward resilient landscapes, fire adapted communities, and improved response—as identified in the National Cohesive Wildland Fire Management Strategy, a national policy approach toward wildfires—sets up a collaborative framework and facilitates wide-ranging solutions to tackle the nation's wildfire challenges.

Within this broader context, this report focuses on a critical aspect of working towards community fire adaptation: analyzing effective land use policy and regulatory solutions in the wildland-urban interface (WUI). The WUI is any area where the built and natural environments create a set of conditions that allow for the ignition and continued spread of wildfire. The severity of how wildfire impacts the WUI is influenced by a number of factors, such as where and how homes, businesses, and infrastructure are developed, weather conditions, and the amount, type, and arrangement of vegetation.

Land use planning plays a role in these development decisions, and therefore can be an effective means for reducing damage and losses in the WUI. State and local governments approach WUI planning through a variety of policy and regulatory frameworks. This report explores four western states—California, Colorado, Montana, and Washington—to better understand each state's approach to wildfire policy and regulation, and to identify potential opportunities for reducing wildfire risk to communities in the future. An overview of the four-state analysis is summarized in Table 1.

TABLE 1. WILDLAND-URBAN INTERFACE PLANNING SUMMARY IN FOUR STATES

State	WUI Planning Highlights	Future Considerations
CALIFORNIA	39,512,223 total population 32% of all housing units are in the WUI	14% projected population increase by 2050 +4.4°F – +5.8°F projected warming by 2050
<i>California provides a strong statewide approach toward WUI planning and regulatory requirements. This sets up a strong foundation from which local jurisdictions may further adopt WUI requirements or implement voluntary measures to reduce wildfire risk.</i>	<ul style="list-style-type: none"> State identifies Fire Hazard Severity Zones and Responsibility Areas General Plans are required for all counties and incorporated municipalities, and must address hazards, including wildfire where applicable State has minimum WUI building code requirements and Fire Safe Regulations State resources include land use planning program expertise and guidance from the Office of Planning and Research 	<ul style="list-style-type: none"> Recent wildfire legislation will shape aspects of the WUI, including Fire Safe Regulations, subdivision planning, defensible space, and infrastructure State-mandated Regional Housing Needs Allocation system does not account for wildfire hazards directly CAL FIRE is funding development of land use planner trainings Updated statewide assessment of fire hazard severity zones is anticipated
COLORADO	5,758,736 total population 43% of all housing units are in the WUI	40% projected population increase by 2050 +2.5°F – +5.0°F projected warming by 2050
<i>Colorado is experiencing a rapidly-growing population and expansion of the WUI. There are few state land use requirements for the WUI, as a result many WUI planning efforts are implemented locally.</i>	<ul style="list-style-type: none"> Counties and municipalities are required to adopt a master plan, but only municipalities must address hazards Statewide building code requirements for wildfire hazard have not been adopted 1041 Regulations give local governments authority for planning decisions related to areas or activities of statewide concern, including hazards 	<ul style="list-style-type: none"> WUI data in Colorado’s Forest Atlas can support development of community wildfire protection plans (CWPPs) Department of Local Affairs developed <i>Planning for Hazards: Land Use Solutions for Colorado</i> Local property assessment programs are replicable and scalable but require funding for widespread adoption
MONTANA	1,068,778 total population 64% of all housing units are in the WUI	17% projected population increase by 2050 +4.5°F – +6.0°F projected warming by 2050
<i>Montana has developed state-level WUI tools that local jurisdictions can adopt, but these are optional and to a large degree have not been implemented locally.</i>	<ul style="list-style-type: none"> Growth policies are not required, but if local jurisdictions adopt them, they must include an evaluation of wildfire and whether there is a need to adopt regulations Subdivision regulations must prohibit development in hazard areas unless mitigation can occur State offers WUI development guidelines and building code for voluntary adoption 	<ul style="list-style-type: none"> Growth policies are not required to cover an entire jurisdictional area Recent statewide risk and WUI assessments could be used to inform land use planning decisions, WUI code implementation, and priority vegetation management Voluntary home assessment programs can supplement local risk reduction
WASHINGTON	7,614,893 total population 35% of all housing units are in the WUI	29% projected population increase by 2050 +4.3°F – +5.8°F projected warming by 2050
<i>Washington has taken recent legislative strides to require adoption of WUI building code requirements. This process is being supported through new WUI assessment tools.</i>	<ul style="list-style-type: none"> Comprehensive plans are required for some jurisdictions per state’s Growth Management Act; hazard elements are optional New building code requirements will take effect based on recent statewide assessment of WUI Ten-year wildland fire strategic plan supports land use measures for fire adaptation 	<ul style="list-style-type: none"> Department of Commerce and FEMA Region 10 are developing a statewide guide for hazard planning and land use Technical assistance program by Department of Natural Resources is seeking budget to implement legislative mandate

Sources: See Part 1: Overview for expanded population and WUI housing data. Projected warming by 2050 data for each state: California (Lieberman 2018); Colorado (Kennedy 2014); Montana (Whitlock et al. 2017); Washington (Department of Natural Resources 2016).

The findings of this report illustrate that there are many opportunities within each state and across all four states to advance WUI risk reduction objectives through land use planning. Broad solutions synthesized from all four states focus primarily on state-level policy and funding activities:

- **Adopt state legislation for minimum wildfire hazard planning requirements.** Robust state leadership is vital to creating frameworks and state-level policies or laws that require or encourage local land use planning for hazard mitigation. With the exception of California, each of the other three states analyzed in this report would benefit from improved legislation or policies that require local governments to take a more proactive approach to addressing the WUI and wildfire hazard in their comprehensive plans and complementary activities.
- **Integrate the role of land use planning expertise in WUI initiatives.** States typically delegate WUI planning responsibilities to a department specialized in managing natural resources and wildfire response. This can leave out land use planners from the role of developing land use-oriented regulations, policy requirements, guidance, and other materials that target the WUI, while relying on agencies that do not necessarily understand the legislative and political considerations of land use and development decisions. Future efforts by state legislatures that direct the development of WUI requirements or guidance should include language specifying the role of land use planning expertise (such as engagement with state agencies or other organizations).
- **Promote learning opportunities to engage planners on WUI topics.** Each of the four states analyzed in this report have established learning networks to enable a range of practitioners to exchange ideas, share best practices, and connect on other resources related to community fire adaptation. Adding more state and local land use planners to each network could encourage partnerships that advance wildfire risk reduction through land use planning tools. Expanding training opportunities to educate planners and other officials on wildfire could also improve understanding of ignition and mitigation concepts.
- **Dedicate resources and funding to support risk reduction in the existing WUI.** It's also important to find solutions for communities already in the WUI. Several states are pursuing local or state-level implementation of property assessment and home hardening programs, but these efforts lack coordination, capacity, and dedicated funds to ensure their success and measurably reduce risk. Further, long-term commitments to behavioral change and maintenance also require sustained resources. States must be more willing to commit funds that invest in proactive and long-term mitigation activities.
- **Identify and transfer land use planning practices from other hazards to wildfire.** There is limited crossover between wildfire planning solutions and other hazard mitigation planning best practices. Borrowing from other creative land use solutions for flood, landslide, and other hazards and applying them to wildfire could yield additional successes and is a research area ripe with opportunity for further exploration.

It's imperative to take action now on implementing these solutions. Western communities are increasingly facing trends and uncertainties that will continue to put pressure on the WUI—this includes accelerating impacts of climate change, population growth, and shifting land use patterns shaped by changing commuter patterns. Collectively, these factors could both expand the footprint of the WUI and increase the devastation of wildfires. Forward-thinking land use planning policies and regulations serve an important role in helping state and local governments address wildfire risk for communities today and those in the future.



OVERVIEW

OVERVIEW

Report Introduction

This report provides a synthesis of land use planning frameworks in four western states—California, Colorado, Montana, and Washington—and how these frameworks currently address the WUI. The goal of this report is to increase understanding of barriers, opportunities and solutions to reducing wildfire risk in communities through land use policies, regulations, training, and resources.

This report is organized into four parts:

- **Overview.** This section provides a general introduction to WUI trends in each of the four states. This general information is intended to help readers understand the context of development in wildfire-prone areas.
- **State Analyses.** Each state section has a summary on how the state identifies its WUI and assesses wildfire hazard and/or risk, followed by an overview of the primary state legislation that directs WUI planning activities at the local level. In many cases, local examples are included to share implementation at this scale. Each state section also considers potential opportunities for future action that may help advance land use planning solutions for wildfire risk reduction.
- **Trends and Unknowns.** This section outlines several of the main drivers that are likely to shape the WUI and related land use decisions in the future, such as climate change, shifts in demographics and telecommuting patterns, and market influences.
- **Future Directions.** This final section explores potential barriers to change and long-term policy solutions based on the general findings from the four states analyzed in this report.

Research Methodology

The research methodologies used to develop this report consisted of personal interviews with planners, land managers, and other practitioners, research and reviews of state legislation, analyses of reports, journals, and new articles, and years of professional experience working as land use planners with communities in each state to assess and reduce wildfire risk in the WUI.

Key Terms Defined

Community wildfire protection plan (CWPP): a plan that meets a minimum set of requirements as defined by the Healthy Forests Restoration Act to identify the local WUI, assess wildfire risk, and determine risk reduction actions.

Fire adapted community: a human community consisting of informed and prepared citizens collaboratively planning and taking action to safely coexist with wildland fire.

Fuel: Any substance that will ignite and combust. Related to wildfire, fuels are defined as wildland fuels (e.g., vegetation) and built fuels (e.g., structures).

Mitigation: The act of modifying the environment or human behavior to reduce potential adverse impacts from a natural hazard.

Wildfire: An unplanned wildland fire, including unauthorized human-caused fires and escaped prescribed fire projects.

Wildfire hazard: The combination of the likelihood of a fire occurring and the intensity of the fire. Also refers to the wildland or built fuels present in a given area, or the combustibility of a given fuel type or fuel complex in general.

Wildfire risk: The wildfire hazard plus the addition of the factors that contribute to susceptibility, or the impact of a wildfire on highly valued resources and assets.

Wildland-urban interface (WUI): Any developed area where conditions affecting the combustibility of both natural and cultivated vegetation and structures or infrastructure allow for the ignition and spread of fire through the combined fuel complex.

Source: American Planning Association Planning the Wildland-Urban Interface PAS Report 594 (2019).

A Snapshot of the Wildland-Urban Interface

In order to plan for and mitigate wildfire impacts on development, it is helpful to think about the WUI both conceptually and spatially.

- 1) The **conceptual definition of the WUI** considers a range of conditions which contribute to how structures (and other features in the built environment) ignite and burn during a wildfire event. For example, the relationship between a cluster of homes, the proximity of each home to vegetation, type of vegetation, local weather conditions, the homes' location and relationship to topographical features such as ridgelines, and the type of landscaping surrounding each home several conditions that influence what happens when flames or embers reach this area and whether a fire will ignite and sustain itself. In this regard, a variety of conditions and planning scenarios require practitioners to approach the WUI as a dynamic set of conditions, as opposed to a fixed state.
- 2) However, **spatially defining the WUI** is also an essential process that allows planners, land managers, and researchers to analyze and plan for these geographic areas. For example, planners can use a WUI map to identify the type of development patterns occurring near, or within, wildfire hazard areas. Researchers can also identify trends in WUI growth to see where development has occurred and where future planning resources may need to be prioritized. WUI maps can also be coupled with other maps, such as sensitive lands or environmental constraints to inform a suitability analysis. Finally, WUI maps are routinely used to draft land use regulations. Although a common criticism is that WUI maps are not accurate, this could be stated for *all* maps (including floodplain maps), and these maps are routinely accepted as the best information available to direct policy and regulatory decisions, even as the maps are refined over time.

In either conceptual definitions or spatial definitions, the WUI can be further classified into intermix or interface areas. An intermix WUI is where development (i.e., structures), is interspersed or scattered throughout wildland vegetation. An interface WUI is where development is grouped near areas with wildland fuels—in this case, there is typically a clear line of demarcation between development and vegetation (Mowery et al. 2019). Spatial delineations of the intermix and interface have criteria for the housing density and vegetation, which can vary depending on the agency conducting the analysis.

WUI Trends in Each State Analysis

The four states selected for this analysis are all experiencing expansion of their WUI in terms of both new housing units and land area. The drivers for WUI expansion—which include population growth, changes to commuting patterns, housing affordability, and lifestyle preferences—are discussed in Part Three (Trends and Unknowns).

Each state has developed their own assessment of the WUI, as described in their corresponding report section. National datasets can also be helpful for showing larger trends with a uniform dataset. Table 2 summarizes population and housing characteristics for each state according to national datasets available from the U.S. Census Bureau. The information on projected future population growth is also included based on forecast data generated by each Census State Data Center. WUI area statistics in Table 2 are based on information calculated by the U.S. Forest Service and University of Wisconsin-Madison SILVIS Lab, which quantifies the country's WUI based on criteria of housing unit density and landcover (Radeloff et al. 2005).

