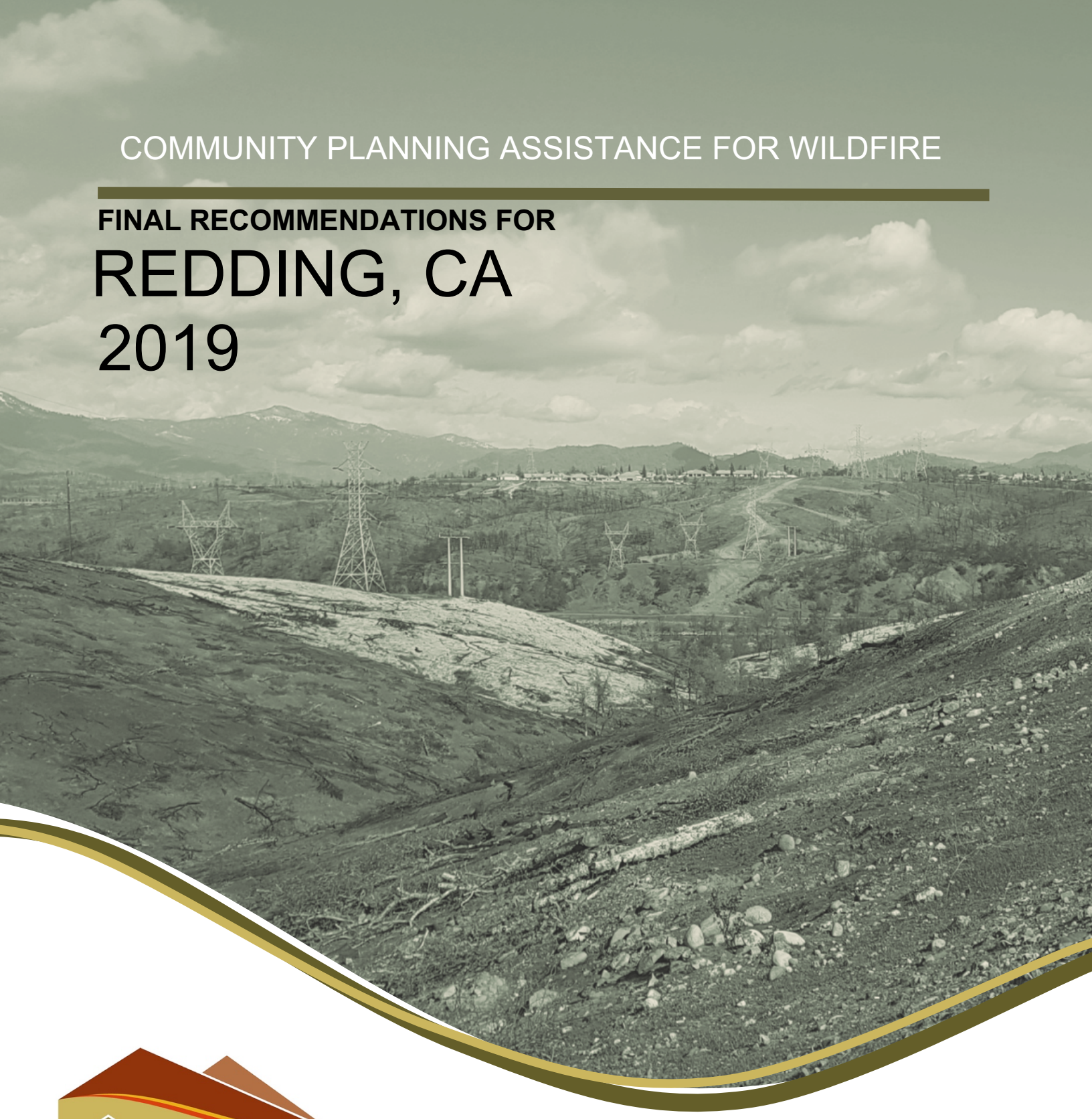
COMMUNITY PLANNING ASSISTANCE FOR WILDFIRE

FINAL RECOMMENDATIONS FOR

REDDING, CA
2019



COMMUNITY PLANNING ASSISTANCE FOR WILDFIRE

PREPARED BY:

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ABOUT

Community Planning Assistance for Wildfire Program

The Community Planning Assistance for Wildfire (CPAW) program works with communities to reduce wildfire risks through improved land use planning. The CPAW program is a joint partnership between Headwaters Economics and Wildfire Planning International. It is funded by grants from the USDA Forest Service and private foundations.