TABLE 2. KEY STATISTICS ON POPULATION, HOUSING, AND WUI IN FOUR STATES

<i>Statistic</i>	<i>California</i>	<i>Colorado</i>	<i>Montana</i>	<i>Washington</i>
Population				
Total Population ^a	39,512,223	5,758,736	1,068,778	7,614,893
Population Growth Rate (Percent Change since 2010) ^a	6.1%	14.5%	8.0%	13.2%
Population Density (Persons Per Square Mile) ^b	239.1	48.5	6.8	101.2
Projected Population in 2050	44,856,461 ^c	8,049,275 ^d	1,251,276 ^e	9,855,117 ^f
Projected Population Growth Rate (% Change in 2050)	13.5% ^c	39.8% ^d	17.1% ^e	29.4% ^f
Housing				
Housing Units ^a	14,366,336	2,464,164	519,935	3,195,004
Housing Units in WUI Area, 2010 ^g	4,426,803	940,552	308,567	1,010,550
Percentage of All Housing Units in WUI, 2010 ^g	32.4%	42.5%	63.9%	35.0%
Expansion of Housing Units in WUI Area, 1990-2010 ^g	1,117,087	398,772	84,669	340,553
Percent Change in Housing Units in WUI Area, 1990-2010 ^g	33.8%	73.6%	37.8%	50.8%
Housing Units for Seasonal, Recreational, or Occasional Use ^h	394,112	119,155	40,596	88,919
Building Permits in 2019 (statewide) ⁱ	110,197	38,633	4,776	48,424
Land Area				
Total Land Area (km ²) ^g	423,967	269,602	380,831	184,661
Total WUI Area in 2010 (km ²) ^g	27,026	9,438	5,304	14,991
Expansion of WUI Area, 1990-2010 (km ²) ^g	4,407	3,725	2,135	3,527
Percent Change in WUI Area, 1990-2010 ^g	19.5%	65.2%	67.4%	30.8%

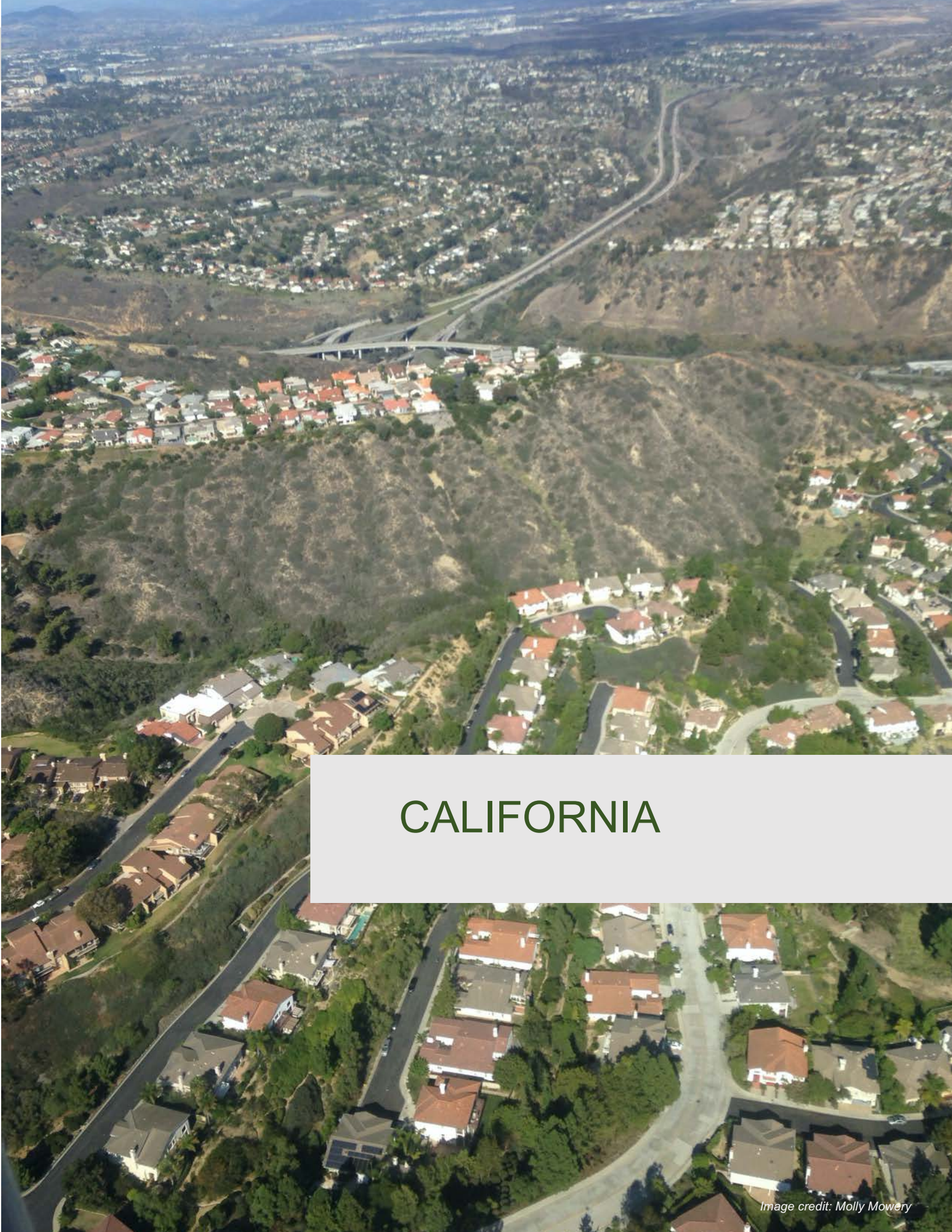
Data Sources:

- a. U.S. Census Bureau, Population Estimates Program, 2019.
- b. U.S. Census Bureau, based on current information in the TIGER® database, calculated for use with Census 2010.
- c. California Department of Finance, Demographic Research Unit, January 2020
- d. Colorado Department of Local Affairs, State Demography Office.
- e. Montana: Department of Commerce, Census & Economic Information Center, July 2019.
- f. Washington: Office of Financial Management, Forecasting & Research Division (Medium Series), January 2018.
- g. U.S. Forest Service, State by state summary of WUI. Available at: https://www.nrs.fs.fed.us/data/wui/state_summary/
- h. U.S. Census Bureau, 2018 American Community Survey 1-Year Estimates.
- i. U.S. Census Bureau, Construction-Building Permits.

Additional Report Notes and Resources

The terms “wildfire hazard” and “wildfire risk” are used throughout the report in distinct ways. It is important to understand the difference between these two terms (see “Key Terms Defined” at the beginning of this section) for appropriate use in a planning context. Each state has conducted either a statewide wildfire hazard assessment or wildfire risk assessment. While these different types of assessments and their application are generally described in the report, readers are encouraged to undertake supplementary study for a full understanding of hazard and risk assessment concepts.

In addition, readers interested in further understanding the technical land use tools that are referenced in this report are strongly encouraged to explore additional resources. A helpful resource that describes wildfire hazard, wildfire risk, and land use planning tools for the WUI is the American Planning Association publication, *Planning the Wildland-Urban interface* (PAS Report 594, 2019). Additional resources are mentioned throughout this report and Part 4 (Future Directions) also includes a sidebar on suggested resources.



CALIFORNIA

CALIFORNIA: STRONG STATE WUI FRAMEWORK

Introduction

In recent years, California set new wildfire records that once seemed unthinkable. Fourteen of the state's most destructive fires in terms of lives and structures lost have occurred since 2015, including the Camp Fire, Tubbs Fire, North Complex, Valley Fire, Woolsey Fire, Glass Fire, LNU Lightning Complex, and Carr Fire (CAL FIRE 2020). Additional impacts from these fires typically included temporary and long-term displacement of residents, poor/hazardous air quality, soil damage and post-fire erosion, debris flow, disruptions to local economies, and many others.

California's fire statistics are frequently well above every other U.S. state in terms of annual property loss and damage from WUI fires. This results from a combination of factors, including the state's landscapes—many of which are ecologically adapted to, or dependent on, fire. California is also the most populous state in the country and many sprawling developments were built in wildfire-prone areas. Compared to other states, the total WUI area in California is much greater (Table 2). As the state finds itself on the front lines of climate change, efforts are in place to combat wildfire destruction and move toward resilient landscapes and communities. These efforts are being implemented through a host of regulatory and policy shifts—many of which rely on land use planning solutions that are managed at the state level.

Assessing the WUI and Wildfire Hazard

The California Department of Forestry and Fire Protection (CAL FIRE) Fire and Resource Assessment Program (FRAP) is responsible for assessing the state's forests and rangelands and analyzing conditions for effective management and policy guidelines. FRAP provides multiple resources, including a statewide WUI map, responsibility area maps, communities at risk from wildfire map, and fire hazard severity zone maps. These and other maps are available online through the FRAP website (<https://frap.fire.ca.gov/>).

State WUI Map

California's statewide WUI map is based on datasets that include housing density, unimproved parcels, and vegetation cover. The WUI map shows the overall pattern of WUI development at the county level in terms of intermix or interface, and the influence zone (wildfire susceptible vegetation up to 1.5 miles from the interface and intermix), however the map is not intended for WUI designations at the parcel or neighborhood scale. The state's WUI map as a standalone resource is not widely used at the state or local level to drive policy and regulation; rather, Fire Hazard Severity Zone (FHSZ) designations are more commonly used, as described below.

Responsibility Areas

FRAP spatially delineates three areas of responsibility for fire protection: state responsibility area (SRA), federal responsibility area (FRA), and local responsibility area (LRA). In state responsibility areas, CAL FIRE has the legal responsibility to provide fire protection. State responsibility area lands are defined based on land ownership, population density and land use. State responsibility areas do not include lands administered by the federal government (which are federal responsibility areas), or areas designated as local responsibility areas. Local responsibility areas are typically densely populated areas and incorporated cities and may also include agricultural lands or portions of the desert.

Fire Hazard Severity Zones

CAL FIRE is required by law to classify lands within state responsibility areas into FHSZs and to identify areas of very high fire hazard severity zones (VHFHSZ) within local responsibility areas (Public Resources Code [PRC] § 4201-4204, Government Code [GC] § 51175-79). FHSZ maps designate moderate, high, and very high zones based on factors such as fuel loading, slope, and fire weather.

CAL FIRE (FRAP) develops mandatory FHSZ maps for state responsibility areas delineated into moderate, high, and very high as shown in Figure 1. The most recent adoption of the FHSZ maps occurred in November 2007, although the FHSZ is undergoing an update. There are currently 31 million acres of land assessed as a FHSZ in the state responsibility area (Miller et al. 2020).

CAL FIRE (FRAP) also maps the FHSZ in local responsibility areas. Areas designated as VHFHSZ in local responsibility areas are provided as recommendations to local agencies who are required to review the recommendations and designate by ordinance VHFHSZs in its jurisdiction within 120 days. A local agency may also include additional areas within its jurisdiction as VHFHSZ following a finding supported by substantial evidence (GC § 51179). In either case, local agencies must identify their VHFHSZ. Based on the current maps available, there are 188 cities with VHFHSZs in the local responsibility area.



Figure 1. California assesses Fire Hazard Severity Zones to identify where wildfire hazards are of greater concern. FHSZ designations are used as the basis for many state and local regulations and policies.

Planning Solutions

The identification of FHSZs in state and local responsibility areas serves as a key foundation for the applicability of WUI legislative and policy requirements, as described below.

State Requirements for Wildfire Hazard in the General Plan

Per state law, it is mandatory for all cities and counties in California to adopt a general plan. General plans are required to address hazards to ensure “the protection of the community from any unreasonable risks associated with the effects of seismically induced surface rupture, ground shaking, ground failure, tsunami, seiche, and dam failure; slope instability leading to mudslides and landslides; subsidence, liquefaction, and other seismic hazards...; flooding; and wildland and urban fires.” (GC § 65302(g)(1)).

Specific to wildfire, all cities and counties whose planning area includes lands classified as state responsibility area or VHFHSZ must meet state planning requirements for fire hazard established by Senate Bill (SB) 1241 (2012) and codified in Government Code § 65302 (g)(3). For these communities, their General Plan safety element must consider wildfire hazard information (as provided by state FHSZ maps, historical data, and other available sources), and the general location and distribution of existing and planned uses of land in the VHFHSZ and state responsibility areas, including structures, roads, utilities, and essential public facilities. In addition, safety elements are required to contain a set of goals, policies, and objectives to protect the community from the unreasonable risk of wildfire, including feasible implementation measures such as:

- Avoiding or minimizing the wildfire hazards associated with new uses of land.
- Locating, when feasible, new essential public facilities outside of high fire risk areas, including, but not limited to, hospitals and health care facilities, emergency shelters, emergency command centers, and emergency communications facilities, or identifying construction methods or other methods to minimize damage if these facilities are located in a state responsibility area or VHFHSZ.
- Designing adequate infrastructure if a new development is located in a state responsibility area or VHFHSZ, including safe access for emergency response vehicles, visible street signs, and water supplies for structural fire suppression.
- Working cooperatively with public agencies with responsibility for fire protection.

Safety element updates must occur a minimum of every eight years, but can also be triggered by other factors, such as a revision to the housing element or local hazard mitigation plan. All general plan safety elements in the state must now also address climate change vulnerability and adaptation (GC § 65302 (g)(4)). As a result, wildfire hazard planning requirements should ideally be considered as part of the broader climate adaptation framework that applies to all natural hazards in the safety element.

State Fire Safe Regulations

The state also regulates aspects of the built environment to address road standards for fire apparatus access, standards for signs identifying streets, roads, and buildings, minimum private water supply reserves for emergency fire use, and fuel breaks and greenbelts (PRC § 4290). One of the primary instruments for implementing these regulations is through the state’s fire safe regulations, currently referred to as the SRA Fire Safe Regulations. Existing law requires that the State Board of Forestry and Fire Protection adopt regulations implementing minimum fire safety standards that apply to state responsibility area lands to ensure that the design and

construction of structures, subdivisions, and developments provide for basic emergency access and perimeter wildfire protection measures.

These regulations currently apply to the perimeters and access to all residential, commercial, and industrial building construction approved after January 1, 1991. Counties with state responsibility areas must either adopt the Fire Safe Regulations or they can adopt more stringent local ordinances that meet or exceed the state's Fire Safe Regulations. In 2018, the California Legislature passed SB 901, which included changes to the state's Fire Safe Regulations that will expand their current applicability from state responsibility areas to include VHFHSZs within local responsibility areas. The updated Fire Safe Regulations will also include new measures to preserve undeveloped ridgelines to reduce fire risk and improve fire protection. These updated regulations are set to take effect in July 2021.

Additional regulations that support WUI risk reduction are found in the California Fire Code, California Building Code (Chapter 7A), and Public Resources Code. For example, before approving a tentative map or parcel map for subdivisions within the state responsibility area or VHFHSZ, counties are required to make findings that a subdivision is consistent with fire safety and defensible space regulations in PRC § 4290 and 4291, and that structural fire protection and suppression services will be available for the subdivision (GC § 66474.02).

Additional State Resources

Implementation of state requirements for WUI policies and regulations is supported through state agencies. CAL FIRE's Land Use Planning Program staff assist local governments with the mandatory safety element review process and provide recommendations and support on policy updates that meet the legislative requirements. Draft safety elements (or amendments) must be submitted to the State Board of Forestry and Fire Protection and local agencies providing fire protection for a review and any recommended changes. Similarly, proposed local ordinances that meet or exceed the state's Fire Safe Regulations are also submitted to the State Board of Forestry and Fire Protection for review and potential certification.

In addition, the Governor's Office of Planning and Research (OPR) provides detailed fire hazard planning guidance for analyzing hazards and risks and implementing policy, regulations, and best practices in the form of its Fire Hazard Planning Technical Advisory. The Technical Advisory was updated in 2020 to address recent legislative requirements to include "specific land use strategies to reduce fire risk to buildings, infrastructure, and communities" (GC § 65040.21) and goes into significant detail on additional opportunities to support WUI policy development and implementation for communities across California (see sidebar).

Fire Hazard Planning Technical Advisory

The Fire Hazard Planning Technical Advisory is part of a General Plan Technical Advice Series issues by the California Governor's Office of Planning and Research. The 2020 Update of the Fire Hazard Planning Technical Advisory provides "a robust planning framework for addressing fire hazards, reducing risk, and increasing resilience across California's diverse communities and landscapes." Highlights from the update include:

- Detailed guidance on **general plan requirements** for fire hazard and climate adaptation
- Recommendations for integration of **wildfire policies and planning activities** across general plan elements, local hazard mitigation plans, and community wildfire protection plans
- A **framework of state and federal policies** and regulations that affect fire planning efforts in California
- **Examples of policies** for new and existing land uses, fuel management, equity, disaster response and other key planning topics
- Summaries and links to **recent local jurisdictional examples**
- A **table of resources** to identify further guidance, funding mechanisms, tools, and other case studies for reference

More information is available at: opr.ca.gov

Local Implementation

The state's strong policy and regulatory framework provides a foundation for how local jurisdictions address wildfire. Variation in local adoption and implementation still occurs, which may result from factors including, but not limited to:

- A range of geographic areas that represent diverse landscapes, fire history, and fire hazard. These influences can shape how local jurisdictions perceive the urgency of incorporating wildfire as part of the planning process.
- Differences in historical and current development patterns, driven by a number of other land use and economic priorities such as housing affordability or opportunities in the real estate market.
- Varying degrees of awareness regarding local and state requirements for fire hazard. This may be based on frequent changes to legislation, a complex system of codes, and different levels of capacity to prepare, adopt, update, maintain, implement, and enforce policies and regulations.

Variations can be seen as a strength of a system that allows a flexible approach toward local adoption and implementation of policies and regulations. For example, some local jurisdictions have adopted more robust regulations that exceed state minimum requirements for Fire Safe Regulations. On the other hand, variations that circumvent risk reduction objectives result in gaps and inconsistencies. Although the state has implemented a system that reviews and approves general plan safety element updates, a more comprehensive analysis would be required to determine the degree to which local communities implement other legislative mandates.

Opportunities

California's wildfire-related legislation has created a dynamic policy landscape in recent years. In 2019, Governor Newsom signed 22 bills that address different aspects of wildfire mitigation, preparedness, and response—many of which implement recommendations from the Governor Newsom's Strike Force report, *Wildfires and Climate Change: California's Energy Future*, released in April 2019 (Office of Governor 2019). More recent bills signed by the Governor in 2020 included: Assembly Bill (AB) 3074, which enhances defensible space requirements to include an ember-resistant zone within five feet of a structure in high fire hazard areas; AB 2968, which requires the California Governor's Office of Emergency Services (Cal OES) to establish best practices for counties in developing and updating their emergency plan; AB 2421, which requires expedited land use permitting of emergency standby generators for macro cell towers, and; AB 3012, SB 872 and AB 2756, which boost homeowners insurance protections for residents (Office of Governor 2020).

As a result, myriad legislation related to land use, subdivision and defensible space are under development—all of which will shape the WUI. Future outcomes will include requirements for real estate disclosures, the implementation of a home hardening program, and updated state Fire Safe Regulations.

Resources and guidance will be beneficial to help inform planners and decision makers seeking to understand recent legislative changes. Several resources are already under development. The updated guidance from OPR is expected to be released in early 2021, which highlights several key pieces of legislation affecting the built and natural environments. OPR will also be kicking off a WUI Best Practices Inventory project in 2021 in collaboration with CAL FIRE and the State Board of Forestry and Fire Protection to provide examples and case studies that highlight best practices for planning, code updates, and enforcement activities in the WUI. In

addition, CAL FIRE awarded a grant to CWPC to develop and provide trainings across the state to land use planners to help educate them on wildfire risk reduction. Finally, other non-governmental groups such as the California Fire Safe Council are set up to provide resources and disseminate information on grants or other funding mechanisms to support wildfire risk reduction projects.

To supplement to these activities, a more thorough assessment of WUI-related legislation could be undertaken to analyze approved legislation and its anticipated effects, determine when it will be implemented, and assess how it will function in relation to existing approaches to the WUI. This assessment could identify any significant gaps related to land use measures and support local governments in keeping pace with forthcoming changes.

A broader assessment of other state priorities and requirements that are often perceived as being at odds with wildfire safety, such as housing affordability and availability, could further inform policy discussions. For example, California's Regional Housing Needs Allocation (RHNA) system frequently gets criticized for not including wildfire or other locally-specific hazards in the regional allocation that mandates how much housing is required within each region for the upcoming eight years (Weil 2020). Recent legislation (SB 182) would have required that Council of Governments and the Department of Housing and Community Development take into consideration the amount of VHFHSZ land within a jurisdiction when developing the methodology to allocate regional housing needs. The bill was vetoed by Governor Newsom due to concerns that this approach could create loopholes for regions to not comply with their housing requirements (Office of Governor 2020). However, communities retain options to address housing and hazards through local planning—the RHNA process requires that all general plan housing elements include a sites inventory that defines where each jurisdiction's specific housing allocation will be accommodated. Identifying "environmental constraints" (which may include natural hazards) can be identified for excluding certain sites that may not be appropriate for future housing growth. Communities can also prioritize infill and redevelopment of existing urban areas, such as underutilized downtown space, which are at relatively low risk of wildfire-related losses (Moritz and Butsic 2020).

In summary, the state's strong approach to addressing wildfire through legislative action is proving critical to advancing better land use planning. However, it may be hard for local jurisdictions to keep pace with the frequent shifts and multiple triggers that require local policy and regulatory updates. Several measures are underway to support this, but more could be done to assess the needs and identify future policy and regulatory opportunities for the WUI. In addition, there is a continued need to explore and address the ongoing tension between housing needs and reducing the number of new homes being built in wildfire-prone areas across the state. A broader assessment of these needs could help further inform future policies, legislation, and incentives.



COLORADO

COLORADO: INNOVATIVE AND FLEXIBLE WUI PROGRAMS

Introduction

Colorado's 2020 wildfire season was record-breaking in multiple respects. Three fires occurred that became the state's largest three fires recorded in terms of acres burned (Pine Gulch Fire, East Troublesome Fire, Cameron Peak Fire). Extreme fire activity also extended late into fall, including the Cameron Peak Fire, Calwood Fire, and the East Troublesome Fire, the latter of which grew by 100,000 acres within a 24-hour period beginning October 21 and required the evacuation of multiple towns (National Wildfire Coordinating Group [NWCG] 2020). The Grizzly Creek Fire, which burned along the major transportation route Interstate 70, disrupted commerce and local supply chains for several weeks (Herman 2020).

Fires were fueled by a combination of extreme drought conditions, dry and dead fuels, wind, and higher-than-average temperatures. Property damage is still being assessed, but current estimates suggest that more than over 700 structures burned, which were a combination of primary residences, second homes, seasonal cabins, and outbuildings (Associated Press 2020). Statewide efforts in the past decade to address wildfire through land use planning have primarily focused on voluntary actions that local communities can take to address the WUI. This reflects Colorado's Constitution which enables voters in counties and municipalities to adopt a home rule charter and exercise local control on issues. Similar to other states experiencing record-breaking wildfire seasons, however, Colorado faces difficult questions regarding the new normal and whether more statewide resources and requirements are necessary to stem future losses.

Assessing the WUI and Wildfire Risk

The Colorado State Forest Service (CSFS) provides web-based applications for the public and professionals (e.g., land managers, fire districts, community planning departments) to learn about wildfire risk and forest conditions through the Colorado Forest Atlas Information Portal—previously available as the Colorado Wildfire Risk Assessment Portal (CO-WRAP).

Wildland-Urban Interface

CSFS produces a statewide WUI map that reflects housing density depicting where humans and their structures meet or intermix with wildland fuels (Figure 2). CSFS recently changed several key datasets used to develop its WUI layer to increase the level of detail available at the community level.¹ The WUI layer is available to communities across Colorado (<https://coloradoforestatlas.org/>).

Wildfire Risk

The web-based Wildfire Risk Viewer application allows public users to identify specific wildfire risk levels within a 1/2-mile radius of a home or any other map location. Wildfire effects themes include WUI Risk Index—a rating of the potential impact of a wildfire on people and their homes, and a Values at Risk Rating—a composite rating obtained by combining the probability of a fire occurring with the individual values at risk layers. The overall Wildfire Risk theme considers four key values and assets (WUI, drinking water, forests, and riparian areas). The resource also provides community wildfire risk reduction information, such as opportunities to learn about

¹ COWRAP's WUI dataset previously used USFS SILVIS data but now uses the Where People Live dataset and 2016 LandScan USA population count data (U.S. Department of Homeland Security) to incorporate imagery of nighttime lights, ownership parcels, building footprints and Postal Service addresses.

participating in the national Firewise USA program, minimum requirements for developing a CWPP, and a local summary of a location’s current recognized activities. County-specific infographic downloads are also available that classify WUI by percentage of population exposed to varying levels of negative wildfire impact. Professional users can request an account for the Risk Reduction Planner application to gain access to a broader suite of layers and tools for risk analysis, including the ability to analyze specific project areas, produce maps, and run comprehensive reports.

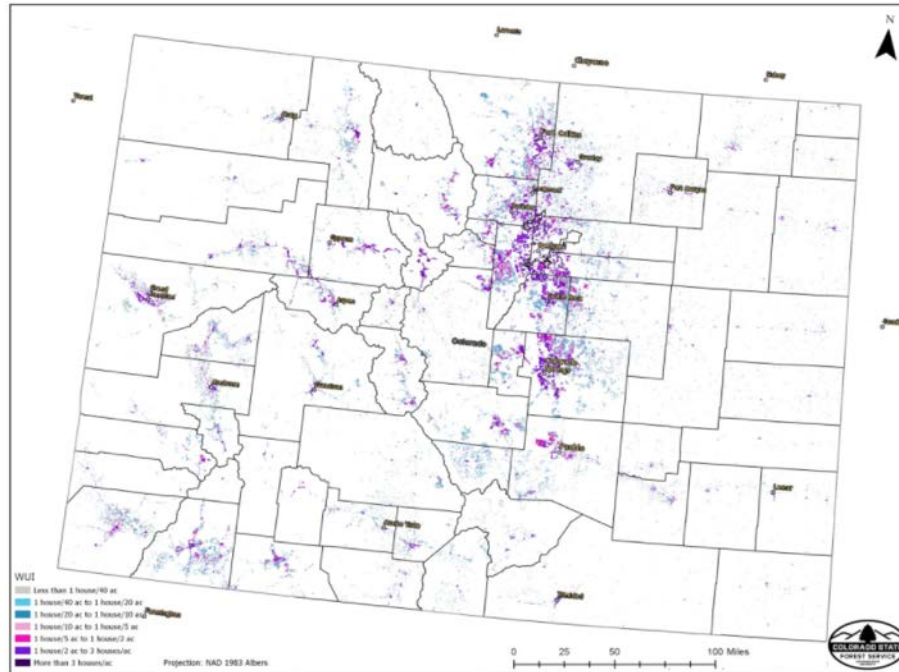
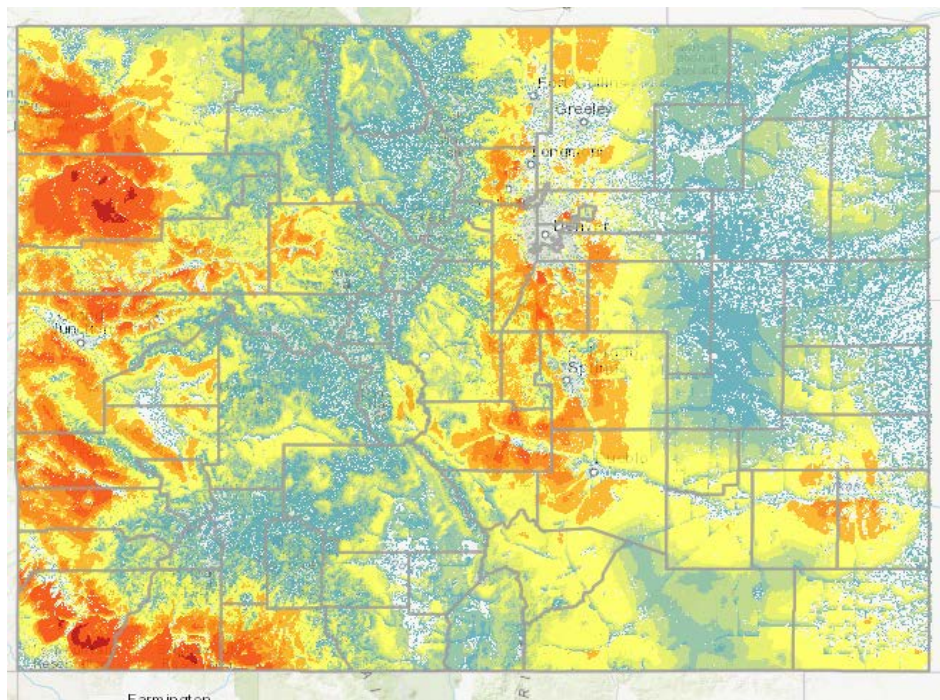


Figure 2.

Top: Colorado’s Wildland Urban Interface – 2018 (CSFS) shows housing density across the state. The darkest shade indicates areas where the density is more than three houses per acre. Available at:

<https://csfs.colostate.edu/wildfire-mitigation/colorados-wildland-urban-interface/>

Bottom: Colorado’s Wildfire Risk Viewer (current) allows users to view potential fire intensity under high to extreme weather conditions for any specific location of interest. Available at: <https://co-pub.coloradoforestatlas.org/#/>



WUI Planning at the State Level

The Colorado Forest Atlas provides an accessible tool for land managers and community planners to tap into information to advance wildfire risk reduction planning. To date, the tool's application has not been meaningfully integrated into state or local land use planning processes but there are opportunities for future consideration.