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ACRONYMS

BOF	Board of Forestry and Fire Protection
CAL FIRE	California Department of Forestry and Fire Protection
CEQA	California Environmental Quality Act
CPAW	Community Planning Assistance for Wildfire
CWPP	Community Wildfire Protection Plan
CCR	California Code of Regulations
DMA	Disaster Mitigation Act
FEMA	Federal Emergency Management Agency
HFRA	Healthy Forest and Restoration Act
HMGP	Hazard Mitigation Grant Program
IAFC	International Association of Fire Chiefs
IBHS	Insurance Institute for Business and Home Safety
ICC	International Code Council
IWUIC	International Wildland-Urban Interface Code (ICC)
LHMP	Local Hazard Mitigation Plan
LRA	Local Responsibility Area
LUPP	Land Use Planning Program
NFPA	National Fire Protection Association
REU	Redding Electric Utility
SIZ	Structure Ignition Zone
SRA	State Responsibility Area
UCCE	University of California Cooperative Extension
USDA	United States Department of Agriculture
USFS	United States Forest Service (United States Department of Agriculture)
VHFHSZ	Very High Fire Hazard Severity Zone
WUI	Wildland-Urban Interface

INTRODUCTION

In 2018, more than 25,000 structures were destroyed from wildfires that occurred in the United States.[1] This staggering figure is a result of several factors, including long-term changes to the fire environment and landscapes, and increased exposure of development in areas known as the wildland-urban interface (WUI, pronounced “WOO-EE”).

Wildfires in the WUI can threaten communities in different ways (Figure 1). Dispersed, rural development patterns on the edge of a community can experience wildfire from adjacent wildland areas. Suburban and urban areas with more dense development may be subject to home-to-home ignitions. Embers can make contact with any development pattern, and likewise wildfires can quickly overwhelm local fire protection resources.