State Requirements for Master Plans

Colorado state statutes require that counties and municipalities adopt a master plan. The master plan is considered an advisory document to guide land development decisions, however, the plan or any part thereof may be made binding by inclusion in the county's or region's adopted subdivision, zoning, platting, planned unit development, or other similar land development regulations (Colorado Revised Statutes [C.R.S.] § 30-28-106; § 31-23-206). Specific direction on the contents of a master plan varies. A municipality's master plan *must* address the location of areas containing steep slopes, geological hazards, wildfire hazards, flood risk zones, and land use topics as specified by state statutes, while counties *may* address these same hazard and land use topics. CSFS is cited as the primary source for locating wildfire hazard areas. As a result of these differences in optional versus mandatory plan requirements for wildfire hazards in the master plan, there is high variability in the extent to which communities address local WUI concerns and corresponding policies.

Areas and Activities of State Interest (1041 Regulations)

The Areas and Activities of State Interest Act, which enacted House Bill 1041 in 1974 and is broadly referred to as "1041 regulations," gives local governments additional authority for planning decisions related to areas or activities of statewide concern. Areas of state interest include natural hazards and significant historical, natural, or archeological resources. The act authorizes local governments, specifically statutory and home rule municipalities and counties, to determine whether a development impacts an area or activity of state interest and to regulate the development of such projects according to legislatively defined criteria (Creighton et al. 2018). Communities may choose to adopt 1041 regulations for any or all areas or activities of state interest. Once adopted, development activities in designated areas or for specific activities are required to obtain a 1041 permit from the local jurisdiction, unless otherwise exempted by statute or local regulations. 1041 regulations are much more commonly used by counties than cities due to many cities' ability to leverage the state's strong home rule powers to obtain these same regulatory powers in a different way.

Other Statewide WUI Activities

Other efforts by the state to specifically regulate the WUI through statewide building code requirements or minimum land use standards have not been adopted. One of the most significant efforts to adopt statewide regulatory measures for the WUI occurred in 2013. Following several devastating wildfires, Colorado's governor convened a Wildfire Insurance and Forest Health Task Force (through Executive Order B 2013-002). The group was asked to identify and recommend ways to encourage activities, practices, and policies that would reduce the risk of loss in the WUI and increase customer choice and knowledge of insurance options. Recommendations included making further investments in CO-WRAP to create a statewide mapping standard and utilizing this information to require disclosures for any home within the WUI with its corresponding CO-WRAP score (for real estate transactions and insurance), prohibiting community building or land use requirements that are inconsistent with science-based principles, assessing a fee on properties in the WUI to help fund mitigation activities, and increasing homeowner and stakeholder awareness of financial and technical assistance to support wildfire risk mitigation.

While implementation of CO-WRAP and general assistance programs have moved forward, recommended statewide policy and regulatory changes affecting land use and building have not occurred. The report acknowledged a significant number of barriers to progress (summarized in the sidebar) that could limit the ability to advance each recommendation (van Heuven 2013). This was further echoed by the Task Force’s experience with trying to pass statewide laws in a strong home rule framework that allows for local-level control (Sakas 2021). More broadly, barriers to implementing WUI regulations are not unique to Colorado, as noted in other state analyses in this report and recent research focused on perceptions of land use planning to reduce wildfire risk across the U.S. (Mockrin 2020).

Barriers to progress for advancing WUI requirements and investments:

- Lack of funding and resources
- Personal responsibility
- Lack of clarity in messaging
- Political perils
- Enforcement difficulties
- Difficulty in regulating existing homes
- Legal constraints
- Unintended consequences

Source:
Wildfire Insurance and Forest Health Task Force Report to the Colorado Governor (2013)

Additional State Resources

The Colorado Department of Local Affairs (DOLA), the state agency responsible for supporting Colorado's local communities and building local government capacity through training, technical, and financial assistance, plays a significant role in supporting hazard planning and disaster recovery work. In 2016, DOLA produced the guide *Planning for Hazards: Land Use Solutions for Colorado*, through collaboration with representatives from state and federal agencies, local government, and other subject-matter experts in hazard mitigation and land use planning. This web-based resource provides land use planners with a broad range of planning tools (1041 regulations, comprehensive plans, subdivision regulations, etc.) with explanations and tips on implementation. This resource is updated regularly. The Colorado Resiliency Office within DOLA is also working on updating the statewide Colorado Resiliency Framework, which will include strategies to address hazards and their impacts to communities across the state.

WUI Planning at the Local Level

Colorado state statutes grant land use and planning powers to both home rule and statutory municipal and county governments (C.R.S. § 29-20-104). Each local government within its respective jurisdiction has the authority to plan for and regulate the use of land by regulating development and activities in hazardous areas, as well as other activities designated under § 29-20-104, *Powers of local governments*—generally referred to as the Local Government Land Use Control Enabling Act. As noted above, state law also grants both municipal and county governments the authority to regulate impacts of new developments that affect state interests, including natural hazard areas.

Jurisdictions are not prohibited from adopting local WUI or wildfire mitigation requirements, such as those that address wildfire susceptibilities on the structure and surrounding vegetation, but they are not required to do so. Communities can adopt model codes or standards, such as the International Code Council (ICC) International Wildland-Urban interface Code (IWUIC) or National Fire Protection Association (NFPA) standards for the wildland-urban interface, and can make amendments to align with local conditions and land use procedures. Further, communities can adopt WUI requirements as part of their fire code, building code, land use code, zoning code, or a combination thereof.

As a result, communities across the state have taken different approaches to planning for and implementing regulations. This can take the form of either adopting a locally-amended code or

developing their own set of land use regulations. These efforts are often implemented in conjunction with other voluntary efforts.

For example, in 2003 Eagle County adopted wildfire regulations for all new development (including special use permit, planned unit development (PUD), and subdivision) and new building construction or exterior remodels. Subdivision or PUD developments are required to submit a vegetation management plan that provides a site-specific evaluation prepared by a natural resource professional with expertise in the field of vegetation management and wildfire mitigation. Construction in locally-defined moderate and high wildfire hazard areas must also comply with the county’s building code requirements for wildfire.

Eagle County also implements REALFire[®], a voluntary parcel-level assessment program that aligns with the most current wildfire mitigation research and best practices for reducing structure loss. REALFire[®] was initiated in 2014 by the Vail Board of REALTORS and Eagle County, partially as a response to the potential statewide requirements recommended by the Wildfire Insurance and Forest Health Task Force (referenced above). The REALFire[®] program is now locally managed and implemented by Eagle County and administered by CWPC. Through this program, homeowners have the opportunity to receive an on-site assessment and a customized wildfire mitigation report. After a property owner completes their customized mitigation recommendations, assessors conduct a follow-up inspection and issue a certificate recognizing successful completion of all mitigation work.

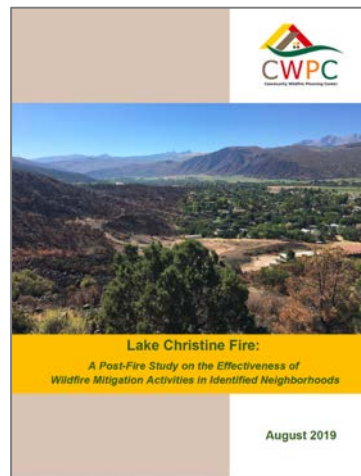


Figure 3. Establishing land use regulations and mitigation programs have been shown to be effective in saving homes, such as those homes that were threatened during the 2018 Lake Christine Fire in Eagle County. A full post-fire report is available at: communitywildfire.org

This program mirrors Boulder County’s Wildfire Partners program, which uses similar assessment technology and directly integrates the mitigation and certificate process into its land use and building code regulations. These property level assessments have been used to improve property owner’s insurance outcomes and track mitigation successes during wildfire events. Moreover, they have been shown to underscore the effectiveness of mitigation during wildfire events (Figure 3).

Opportunities

Colorado is an example of a state that provides local jurisdictions with significant latitude to plan for and regulate the WUI. As a result, there is wide variation in WUI planning efforts. Some communities have taken a proactive and comprehensive approach toward mitigation, while others have largely handled wildfire threats through increased response, education, and outreach. In light of the widespread wildfire activity across the state and anticipated continued

growth in wildfire-prone areas, more could be done to advance the linkages between hazard planning and land use decisions at the state and local level.

For example, CSFS has invested significant effort into updating the Colorado Forest Atlas, which has a wealth of information on wildfire hazard, risk, and community values. This information is intended to be easily incorporated into local decision making and planning through a CWPP and other planning tools. However, it is rare to find examples of CWPPs that meaningfully incorporate land use planning activities into their frameworks and become implemented. Although counties in Colorado are required to determine whether there are fire hazard areas in unincorporated portions of their county and adopt CWPPs (C.R.S. § 30-15-401.7), many land use planners are not engaged in the development and implementation of CWPPs. This can result in wildfire concerns being addressed through other land management and response agencies and corresponding activities that do not include significant efforts to reduce future development in the WUI.

One potential solution to address this gap between wildfire planning and land use decisions could be for CSFS to partner with DOLA or another organization to provide focused workshops and trainings to educate local community planners about the Colorado Forest Atlas and CWPPs. Another solution would be for the state legislature to amend master plan requirements to ensure that all local jurisdictions review the Colorado State Forest Atlas during periodic updates to their master plan to determine whether wildfire hazard is a local issue. Based on this information, communities should be required to develop policies that minimize future wildfire hazard (or risk) and consider land use planning decisions that affect wildfire-prone areas.

Further, the state could provide dedicated annual wildfire mitigation funding that creates a more predictable approach toward WUI planning. Following the devastating 2012 and 2013 wildfire seasons, and more recently the 2020 wildfire season, the state boosted its budget to put more grant dollars toward fuels, forest health, and capacity building projects. These funds, including the current Forest Restoration & Wildfire Risk Mitigation Grant Program (created through SB 17-050), are essential. However, the reactionary approach to increasing grant funding following more severe wildfire seasons does not lend itself to communities who seek to proactively invest in mitigation during other years. Further, grant funding focused on treated acres or capacity-building programs can be difficult to translate into land use planning activities.

The development and adoption of local codes can span several years, if not longer. Even if statewide mandatory requirements for building construction and land use are still not considered to be politically feasible (Sakas 2021), the state could provide a model WUI code for optional adoption by local jurisdictions. This could increase the efficiency of local adoption by equipping counties and municipalities with a model that could be amended and adopted (as opposed to starting from scratch). Finally, incentives such as additional state funding would encourage local approaches to WUI planning, as described above—communities who proactively adopt land use policies could receive more funds to implement measures such as voluntary property assessment programs and WUI codes.



MONTANA

MONTANA: STATE GUIDANCE FOR LOCAL WUI PLANNING

Introduction

The Bridger Foothills fire in Gallatin County in September 2020 served as a vivid reminder about the threat of WUI fires in Montana. Shortly after this lightning-caused fire was detected on September 4, initial attack forces from local fire departments, U.S. Forest Service and cooperators responded immediately. Suppression tactics were unsuccessful in halting the fire given the extremely dry and windy conditions (NWCG 2020). Rapid fire growth in light and heavy fuels led to evacuations that offered limited notice time for residents. Ultimately the fire burned 28 homes (Dore 2020) and 8,224 acres (NWCG 2020).

This type of fire incident was not unique that year. In 2020, initial estimates indicate that close to 380,000 acres burned, and 166 structures and millions of board feet of timber were destroyed across the state, and the total cost in tribal, county, state and federal dollars to fight wildfires has reached nearly \$50 million (Murray 2020). Other Montana fires in 2020 that burned into or threatened communities were the Snider/Rice Fires in Powder and Rosebud counties, Sarpy Fire on the Crow Indian Reservation, Birdseye Fire near Helena, Huff Fire near Jordan (Garfield County), and the Bobcat Fire southeast of Roundup (Musselshell County).

The state is arguably doing more now than it has in the past to assess its wildfire risk and provide foundational WUI and risk assessment tools for communities. However, rapid development and a largely hands-off approach toward land use planning across the state may make curbing WUI growth a challenging process in the future.

Assessing the WUI and Wildfire Risk

The responsibility to identify the WUI and wildfire hazard across the state is given to the Montana Department of Natural Resources and Conservation (DNRC) through legislative requirements. The department manages several online assessment resources, including a wildfire risk portal, a WUI boundary map (showing boundaries primarily at the county level), and a WUI parcel map. These resources are available through the department's online Wildfire Risk Portal (<http://dnrc.mt.gov/flood-and-fire>).

Wildland-Urban Interface

Montana DNRC is required to identify the parcels of property in the state that are considered to be WUI parcels, delineate those parcels on maps, and ensure that the maps and information on the maps are available to the public, local governing bodies, and governmental fire agencies (Montana Code Annotated [MCA] § 76-13-145). The department either identifies a county's WUI parcels based on the WUI designation under an approved county CWPP; or, if the county does not have a CWPP, the department will consult with the county on various measures that the department may take in its identification and designation process. The department is also required to review each county's WUI designation every five years and maintain accurate maps and other identifying information. To meet its legislative requirements, Montana DNRC published a statewide WUI parcel map in 2011, which is currently undergoing an update.

Wildfire Risk

Montana DNRC has recently undertaken the development of the Montana Wildfire Risk Assessment, a comprehensive statewide wildfire risk assessment to assist with planning and prioritizing work around resilient landscapes, fire-adapted communities, and improved response

(an approach that aligns with the three goals of the National Cohesive Wildland Fire Management Strategy). This assessment is a quantitative analysis of the assets and resources across a specific landscape and how they are potentially impacted by wildfire. Assets are human-made features, such as commercial structures, critical facilities, and housing, that have a specific importance or value. Resources are natural features, such as wildlife habitat, vegetation type, or water. The Montana Wildfire Risk Assessment provides foundational information for developing collaborative regional and local hazard mitigation plans, community wildfire protection plans, fire prevention activities, land and resource management plans, and prioritizing cross-boundary work throughout that state. Geospatial data is available through an interactive web map and open data portal.

Communities can develop their own local hazard or risk assessment and WUI definition. For example, the Tri-County FireSafe Working Group, representing Broadwater, Jefferson, and Lewis and Clark Counties, received assistance from the U.S. Forest Service Rocky Mountain Research Station (RMRS) under the Community Planning Assistance for Wildfire (CPAW) program to update its regional hazard assessment as part of its recent CWPP update (2020). The plan also provides a regional WUI map and local WUI definition that factors in structure density, proximity to infrastructure, ingress/egress routes, and emergency response considerations.

Planning in the Montana WUI

From a legislative standpoint, the state has adopted noteworthy legislation to define the WUI and provide local governments with tools to address the WUI. The reality on the ground, however, is that there are limited examples of implementation and a continued reliance on voluntary measures. This may be reflective of a broader resistance toward land use regulations which results in stronger reliance on voluntary measures at multiple levels.

State WUI Planning Policy

In Montana, cities and counties are authorized to adopt a growth policy—a long-range planning document to guide future growth of cities and counties (similar to a comprehensive plan). Growth policies may cover all or part of the jurisdictional area (MCA § 76-1-601). If a jurisdiction chooses to adopt a growth policy, the plan's contents must include an evaluation of the potential for fire and wildland fire in the jurisdictional area, including whether or not there is a need to delineate the WUI and adopt regulations requiring defensible space around structures, adequate ingress and egress to and from structures and developments to facilitate fire suppression activities, and adequate water supply for fire protection (MCA § 76-1-601).

Despite the requirement to address the WUI, the growth policy itself still has limitations. Preparation and adoption of a growth policy is optional for communities in Montana. Further, a growth policy is not a regulatory document and does not confer any authority to regulate that is not specifically authorized by statute or regulations adopted pursuant to the statute. A governing body may not withhold, deny, or impose conditions on any land use approval or other authority to act (e.g., building permit) based solely on compliance with a growth policy (Preite 2009). This provides a very weak foundation for local response that has been in part addressed through some narrow legislative enactments responding to risks in the WUI, as described below. Having a growth policy is an important start for a city or county in Montana, but it does not guarantee that the local jurisdiction's WUI will be more appropriately planned.

State WUI Regulations

Montana state legislation does not require local jurisdictions to regulate the WUI through zoning, subdivision, or other planning instruments. While the state provides some tools to support WUI regulation, should local jurisdictions choose to pursue these activities, there are also limitations. Below are the highlights:

- Montana WUI Guidelines.** In 2009, Montana DNRC adopted *Guidelines for Development within the Wildland-Urban Interface*. These WUI development guidelines respond to a legislative mandate which required the department to adopt administrative rules addressing development within the WUI, including but not limited to best practices for development within the WUI and criteria for providing grant and loan assistance to local government entities to encourage adoption of best practices for development within the WUI (MCA § 76-13-104).

The department's WUI development guidelines provide a list of recommendations that can be incorporated into local subdivision regulations and city or county zoning regulations. Guidelines for subdivision regulations address development of lots in new subdivisions, such as wildland fuel mitigation through the creation of defensible space and a vegetation management plan, site development practices to locate structures away from steep slopes or "fire chimneys", incorporation of fuel breaks into community design, and providing adequate access and water supply. Guidelines for zoning regulations address issues such as maintenance of vegetation management on existing lots, construction of driveways on existing lots, and the development of lots in subdivisions.

- WUI (Building) Code.** The Montana WUI development guidelines do not include recommendations for structural elements, which are regulated by the Montana Department of Labor and Industry. The Department of Labor and Industry developed a model WUI code, which is based on the IWUIC but contains significant amendments to focus only on building envelope requirements. Local jurisdictions can adopt the state's amended version (currently based on the IWUIC 2018 version), but they do not have the legal authority to amend the state code (Administrative Rules of the State of Montana [ARM] § 24.301.181).
- Subdivision Regulations.** Montana's Subdivision and Platting Act requires a governing body to evaluate proposed subdivisions based on established criteria. Subdivision regulations must prohibit subdivisions in areas of natural or human-caused hazards, unless the hazards can be eliminated or overcome by approved construction techniques or other mitigation measures based on written findings (MCA § 76-3-504). In this case, approved construction techniques or other mitigation measures may not include building regulations other than those identified by the Department of Labor and Industry (MCA § 50-60-901). Further, the state explicitly prohibits local governments from denying approval of a proposed subdivision based solely on parcels within the subdivision having been designated as wildland-urban interface parcels under MCA § 76-13-145. *Designation of Wildland-Urban Interface parcels* (MCA § 76-3-608).

Additional State Tools and Resources

Homeowners can access the state's online Wildfire Risk Portal to learn more about their susceptibility and exposure to wildfire risk in Montana. This information also lays out steps they can take to lower wildfire ignition potential for their home. Homeowners can also request a free wildfire preparedness site visit which is a parcel level assessment undertaken by Montana DNR

or qualified partners working in wildfire mitigation (e.g., local fire department personnel). Other resources are available through the Fire Adapted Montana Learning Network website.

Local Application of State Tools

The state has provided a foundation of tools that enable planning and regulation of the WUI by local jurisdictions but with some constraints and limitations, as noted above. In practice, there are only a handful of examples where cities or counties have successfully adopted plans or land use requirements that address WUI development.

One example is Missoula County, which has adopted a Missoula County Growth Policy (2016), Missoula County Area Land Use Element (2019), Missoula County Community Wildfire Protection Plan (2018), and Climate Ready Missoula (2020). These plans contain information about the county’s WUI and provide recommendations for regulatory strategies to mitigate development from wildfire hazard (Figure 4). The county has also adopted WUI requirements in its Subdivision Regulations to mitigate wildfire risk to development.

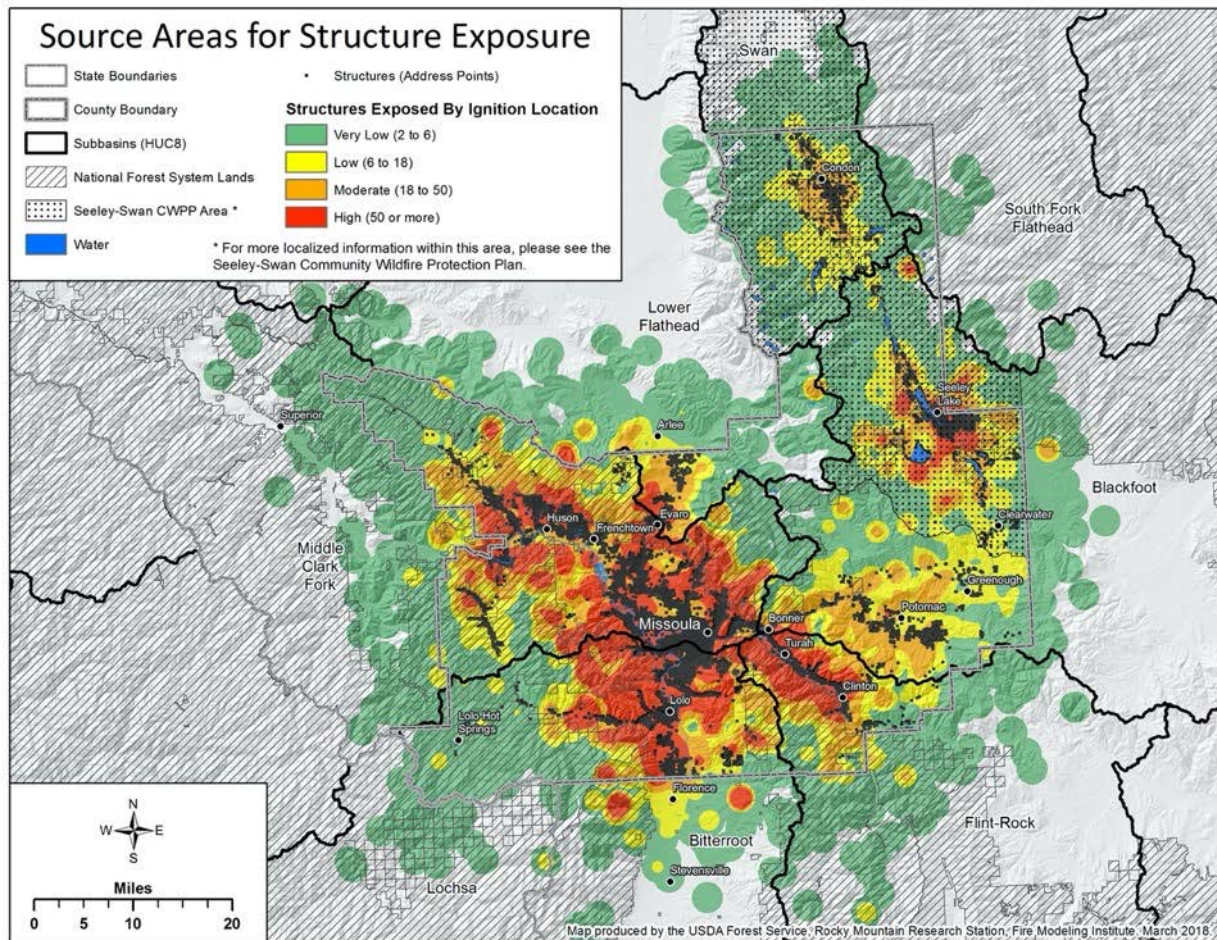


Figure 4. Missoula County received technical assistance from a number of local and national experts to support updates to its WUI planning activities. For example, the U.S. Forest Service RMRS provided extensive assessment maps as part of the County’s CWPP update, including this map that shows the source areas that could expose structures to embers and flames. Planners can use this information to make decisions such as locating development further away from these source areas to reduce future susceptibility of the development (image reproduced from CWPP).

Most recently, Missoula County has been working with multiple consultant teams to assist in updating its zoning code and consider recommendations to improve its overall approach to reducing risk in the WUI. A recent zoning code audit recommended that WUI standards be included as part of the Missoula County Zoning Code update. Based on its engagement in the CPAW program, the county received recommendations to include provisions for the WUI in its future zoning code, adjust subdivision regulations to make all wildfire-related regulatory requirements consistent, and adopt the Montana WUI code to regulate wildfire susceptibility through building construction material and design requirements (Johnston and Mowery 2020). The county is also seeking to expand its voluntary property assessment program to address existing structures and provide an opportunity for ongoing community education and outreach.

Support and engagement from local elected officials have been a key factor in Missoula County's advancement of WUI planning and regulatory implementation. Other factors of success include: an active fire history; engaged staff from the Community and Planning Services department and Office of Emergency Management; being a recipient of grant-funded technical assistance that included support of their CWPP update and WUI regulatory updates; having a local culture that includes the RMRS Missoula Fire Sciences Laboratory, and; a collaborative approach toward fire planning with local fire districts, state and federal, and tribal land management partners, as illustrated through the CWPP update process (Mowery et al. 2019). The Missoula County example also underscores that WUI planning efforts typically span multiple years, require ongoing community conversations, and benefit from dedicated staff and leadership to comprehensively address these challenges.

Opportunities

While Missoula County illustrates a successful path for potential WUI updates, challenges remain for many communities across the state. Land use planning and regulatory tools such as zoning and building codes can be politically difficult to adopt (DeGrandpre and Pohl 2017). Restrictions on the local adoption of subdivision regulations that do not allow decisions to be based on the presence of hazards is a major weakness compared to other states; similarly, the inability to amend the state WUI code has made it difficult for communities to adopt the code. Many tools, such as growth policies, also require staff expertise, capacity, and resources to develop and implement. Finally, existing resources such as the WUI Guidelines are not very well known in the state, even within Montana DNRC.

Opportunities to address these challenges and broadly advance WUI planning in Montana could be pursued at the state and local levels. Although some of these activities would require legislative approval, others could be done as voluntary implementation efforts.

At a state level, the Department of Labor and Industry could refine the state WUI code adoption process to create a legal pathway for local jurisdictions to adopt the state WUI code and allow inclusion of additional sections or amendments to existing ones (e.g., hazard severity assessment, vegetation management plan). This may encourage greater flexibility in communities who are seeking to regulate structures in the WUI but want an approach that phases in requirements or better aligns with local interests. Importantly, it also allows local communities to prioritize wildfire mitigation efforts in the home ignition zone. Note that this approach may still require a set of minimum requirements associated with WUI code adoption and would have to conform with what is acceptable to regulate through the state building code process.

State legislation could also require all counties to adopt a growth policy and require that these policies be countywide and updated within a certain timeframe with a land use map. This would address any current gaps that allow a growth policy to only cover part of a jurisdictional area

(MCA § 76-1-601). Again, this would require resources and guidance to support this effort but would set a foundation for communities to understand and plan for growth in wildfire-prone areas. In addition, removing legislative prohibitions on the use of WUI maps and data in the subdivision review and approval process would empower local officials to make responsible development decisions.

Further, increased integration of land use and wildfire mitigation expertise across state agencies could improve wildfire risk reduction planning objectives. For example, Montana DNRC has subject matter experts in terms of wildfire mitigation, the Department of Commerce (Community Technical Assistance Program) provides technical planning assistance to communities, and the Department of Labor and Industry maintains building codes. While Montana DNRC's guidance on land use and development regulations in the WUI is limited due to a lack of internal technical expertise in land use planning, development regulations, and building codes, the Community Technical Assistance Program and Department of Labor and Industry may not have the best understanding of wildfire mitigation. These challenges are not unique to Montana, but in a state that relies more heavily on outreach, education, and voluntary approaches to address the WUI, it is important to cross-pollinate knowledge and responsibilities to maximize the effectiveness of regulatory guidance and assistance activities.

At a local level, direct outreach and support to planners by Montana DNRC could also help planners better understand how to integrate wildfire risk information into their local planning process. The Montana Wildfire Risk Portal is an important step for providing tools for planning, prioritizing and implementing cross-boundary work throughout Montana and within forestry division programs. However, these tools and resulting information that feed into CWPPs are typically not coordinated with other local plans, including growth policies, nor do they readily translate into an appropriate scale for adoption of land use regulations. Finally, local communities could explore how to integrate the state's voluntary home assessment program into other land use planning processes, similar to examples from Colorado. Recognizing that voluntary efforts will continue to play a significant role in risk reduction, it will be essential to coordinate these activities with regulatory approaches.



WASHINGTON

WASHINGTON: BUILDING MOMENTUM FOR WUI PLANNING

Introduction

Similar to other western states, Washington has experienced dramatic increases in wildfire activity in recent years, both in size and impacts. In 2020, the number of acres burned across the state exceeded 800,000—an area more than two-thirds the size of what burned during the record-breaking season of 2015 (Seattle Times 2020). One of the largest blazes, the Cold Springs Fire, south of Omak, killed an infant and severely injured his parents while the family tried to flee. The fire burned approximately 190,000 acres, 78 primary residences, and 60 secondary buildings, including an old lumber mill that closed in 2016 (NIFC 2020).