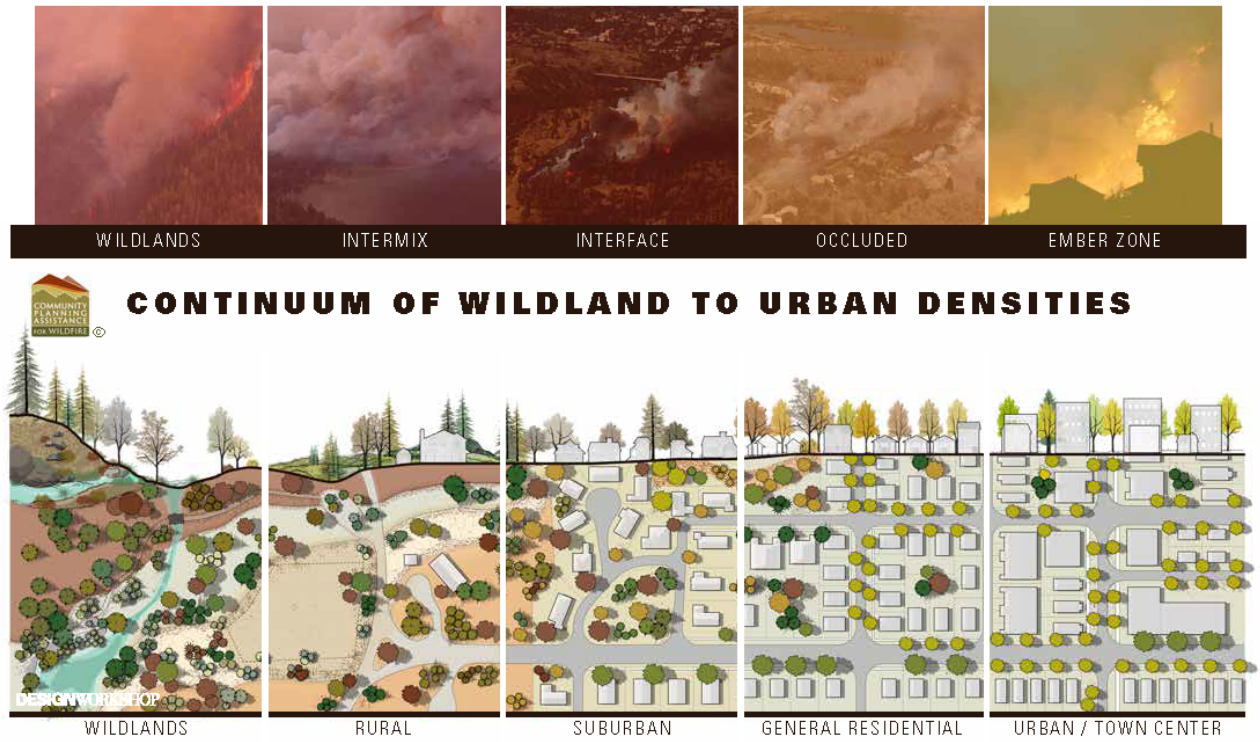

Figure 1. Communities in the wildland-urban interface can be affected by wildfire in different ways, depending on their development patterns and other factors of wildfire susceptibility.

[1] National Interagency Coordination Center 2019 Annual Wildfire Statistics Report.

Development location and density of structures are just two features that contribute to how a wildfire may affect a community. Other influences include the type of land use, landscaping decisions at the property and community scale, choice of building materials and construction, access and egress, available resources for response, and level of preparedness. These factors form the basis for how land use planning decisions can shape WUI communities.

Communities have a variety of planning tools available to address challenges associated with the WUI (Figure 2). These tools include plans and policies (e.g., growth management plans, neighborhood plans, open space management plans), and codes and regulations (e.g., subdivision regulations, landscaping ordinances, steep-slope ordinances, zoning codes, building codes, and wildland-urban interface codes).