As with many fires, however, the size of a blaze does not always equate to the extent of its damage. The Babb-Malden Fire, for instance, burned just over 15,000 acres but destroyed 80% of the Town of Malden during a fast moving incident over Labor Day (Burnside and Silverman 2020). The fire burned 121 homes and 94 other structures, including the town's City Hall, local fire station, and post office (Seattle Times 2020).

To counter these alarming wildfire trends, the state has taken a proactive approach in recent years by passing legislation, adopting a 10-Year Wildland Fire Protection Strategic Plan, and expanding resources to support communities. In addition to state and federal agencies, groups such as the Washington State Fire Adapted Communities Learning Network also collaborate with state and local communities to implement wildfire risk reduction strategies. However, implementation of land use planning activities that incorporate wildfire has been largely spearheaded by a patchwork of local jurisdictions. A recently-enacted state WUI mapping effort should help pave the way for more widespread adoption of land use measures in the future.

Assessing the WUI and Wildfire Risk

The Washington Department of Natural Resources (Washington DNR) was created in 1957 by the state legislature. The department now manages 5.6 million acres of forest, range, agricultural, aquatic and commercial lands. The department includes a Wildfire division—responsible for operating the state's largest on-call fire department and assisting communities with preparedness and prevention activities. In 2019, the department also created a Forest Health and Resiliency Division, which provides information, assessment, analyses, and resources on forest health and climate change issues.

Wildland-Urban Interface

In 2020, Washington DNR Wildfire and Forest Health and Resiliency Divisions—with consultation from the U.S. Forest Service Rocky Mountain Research Station—produced a statewide map that identifies WUI areas. The development of a statewide WUI map was a result of legislation adopted in 2018 (SB 6109). The WUI map depicts areas where structures and wildland overlap with specific structure densities. This new map provides a tool for jurisdictions to define their local WUI area, as per the requirements of the IWUIC, to enable a streamlined process for future building code adoptions. Additional anticipated outcomes of the WUI map include increased dialogue among local stakeholders and assistance with informing forest health plans and treatments near communities.

Wildfire Risk

Wildfire risk in Washington (and Oregon) has been assessed through the U.S. Forest Service Pacific Northwest Region Quantitative Wildfire Risk Assessment. Similar to Montana's statewide assessment, this assessment provides foundational information about wildfire hazard and risk across a specific landscape to show how resources and assets could be potentially impacted by wildfire. This assessment was also used to help inform recommendations in the state's 10-Year Wildland Fire Protection Strategic Plan (see sidebar).

Washington DNR also recently hired a fire scientist to take a deeper look at fire risk analysis across the state. This position serves as the agency's fire science lead responsible for conducting scientific analyses and research in support of the state's 20-Year Forest Health Strategic Plan, 10-Year Wildland Fire Protection Strategic Plan, Forest Action Plan, and other related plans and initiatives. This position also leads and integrates fire risk analysis and community wildfire risk reduction with landscape restoration planning and will serve as the agency expert in fire science independently performing original scientific research and analysis with publication of research findings.

Planning Solutions

Washington's state legislative requirements generally allow local communities to choose how they address wildfire hazard through local policy and ordinances. As a result, there is variation in how jurisdictions have addressed wildfire through land use planning mechanisms.

State WUI Planning Policy

The Washington State Growth Management Act is a series of state statutes, first adopted in 1990, which requires many cities and counties in Washington to adopt comprehensive plans to manage their population growth (MRSC). Mandatory elements include land use, housing, capital facilities, utilities, rural development (counties only), transportation, economic development, parks and recreation, and ports (for cities with annual maritime port revenues exceeding \$60 million) (Revised Code of Washington [RCW] § 36.70A.070). Notably, 'natural hazards' is not a required element, nor is this topic called out as an optional element (RCW § 36.70A.080). This does not preclude a community from addressing natural hazards in its comprehensive plan but may result in gaps across the state and an underutilization of science-based decision making tools to inform development and associated risk.

State Wildland-Urban Interface Code Adoption

In 2018, Washington adopted portions of the IWUIC (2018 version) to become part of the state building code and take effect on February 1, 2021. Implementation of this code is intended to occur now that mapping of statewide WUI areas by Washington DNR is complete (RCW § 19.27.560). The new statewide code includes requirements for ignition-resistant construction for roof coverings, exterior walls and siding, and accessory structures such as decks, and minimum

Washington State Wildland Fire Protection 10-Year Strategic Plan

In August 2019, Washington State Department of Natural Resources released its 10-year strategic plan to comprehensively look at wildland fire issues across the state. The plan analyzes how fire can best be safely managed to both reduce losses and costs and achieve resilient and healthy ecosystems and communities. The plan contains four goals, including **Goal 3. Communities are prepared and adapted for current and future wildland fire regimes.**

To help establish and sustain fire-adapted communities, the strategic plan includes recommendations that advance the role of land use planning through the adoption of land use plans, regulations, and codes that reduce wildland fire risk in the WUI.

Key implementation actions for land use planning include:

- Encourage implementation of WUI building standards in at-risk communities.
- Provide training and incentives for land-use planning that address the WUI.

The full report is available at:
www.dnr.wa.gov/StrategicFireProtection

standards for driveways. Counties, cities, and towns are legally required to comply with those portions of the 2018 IWUIC that have been adopted as part of the state’s building code. Communities may also adopt other portions of IWUIC or make amendments as long as those amendments exceed the minimum performance standards and requirements in the model code.

Under the authority of chapter 19.27 RCW, the state has also adopted the International Fire Code (Washington Administrative Code [WAC] § 51-54A), which was last updated on July 1, 2020 and is effective in all counties and cities in the state. The fire code contains a chapter on the IWUIC (WAC § 51-54A-8200), which supplements provisions in the state’s building code. The WUI chapter allows a local code official to require site plans, vegetation management plans, and vicinity plans to assess conditions such as topography, width and percent of grade of access roads, landscape and vegetation details, locations of structures or building envelopes, existing or proposed overhead utilities, occupancy classification of buildings, types of ignition resistant construction of buildings, structures and their appendages, roof classification of buildings, and water supply. The code official is also authorized to waive or modify requirements for a site plan.

Additional State Tools and Resources

As part of SB 6109 (2018), Washington DNR was directed to establish a program of technical assistance to counties, cities, and towns for the development of findings of fact and maps establishing WUI areas of jurisdictions in accordance with the requirements of the IWUIC. The department was also tasked with developing and administering a grant program to provide direct financial assistance to counties, cities, and towns for the development of findings of fact and maps establishing WUI areas. Appropriations are authorized by the legislature, but a dedicated fund has not yet been created. A budget request to implement technical assistance is included in the 2021-23 fiscal year budget.

Local Implementation

Although the state has not required local governments to address wildfire in comprehensive plans or local regulations, many jurisdictions have taken steps to move land use related measures forward:

- **Yakima County’s International Wildland-Urban Interface Code** implements the 2015 IWUIC, with amendments (Yakima County Code § 13.12). The 2017 Yakima County Comprehensive Plan (Horizon 2040) contains a Natural Hazards Element that aligns closely with the county’s Multi-Jurisdictional Hazard Mitigation Plan and supports a wide range of wildfire risk reduction policies and activities, such as the Yakima Valley Fire Adapted Communities Coalition, Firewise USA program, and ongoing support for its WUI Code.
- **Clark County’s Wildland Urban Interface/Intermix Ordinance** requires that new structures in WUI areas, as defined by a local map, be designed in accordance with NFPA 1144, and private driveways meet minimum width, surface, and clearance standards (Clark County Code § 15.13).
- **City of Richland’s Building Code** prohibits cedar shakes and shingles, or other roofing material with similar flame spread characteristics, on all new construction (Richland Municipal Code § 21.01.040).
- **City of Chelan’s International Wildland-Urban Interface Code** implements the 2015 IWUIC as per state and local amendments. Code requirements address access, water supply, individual structures, and vegetation (Chelan Municipal Code § 15.06).

- **City of Wenatchee’s Wildland-Urban Interface Standards** regulate construction of all new structures and additions within the designated WUI zone and includes requirements for 30-feet of defensible space (Wenatchee City Code § 3.36). The city also has included goals and policies in its Wenatchee Urban Area Comprehensive Plan to support the city in becoming a fire adapted community.

These activities are complemented by a host of other efforts that support community fire adaptation. For example, the Washington Fire Adapted Communities Learning Network, which focuses on learning and sharing resources and making connections among communities across the state, has been engaged in topics related to smoke, health, evacuation, agriculture, and transient populations in an effort to advance topics related to people living in the WUI. Chelan County Fire District #1 also recently received federal grant assistance to enhance the implementation a property assessment program through a mobile application (similar to REALFire® and Wildfire Partners in Colorado). This program will be undertaken in coordination with other local fire districts to provide a consistent platform for home ignition zone assessments and mitigation. Similar to other states, several communities have also successfully applied for and used funding from Federal Emergency Management Agency (FEMA) to implement defensible space projects. Although not focused directly on land use planning, these types of voluntary activities showcase creative solutions needed to address the complexities of the WUI.

Opportunities

One of the clearest opportunities to advance thoughtful WUI decision-making at the local level is for the state to mandate the inclusion of natural hazards as an element in comprehensive plans. As part of these requirements, communities could be directed to review state and local WUI and wildfire hazard data, such as that which is now available from Washington DNR and locally-adopted hazard mitigation plans. At a minimum, robust policy guidance from the state, such as how to integrate new wildfire tools into the comprehensive plan, could support more widespread adoption of wildfire policies.

It should be noted, however, that this approach still only targets those communities that are required to or voluntarily opt-in to develop and maintain a comprehensive plan under the Growth Management Act. Support for smaller, rural counties that may have a significant percentage of its population in the WUI may need to consider alternatives, such as a developing a natural hazard mitigation plan and/or CWPP based on Washington DNR’s WUI mapping effort.

To some extent, the process of integrating hazard planning into comprehensive plans has already been initiated and is underway. Several years ago, the Washington State Legislature tasked the Ruckelshaus Center, a joint effort of Washington State University and the University of Washington, to assess Washington State’s planning framework to identify opportunities to improve and adjust state planning requirements (WA EMD 2018). As part of this process, state and federal partners worked to develop an improved strategy to integrate hazards into statewide planning, thereby improving its effectiveness as a regulatory mitigation mechanism. The results from this process were released in 2019 and include recommended actions to develop comprehensive and integrated strategies, policies, implementation plans, and funding for climate adaptation and hazard mitigation on the local, regional, and state level and integrate disaster preparedness, and emergency and recovery planning, with growth management planning and policies (Murphy et al. 2019).

In addition, the Washington State Enhanced Hazard Mitigation Plan includes a mitigation strategy to “Incorporate Hazard Mitigation and Disaster Recovery into Comprehensive Plans”. To advance this strategy, the Washington Department of Commerce has begun working with FEMA Region 10 staff to create a collaborative advisory committee and develop a customized

set of hazard planning resources for communities in Washington. This project will be patterned after Colorado's *Planning for Hazards: Land Use Solutions* guide to provide sample regulatory and policy language, best practices, and other implementation tips.

If the state approves Washington DNR's budget request to fund technical assistance and grants, this will set up a dedicated funding source for communities to implement WUI land use tools that have long-term horizons. To maximize the technical assistance, careful consideration should be given by department staff to include experts in WUI building and land use planning to help local governments navigate potential challenges and nuances. For example, communities may require additional assistance with transitioning their current codes to the state code, such as those with outdated references to NFPA standards or previous state WUI maps.

Finally, future areas of exploration could include expanding the Critical Areas Ordinance to include wildfire. The Growth Management Act requires all cities, towns and counties in the state to identify and protect the functions and values of critical areas. Critical areas are defined as: wetlands; areas with a critical recharging effect on aquifers used for potable water; fish and wildlife habitat conservation areas; frequently flooded areas; and geologically hazardous areas (RCW § 36.70A.030). When applied as intended, the Critical Areas Ordinance requires local jurisdictions to either prohibit development in geologically hazardous (landslides, erosion, earthquake, liquefaction) and frequently flooded areas, or include required mitigation measures in local building codes or through the state's environmental regulations known as the State Environmental Policy Act (SEPA). Under SEPA, jurisdictions must weigh the impacts of development. SEPA also provides governments 'substantive authority' to mitigate impacts that are not explicitly addressed under existing laws, codes, or ordinances.

According to the Washington State Enhanced Hazard Mitigation Plan, most jurisdictions have prepared critical area regulations that meet minimum state standards. Although effectiveness varies depending upon local resources and local political considerations, the Critical Areas Ordinance is one of the best tools a community has to change the vulnerability trajectory by reducing future vulnerability through protection of sensitive areas (WA EMD 2018). The effectiveness of this has been demonstrated in the reduction of current and future flood hazard risk in King, Pierce, and Thurston Counties. At a minimum, transferring lessons learned from the success of this statewide requirement toward the adoption and enforcement of WUI requirements could further support WUI risk reduction.



TRENDS AND UNKNOWNNS

TRENDS AND UNKNOWNNS

The year 2020 brought many unprecedented events in recent human history, most notably the widespread impacts from the novel coronavirus (COVID-19). It was also a year of devastating wildfire activity, which led to renewed urgency to addressing the anticipated effects of climate change. Together, the pandemic and wildfires have given rise to a complicated set of questions, such as:

- To what extent will the pandemic shift commuter patterns that result in an increase in remote work and an expansion of the WUI?
- Will extreme fire behavior and other climate change impacts prompt a migration away from areas with high wildfire hazard?
- How could potential shortfalls in local, state, and federal budgets reduce investments in mitigation and prevention activities?

While answers to these and other questions may require long-term analysis, this section seeks to acknowledge several of the main drivers that are likely to shape the WUI and land use decisions in the future. It's also worth noting that several factors not addressed in this report, such as forest management and fire suppression policies, will continue to influence future wildfire risk and should be considered as part of the larger discussion.

Climate Change

Today's best available climate data and science indicate there is a strong connection between climate change and wildfires. Weather and climatic conditions such as temperature, wind, humidity, precipitation, and drought are major determinants of fire likelihood and fire intensity. Climate is also generally considered to be a major driver of the total area burned by wildfire events (USGCRP 2018).