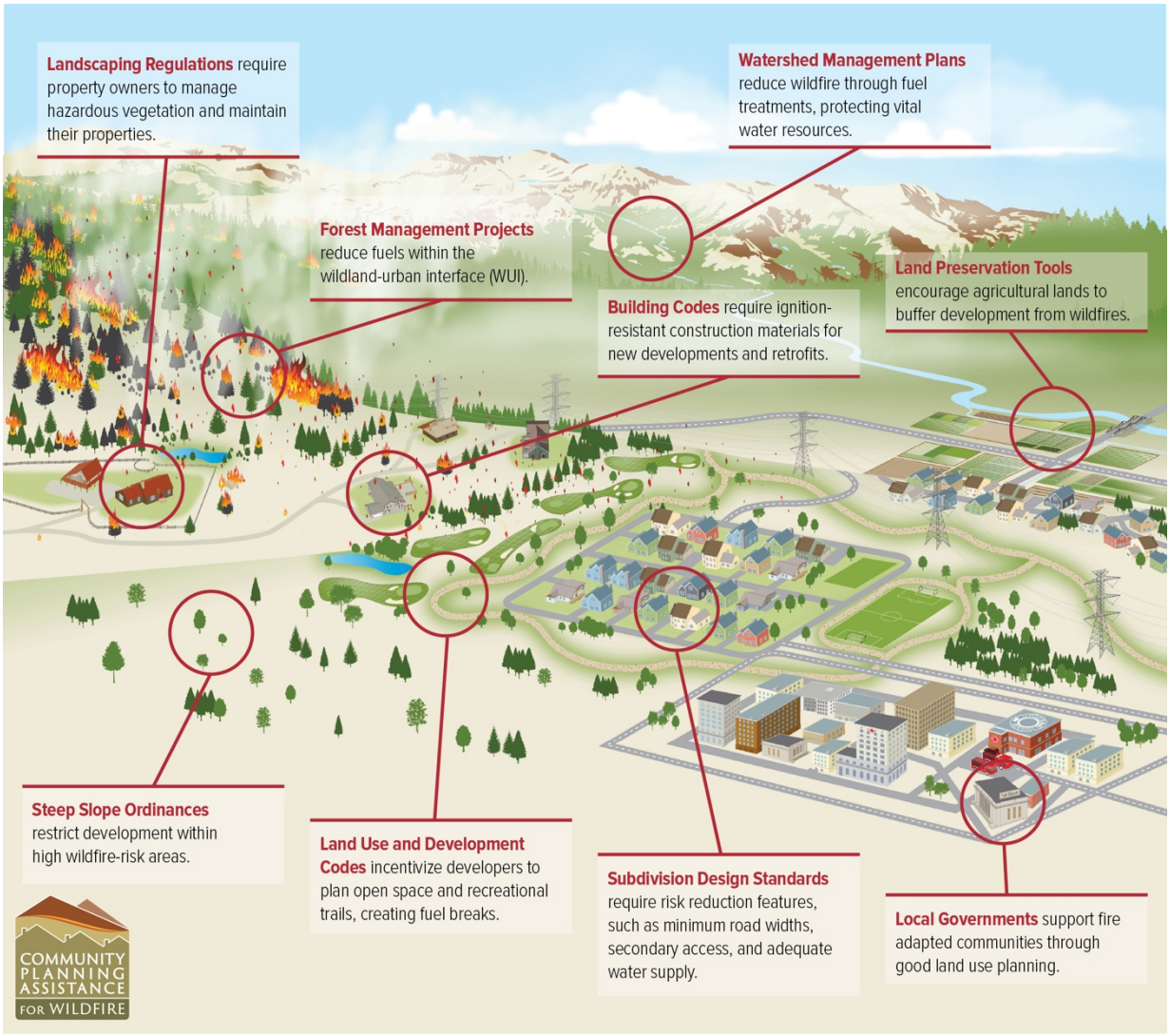

Figure 2. Examples of different policy and regulatory options available to communities when planning for wildfire.

Community Planning Assistance For Wildfire

Identifying appropriate land use planning tools to result in more resilient WUI communities was the catalyst for the Community Planning Assistance for Wildfire (CPAW) program. The CPAW program helps communities make more informed decisions about current and future development to better integrate wildfire-resilience into the planning process. CPAW was established by Headwaters Economics and Wildfire Planning International in 2015 and is funded by the USDA Forest Service and private foundations. Since its inception, CPAW has worked with communities of varying sizes, capacities, and geographical locations across the United States (Figure 3).