Wildfire activity in the U.S. is already changing rapidly, particularly in the West, as conditions become hotter and drier due to climate change. Earlier snowmelt and higher temperatures—and resulting drier soils from increased evaporation—in addition to greater water loss from vegetation have all contributed to lengthened fire seasons. Increased tree mortality due to bark beetle infestation, which has underlying climate drivers, has also modified landscapes in ways that make them more likely to burn (Union of Concerned Scientists 2020).

In future decades, climate change is expected to continue bringing hotter temperatures and more frequent drought conditions to most areas of the country. Substantial reductions in winter and spring snowpack are projected for western states. Changes in climate that create warmer, drier conditions and a longer fire season will increase wildfire risk in terms of probability, frequency, and intensity (USGCRP 2017). Increased temperatures and drought severity will also lead to more areas burned as the incidence of large fires in the West is projected to further increase (USGCRP 2017; Barbero et al 2015).

Details on climate-driven increases to wildfire risks are addressed in state hazard mitigation plans as currently adopted by the four states covered in this report. California has also undertaken four comprehensive climate change assessments, which are designed to assess the impacts and risks from climate change and identify potential solutions to inform policy actions. For instance, the most recent assessment found that that by 2100, if greenhouse gases

continue to rise, the frequency of extreme wildfires would increase, and the average area burned statewide would increase by 77 percent.

While the science has become clearer in recent years on modeling climactic changes, what's less understood is how communities affected by extreme heat, compromised air quality from wildfire smoke, public safety power shutoffs, and long-term droughts will adapt and cope with these impacts on daily life. Whether climate change is considered in isolation or in combination with other drivers below, much of the western U.S. could face even greater wildfire risk in the foreseeable future and adaptation strategies are imperative.

Population Growth

As summarized in this report's Overview, the four western states covered in this report are projected to see significant increases in total population by 2050, and particularly in Colorado which has forecast a nearly 40% growth in residents. While it is difficult to predict exactly where people and new housing will be located in the coming decades, recent studies have drawn direct correlations between population and housing growth in the West with increasing wildfire risks. For example, research has shown that the escalation in the number of homes and increased developed land area are the primary driver for increasing wildfire exposure (Strader 2018). Research has also clearly identified new housing growth as the dominant cause of WUI growth (as opposed to an increase in wildland vegetation), as well as a major factor contributing to wildfire occurrence and cost (Radeloff et al. 2018). Based on previous development patterns, the implications of high population growth in western states likely means that more people and homes will be located in wildfire hazard areas—and that the WUI will continue to expand.

Land Use Changes

While past forest and fire management practices can greatly influence wildfire risk, land use changes and development patterns can also increase people and property exposed to wildfires and increase ignition sources that spark fires (Union of Concerned Scientists 2020). Historic and ongoing development patterns with little regard for wildfire risk have in fact greatly increased the number of homes located in fire prone areas. This has been a continuous national trend over the last several decades as the geographic footprint of the WUI has expanded significantly. Between 1990 and 2010, the total land area of the WUI increased from 581,000 to 770,000 square kilometers (3 percent growth), making it the fastest-growing land use type in the conterminous U.S. (Radeloff et al. 2018). As noted above, this trend of WUI expansion is expected to continue based primarily on new housing growth. However, there are other changing or emerging land use patterns to consider when thinking about future wildfire risk.

Community development and land use patterns are typically guided and shaped by local planning, zoning, and development regulations in combination with responses to much broader influences. Such influences may be societal, economic, environmental, political, or technological and may occur at regional, national, or even global levels. These broader influences can include long-term or permanent shifts such as population growth, the cost of housing, access to public transit, or major changes to a community's primary economic base. They may also include short-term or temporary disruptors such as a financial recession, changes to state or federal regulations, or the impact of natural disasters and global pandemics.

Although future influences on land use changes are far from certain, below are current or anticipated trends that should be considered along with their potential implications for future wildfire risk. Implications of these influences suggest continued growth and development in the WUI at likely higher growth rates than previous decades.

- **Digitalization of work and commerce** allowing more people to work and shop from home or other remote locations. The COVID-19 pandemic has accelerated this ongoing trend and is rapidly shifting organization policies and employee preferences around digital connectivity and telecommuting, with research indicating there could be a significant upswing in the number of people still working from home following the pandemic (Global Workplace Analytics 2020; Bartik et al 2020).
- **Increasing housing costs for urban and metropolitan areas** nationwide, driving more people to consider moving to exurban communities, smaller towns, and rural areas that are more affordable. This trend is particularly acute in California, as low-income residents flee expensive coastal cities and settle in less expensive towns near the mountains (Simon 2020).
- **Growing interest and preference for people to live closer to nature** with greater access to parks, open space, and recreational opportunities, including options that range from suburban subdivisions to more rural communities far from dense city living.
- **More people buying and investing in secondary homes** to be used as seasonal vacation homes and/or income-generating rental properties (Airbnb, VRBO, etc.), with many of these homes located in mountain retreats and other remote “getaway” destinations. COVID-19 has triggered even more second-home buying with some mountain resort towns also seeing a surge of people buying properties not just for a vacation home but one which they plan to move into permanently (Blevins 2020).
- **Increased numbers of households being displaced or opting to relocate** to higher ground from areas projected to experience more frequent and recurrent flooding, such as mountain valleys and coastal areas subject to future sea level rise and tidal inundation.

Migratory Shifts

Geographic patterns of population growth and decline may also have an effect on the WUI. Most recently, migratory shifts have included rapid growth in areas with attractive scenery and retirement destinations, such as throughout the Southwest and Intermountain West (USDA Economic Research Service 2019). This trend is generally expected to continue based on population projections for western states, in addition to several trends and uncertainties.

For example, how climate change will influence domestic migration and population distribution remains unknown. Early research suggests that shifting climate patterns could transform the country in terms of the most habitable places moving northward and to the west. This includes an evolution of work first published by the National Academy of Sciences (Chi Xu et al. 2020) that projects rapid, unprecedented changes to the human climate niche (i.e., regions most suitable for humans to live) over the next 50 years. Another influential study, published in the Journal of the Association of Environmental and Resource Economists, estimates that one in 12 Americans in the southern half of the country will move toward California, the Mountain West, or the Northwest over the same general time period because of climate influences alone (Fan et al 2018).

The potential out-migration from large cities and metropolitan areas to suburban, exurban, and rural communities also remains unclear and highly variable across different states depending on factors such as housing affordability and job markets. As telecommuting becomes more prevalent, however, a potential long-term shift in regional balance toward these areas could result in an expansion of the WUI. Other drivers for telecommuting may include more recent shifts resulting from the pandemic.

Although perceptions that the COVID-19 pandemic may be ushering in a mass migration from high-density downtown areas, this shift is not yet supported by the data. Rather, current statistics show that Americans moved less in 2020—and those who are moving did not “flee” the city for pandemic-related reasons (Patino 2020). In addition, data on apartment search activity revealed that interest in city living actually increased in the second quarter of 2020 when the pandemic first struck with full force (Cortright 2020). Some researchers have suggested that not only is the pandemic unlikely to reverse urbanization trends, but that big cities may emerge more livable, affordable, and economically viable than they were before (Pearlstein 2020).

Real Estate and Property Insurance

Other potential uncertainties for future WUI growth are the nation’s real estate market and property insurance systems. Along with government policies or programs that can subsidize growth, development, or redevelopment in hazardous areas, readily available and affordable insurance policies have long encouraged people to buy or replace homes in disaster-prone areas. This system created a widespread moral hazard, with people feeling financially protected from the consequences of risks they would otherwise not be comfortable assuming.

More recently, however, many residents across the West have seen their insurance providers refuse to renew their policies or are finding coverage harder to find due to wildfire (Quinton 2019). For example, after multiple years of losses from wildfires in California, insurers cancelled policies or raised premium rates to reduce their hazard-related liabilities (Kasler 2021). State regulators tried to blunt the impact by placing a temporary moratorium on insurance policy cancellations for those areas of the state impacted by wildfires (Flavelle 2019). However, residents who lost access to private insurance were forced to buy coverage from the state’s Fair Access to Insurance Requirements (FAIR) plan, usually at two or three times the cost (Kasler 2021). Insurers who do continue to provide coverage may make coverage conditional on homeowners mitigating their risk by managing vegetation and taking other measures to keep their properties as safe as possible.

There are related uncertainties on how insurability and real or perceived wildfire risk concerns will affect the real estate market. Research has shown conflicting effects of wildfires on housing prices. A 2010 study of 18,785 housing sales in northwest Montana found that between 1996-2007 home prices in areas in closer proximity to wildfires (including views of wildfire burned areas) were lower than equivalent homes further away from a fire (Stetler et al. 2010). Similarly, Realtor.com analyzed housing price data between 2014-2019 for homes in California to measure any potential effect of wildfires on price trends. They found that homes within a one-mile radius of a historical fire increased in price by 32% over that time, compared with 35% price growth for other homes in those same counties (Passy 2020). However, researchers at the University of Nevada, Las Vegas found that wildfires drive down real estate prices only in the immediate aftermath of a disaster and home prices in burned areas typically rebound to pre-fire levels within one to two years (Blankenbuehler 2018).

As a result, there is not enough conclusive data to determine whether increased insurance premiums, lack of coverage, perceptions of risk, or climate change influences have yet hindered the real estate market in wildfire prone areas in the long-term. Other competing drivers, such as the need for housing in areas with growing populations or the desire for environmental amenities, may still offset these influences.

Summary

Despite uncertainties in terms of migration patterns and other land use changes, a number of influences point to increasing wildfire risk from climate-driven changes and the continued expansion of the WUI from population growth. As the long-term effects of climate change and increasing threat of catastrophic wildfires become better understood, hazard insurance is anticipated to become more expensive and less available for properties deemed high risk. Questions remain on how government regulators will respond to protecting consumers and the housing market for affordable insurance and whether real estate will be affected by wildfire disasters. Whether considered in isolation or in combination, these drivers indicate that wildfire-prone regions will likely face more social, economic, and environmental challenges in the future.



FUTURE DIRECTIONS

FUTURE DIRECTIONS

Land use planning strategies and tools have long been recognized as among the most rational and cost-effective solutions to reducing community risks to natural hazards (Godschalk et al. 1999). Along with building codes, which specify exactly how we build, the question of what and where we build is most often addressed through local planning, zoning, and other development regulations. Per the American Planning Association (APA), building codes and land use planning solutions are considered equally important and must complement each other to be maximally effective in reducing the threat posed to communities by natural hazards (APA 2019). This section highlights common barriers that prevent implementation of land use tools and recommends five WUI policy solutions based on a synthesis of each state analysis.

Confronting Barriers

With all that is known about land use planning as an effective tool for disaster risk reduction, why isn't more being done across western states that face wildfire challenges? With the exception of California, efforts in Montana, Colorado, and Washington to comprehensively address wildfire through land use approaches are still nascent in their development and lack dedicated resources for long-term implementation.

Previous research into barriers and obstacles to planning for natural hazards provides some answers. To better understand the factors that contribute to specific risk and resilience-related behaviors among land use planners, the National Oceanic and Atmospheric Administration (NOAA) directed a thorough research study in 2010. Results indicated that there is a lengthy list of barriers to implementing land use solutions for hazard and resiliency planning, most of which tend to be external to individual planners. These included such barriers as a lack of public support or political will, limited budgets, competing priorities, limited access to actionable data, a disconnect between land use planners and emergency managers, the competing interests of existing development, property rights, and a bias in favor of growth (NOAA 2010).

A similar research project on the integration of hazard mitigation into land use planning was conducted by FEMA in 2013, resulting in findings that were consistent with the NOAA study. Common barriers and obstacles identified by FEMA included a lack of awareness of hazard risk and mitigation solutions—combined with a lack of political will to implement mitigation solutions, limited capacity or resources at the local level, and insufficient frameworks for intergovernmental coordination. The FEMA study also found that the mitigation of natural hazards was not identified as a priority for many communities in their routine planning and development decisions (FEMA 2013).

Other challenges more specific to wildfire shared during interviews and research for this report included:

- **Defining the WUI at the local level for land use planning takes additional analysis.** There are ongoing questions about fundamental aspects of identifying and defining the WUI for application to land use decisions. States that have developed statewide WUI maps or wildfire hazard/risk assessments provide a critical piece from which local planning decisions can build on. Yet many land use planning decisions require information that integrates wildfire hazard or risk at a parcel-level scale. Translating state-level hazard and WUI information down to this scale can be difficult but necessary to ensure that application of policies and regulations are fair and consistent. In addition,

the WUI is a dynamic concept. As development occurs on a regular basis, capturing the current built environment does not always reflect future conditions.

- **Values and land use decisions in the WUI can be difficult to quantify.** Wildfire risk is not uniformly spread across geographic areas within a state. As a result, there are other economic drivers, such as pressure and support for residential and commercial development, that compete against land use planning priorities to minimize development in the WUI. Further, it can be challenging for local communities to quantify and compare the costs of building infrastructure and homes in a fire-resistant manner (or avoid development altogether) with allowing development to occur without restrictions and benefit from tax revenue increases. Similarly, measuring other values at risk in the WUI (e.g., watersheds, habitats) can be even more difficult to quantify than housing unit costs.
- **Local officials may believe that land use planning and regulations are unnecessary or ineffective.** Other research has revealed that local government staff, particularly those in less urbanized locations where there has been low or moderate past investment in wildfire-related land use regulations, can have reservations about whether planning regulations are effective in reducing wildfire risk (Mockrin et al. 2020). Reasons behind this varied, including maintaining beliefs that residents will take local action independently or perceptions that the threat of wildfire did not require a regulatory approach.

Advancing WUI Solutions

Each state analysis within this report identifies several opportunities at the state and local levels that are unique to that state and warrant further exploration. In synthesizing all four states, broader solutions also emerged that can advance the larger set of land use planning solutions for wildfire risk reduction in the WUI. These solutions are focused on holistic, policy-oriented approaches, mainly at the state level. This is primarily because other guides already exist which focus on technical solutions at the local level (e.g., model code language, examples of case studies and best practices)—see the shortlist of resources in sidebar.

1. *Adopt State Legislation for Minimum Wildfire Hazard Planning Requirements*

The existence of state-level policies or laws that require or encourage local land use planning strongly influences the degree to which local communities will do so and will include planning for natural hazard mitigation. Although the implementation of land use planning is left primarily to local and regional jurisdictions, the American Planning Association has repeatedly stressed the importance of raising the priority level for hazard mitigation in state planning legislation. In publishing its most recent survey of state land use and natural hazard laws (2019), the American Planning Association explained that where state governments require local land use planning and

WUI Technical Planning Resources

Planning the Wildland-Urban Interface, published by the American Planning Association (2019). Available at www.planning.org/publications/report/9174069/

Fire Hazard Planning Technical Advisory, published by the California Governor's Office Planning and Research (update forthcoming in 2021). Available at www.opr.ca.gov

Planning for Hazards: Land Use Solutions for Colorado, developed by the Colorado Department of Local Affairs (2016). Available at www.planningforhazards.com

Building to Coexist with Fire: Community Risk Reduction Measures for New Development in California, published by the University of California Agriculture and Natural Resources (2020). Available at: <https://anrcatalog.ucanr.edu/Details.aspx?itemNo=8680>

Community Wildfire Safety Through Regulation – A Best Practices Guide for Planners and Regulators, published by the National Fire Protection Association (2013). Available at www.nfpa.org/-/media/Files/Public-Education/By-topic/Wildland/WildfireBestPracticesGuide.ashx

specify the elements that it must contain, localities do a much more thorough job; conversely, where state governments do not require or encourage it, localities usually do not make it a priority. The American Planning Association also found that many states do not require or even suggest to localities that natural hazards be considered in land use and development decisions, conveying how unfortunate this finding is “because land use planning can have a major impact in reducing disaster losses from hurricanes, earthquakes, wildfires, and floods” (APA 2019).

Many of the states analyzed in this report would benefit from an increased statewide influence on WUI planning, as noted in each section. For example, Montana could expand current requirements so that all counties *must* adopt a growth policy for the entire jurisdictional area. At a minimum, the state could remove the current legislative prohibitions against using state WUI maps and data as support for conditioning or denying zoning and subdivision applications. Similarly, Colorado could expand the requirement so that all counties (not just municipalities) address hazards in their master plan. Finally, Washington could include natural hazards as a mandatory element in comprehensive plans adopted by local jurisdictions. Other states outside the scope of this analysis could also look to these suggestions when creating future legislation that builds a comprehensive framework for land use planning in the WUI.

2. Integrate the Role of Land Use Planning Expertise in WUI Initiatives

One of the major observations in conducting research for this report is that state governments delegate state WUI planning responsibilities to a department specialized in managing natural resources and wildfire response. These departments are outstanding in their ability to undertake wildfire hazard or risk assessments, resident outreach and education on wildfire risk, and related services. However, with the exception of California, all other states’ natural resource departments (Montana, Washington, Colorado) do not include trained land use planners. This creates a technical gap when tasked with developing, disseminating, or advocating for land use regulations, policy requirements, guidance, and other materials that target the WUI.

Some states have addressed this in different ways. Washington’s Department of Commerce is working with regional FEMA hazard mitigation planning staff to initiate an effort similar to Colorado’s Department of Local Affairs, which spearheaded the development of customized state guidance on integrating hazards into land use planning (in partnership with local university and a technical advisory committee). California state legislation created a Land Use Planning Program (SB 1241; GC § 65302) and also directs the Governor’s Office of Planning and Research to create technical guidance on fire hazard planning (SB 901 and AB 2911; GC § 65040.21). This approach ensures that staff engaged in WUI planning efforts have direct experience and training in land use planning.

Future efforts by state legislatures that direct the development of WUI requirements or guidance should include language specifying the role of land use planning expertise (such as engagement with specific state agencies or other organizations). This ensures these skill sets are well-integrated into WUI planning solutions.

3. Promote Learning Opportunities to Engage Planners on WUI Topics

Expanding opportunities to educate land use planners on their role in the WUI through hands-on trainings and other activities would also help advance collaborative solutions to wildfire risk reduction. Each of the four states analyzed in this report have established learning networks to enable a range of practitioners to exchange ideas, share best practices, and connect on resources related to community fire adaptation. Adding more state and local land use planners to each network could increase knowledge and encourage partnerships that advance wildfire risk reduction through land use planning tools.

Another mechanism to facilitate learning would be the development of targeted trainings on the WUI. The development of land use planner trainings for wildfire is underway in California and is an anticipated outcome of Washington's planned activities to promote land use planning for hazards across the state.

Wildfire hazard trainings could also replicate other proven hazard planning or city design models. For example, Rhode Island approved legislation that requires all members of local planning boards and commissions to participate in a training program on the impacts of flooding and sea level rise to the state (Adaptation Clearinghouse 2021). Another example is the Mayors' Institute on City Design, which is a leadership initiative of the National Endowment for the Arts in partnership with the United States Conference on Mayors. The Institute brings together mayors, design professionals, and development experts for multi-day workshops to tackle complex planning and design challenges, focused around case study projects. Key considerations to trainings and learning-oriented approaches are dedicated funding and trusted organizations with experience in network development and outreach.

4. Dedicate Resources and Funding for the Existing WUI

Many local communities have large swaths of existing development in wildfire-prone areas. Once an area is designated as the WUI, it is unlikely to reverse course in the future (in other words, it is unlikely that it will no longer be classified as a WUI). A national analysis of WUI areas based on housing and vegetation showed that among areas that were considered in the WUI in 1990, the vast majority were still WUI in 2010, and both homes and population increased in those areas over that time (Radeloff et al. 2018).

WUI planning decisions also need to consider areas that have already been affected by fires. In 1990, there were 177,000 houses within the perimeters of the fires that occurred in the subsequent 25 years. By 2010, there were 286,000 housing units in the same fire perimeters, (i.e., 109,000 more), which corresponds to 62% growth—far outpacing the average US housing growth rate of 29% (Radeloff et al. 2018). As more homes are being added within the perimeters of fires, this complicates firefighting response and evacuation efforts. Further, most property owners in western states—including Colorado and Montana—are still not required to use materials like fire-resistant roofing or siding when they rebuild after a fire (Sommer 2020). This suggests that rather than addressing the challenges created by previous development, land use decisions continue to perpetuate or exacerbate problems in the WUI.

As a result, it's equally important to find solutions for developed WUI areas. Several states are pursuing local or state-level implementation of property assessment and home hardening programs. Colorado has several county-level examples of property assessment programs that are integrated into or complementary to land use regulations. California also passed recent legislation (AB 38) to develop a statewide home hardening retrofit program.

These and similar approaches require dedicated sources of funding—which to date have largely been lacking. The California League of Cities reported in May 2020 that Governor Newsom eliminated funding to implement the home hardening pilot program, primarily as a result of revisions to the state's budget to counteract losses imposed by the pandemic. In addition, the impacts of the pandemic lowered demand for California's Cap-and-Trade program, resulting in lower revenues to fund forest health and fuel reduction projects under the Greenhouse Gas Reduction Fund as initially projected (Stark 2020). Washington's state legislature has also directed state agencies to provide technical assistance for communities facing WUI challenges, but the final authorized budget amount is pending. Similarly, communities in Colorado seeking to replicate the successes of property assessment programs such as REALFire® or Wildfire Partners are in the position of applying for limited grant dollars and fulfilling local match requirements.

Setting up funds specifically to help WUI-oriented land use tools would eliminate the need for communities to compete against one other on forest health and fuel reduction projects. Investing in these solutions now would also help counteract uncertainties related to the future insurability of properties and other real estate concerns mentioned in the previous section.

5. Identify and Transfer Land Use Planning Best Practices From Other Hazards to Wildfire

Many of the trends and potential challenges described in this report are not new to states or communities across the country. However, too often there is limited crossover between wildfire planning solutions and other hazard mitigation planning best practices. Borrowing from other creative land use solutions for flood, landslide, and other hazards and applying them to wildfire could yield additional successes. This approach may become especially relevant as more adaptation strategies for climate change emerge, such as managed retreat. This solution proposes future research to explore potential cross-pollination of tools and strategies. In addition, facilitating meaningful dialogue among hazard planning professionals could lend itself to further application of creative land use strategies. A sampling of land use solutions for other natural or climate-related hazards which may be transferable to wildfire are provided in the sidebar below.

Hazard Planning Best Practices – Examples From Across the Country

Improving Flood Resilience in Norfolk, VA

In response to recurrent and worsening flood hazards, the City of Norfolk adopted a new zoning ordinance in 2018 to improve flood resilience using a two-pronged strategy. Their innovative approach was designed to (1) mitigate flooding and promote safer development in known flood hazard areas; and (2) direct new and more intense development to areas on higher ground.

The new zoning ordinance establishes a Coastal Resilience Overlay (CRO) zone, where new development and redevelopment will have to comply with new flood resilience requirements. Requirements include higher regulatory standards such as increased design flood elevations, the use of salt-tolerant and native species for landscaping, permeable surfaces for parking spaces, and other stormwater infiltration standards. The ordinance also establishes an Upland Resilience Overlay (URO), designed to encourage new development in areas of the city with lower risk of flooding. URO requirements include policies aimed to incentivize and target redevelopment projects to create transit-oriented, walkable, and bikeable neighborhoods.

Norfolk's ordinance also adds a new "resilience quotient system," where developers earn points for adopting different resilient measures that promote flood risk reduction, stormwater management, and energy resilience, among other practices. All new developments are required to meet different resilience point values based on the development type (e.g., residential, non-residential, mixed-use) and development size, unless the developer opts to meet specified standards for elevation and drainage. The ordinance also includes incentives for extinguishing development rights in the CRO district. For example, points can be earned in the URO zone by extinguishing development rights through open space conservation easements or restricting densities of development in the CRO. In turn, the rights conferred to the city allow it to further expand improvements for water retention or flood protection.

For more information: <https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2019/11/norfolks-revised-zoning-ordinance-aims-to-improve-flood-resilience>

Resilient Building Design in Hoboken, NJ

In 2014, following the devastating impact of Hurricane Sandy, the City of Hoboken identified the need to develop their own community-specific design guidelines for its flood-prone structures. Because municipalities in New Jersey do not have authority to alter provisions of local building codes, their ability to influence design is limited to addressing other aspects of structural risk in flood hazard areas. Municipalities do however have flexibility to vary required construction materials, foundation design, design flood elevations, and setbacks to reduce hazard risks.

Hoboken's Resilient Buildings Design Guidelines provide an overview of the current laws and regulations governing construction within Hoboken's flood-prone areas, as well as the approval process for repairs, improvements, and new construction. They also provide a range of optional flood resilience strategies for residents, property and building owners, developers, and businesses to lower their risk and reduce their flood insurance premiums. This includes information on using flood resilient building materials, protecting utilities and mechanical systems, and other floodproofing measures that go beyond existing codes and regulations.

For more information: <https://drive.google.com/file/d/0B9ITDiYbNgQrenhaYWhHT1ZPRTg/view>

Hazard Planning Best Practices – Examples From Across the Country (*continued*)

Landslide Hazards Code in Salem, OR

In the wake of a 1996 disaster wrought by heavy rains and landslides, the City of Salem initiated the development of an ordinance to identify and mitigate risk within landslide hazard areas. The city's Landslide Hazards Code was originally established in 2000 as part of its Unified Development Ordinance and implements the Geologic Hazards Policy of the Scenic and Historic Areas, Natural Resources, and Hazards section of the Salem Area Comprehensive Plan.

The city's resulting ordinance uses a tiered approach involving a cumulative scoring system to determine and categorize an area's landslide hazard risk (high, moderate, or low), with specific code requirements applying to those assigned categories.

Requirements may include more site-specific investigation such as a geological assessment or geotechnical report, along with the identification of mitigation measures necessary to safely undertake the development activity. No regulated activity can receive final approval or be permitted until these requirements are met and a certificate of compliance is issued to the applicant.

For more information (see page 80): https://www.oregongeology.org/Landslide/Landslide_Hazards_Land_Use_Guide_2019.pdf

Zoning for Conservancy Districts in Chatham, MA

Chatham's zoning bylaw designates "conservancy districts" encompassing all land in the town's 100-year floodplain as mapped in its most recent town-approved Flood Insurance Rate Maps. Among the stated purposes for the conservancy district is to protect public health and safety, and more specifically to protect people and property from the hazards of flood and tidal waters that may result from unsuitable development in or near swamps, ponds, bogs, and marshes; along water courses; or in areas subject to flooding, extreme high tides, and the rising sea level.

The bylaw clearly delineates three types of activities in designated conservancy districts—permitted uses, special permit uses, and prohibited uses. Notably the construction of non-water dependent uses is largely prohibited, and the town has been legally successful in preventing the construction of new residences in any of its mapped floodplain areas. Lessons learned from Chatham's use of conservancy districts for flood risk reduction are highlighted in a 2008 case study that describes how and why this land use solution was challenged but upheld in the courts.

For more information: https://www.chatham-ma.gov/sites/g/files/vyhlf2926/f/uploads/stormsmart_chatham1.pdf

Landscape Regulations in Miami-Dade County, FL

The choice of landscape vegetation can have a dramatic effect on the amount of debris generated from a residential or commercial site that is exposed to the high winds of a tropical storm or hurricane. This debris can clog storm water drains and result in local flooding. It also may become wind-borne debris that can inflict damage on other private and public property.

In response, Miami-Dade County has incorporated risk reduction principles and practices into its landscape manual, including the identification of trees that can best withstand flooding, drought, and wind. The county also has developed an ordinance (Landscape Code) that prohibits the planting of trees that do not meet these standards, as well as specifications for hazard pruning where safety considerations are paramount (i.e., removal of dead, diseased, decayed, and obviously weak trees or branches). In recognition of the aforementioned threats posed by tropical storms and hurricanes, a stated purpose of the ordinance is to promote the use of trees to protect and buffer the effects of high winds on structures.

For more information: <https://www.miamidade.gov/zoning/code-landscape.asp>

Conclusion

Climate change and shifting land use patterns are anticipated to increase the scope and scale of the WUI problem. This calls for bold action now. Solutions should leverage the role that land use planning can play in reducing wildfire risk in the built environment. Robust state frameworks can be effective in supporting local governments in reducing wildfire risk to communities.

Without requirements, incentives, funding, and other resources, there is little evidence of widespread adoption of fire safe land use planning practices, such as comprehensive plan policies and regulations, to address the WUI. Local scale programs and regulations also play a critical role in customizing actions to address the WUI, and more could be done to sustain and replicate these activities. Integrating land use planning solutions must be part of community priorities in creating safe and fire adapted communities that can thrive in an uncertain future.

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