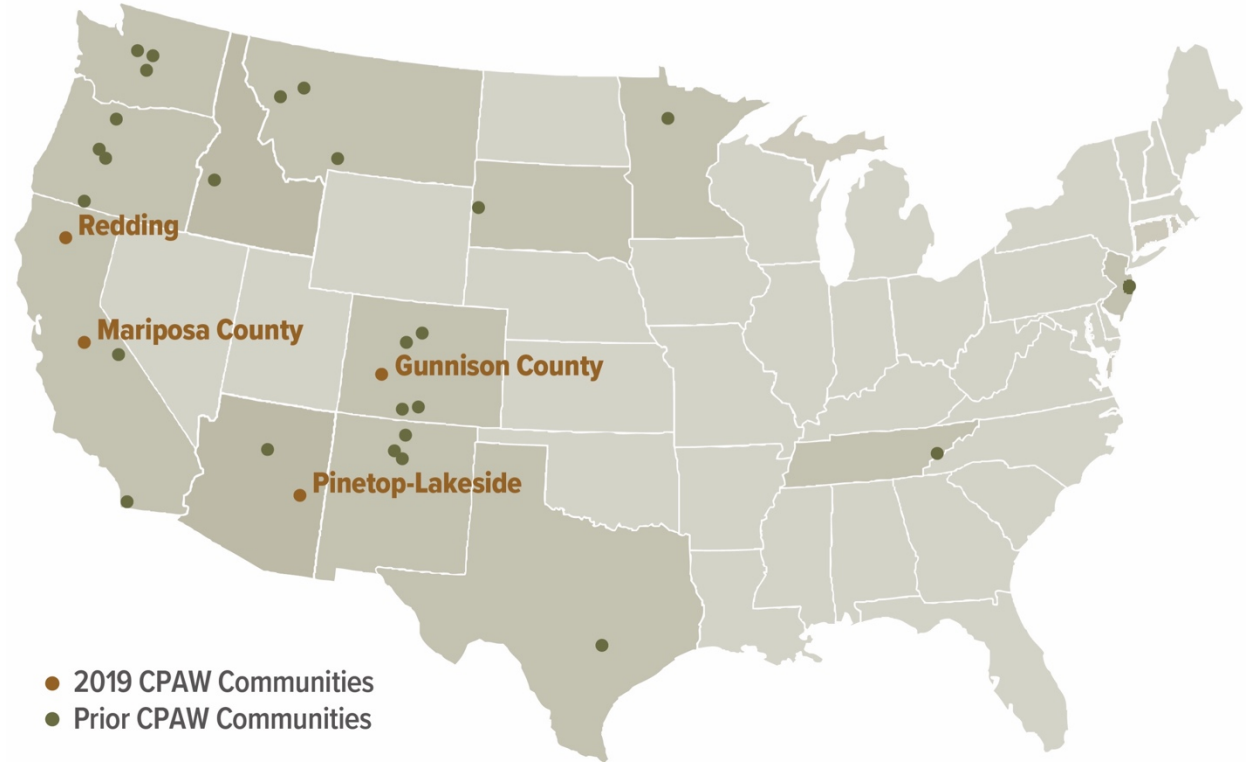

Figure 3. In 2018, Redding, California was one of four communities selected to receive customized technical assistance during the 2019 calendar year.

Communities voluntarily apply and are competitively selected to participate in the program on an annual basis. Communities must show commitment and engagement from both the planning and fire departments to reflect the collaborative nature required for CPAW success. If selected, communities receive customized technical consulting services from CPAW's team of professional land use planners, foresters, risk modelers, and researchers. Specific services vary based on community needs, and may include capacity-building trainings on WUI planning topics, risk modeling and spatial analysis, guidance on wildfire mitigation plans and policies, and other strategies to address local wildfire risk.

Stakeholder Engagement

Community members engaged in the process play a critical role to project success. While services are provided at no charge to the community, each community signs a Memorandum of Understanding with CPAW to outline its mutual understanding of roles and responsibilities and

project commitments. CPAW teams engage with a variety of local stakeholders who may serve as steering group members, local experts, or interested parties. These stakeholders provide valuable input and feedback, represent diverse wildfire and community development interests, and act as communication channels to other local groups.

CPAW Process and Recommendations

The CPAW community planning process occurs over the course of one year. During that time, CPAW team members meet with stakeholders to discuss local issues, conduct several field tours to learn about unique wildland-urban interface and wildfire mitigation challenges, and provide presentations to help the community understand CPAW's program goals (Figure 4). Team members also review community planning documents to identify gaps and opportunities for strengthening wildfire policies and regulations. The CPAW team delivers a final set of recommendations by the end of the assistance year. Follow-up implementation assistance may also be available to communities depending on their needs and CPAW's program funding.

Figure 4. CPAW team members and city staff discuss local planning topics on a field tour during the first site visit.

CPAW recommendations are customized to each local community based on field visit data gathering, stakeholder feedback, research, science, best practices, and national expertise in planning, forestry, hazard mitigation and wildfire risk reduction. All recommendations are voluntary. Local governments retain sole authority for the decision to implement any recommendations delivered by CPAW.

Redding Planning Context

The City of Redding is the urban center and county seat of Shasta County, located at the northern reaches of California's Central Valley (Figure 5). It is one of the state's largest cities north of Sacramento and serves as a major regional hub for retail, education, health care, professional services, and government. More than half of the county's population lives in Redding; neighboring cities of Anderson and Shasta Lake are the only other incorporated jurisdictions in the county.

Redding is bisected by Interstate 5, a major north-south freeway that connects the city with major metropolitan areas including Sacramento, San Francisco, Portland, and Seattle. The city is in proximity to many outdoor attractions and recreational areas such as Shasta Lake, Lassen Volcanic National Park, and the Shasta/Trinity/Whiskeytown National Recreation Area.

Figure 5. Redding is located in northern California along the Sacramento River.

Geographic Location and Significant Features

Redding is situated at the point where the Central Valley meets the foothills of the Cascade mountain range, with an average elevation of approximately 500 feet across varying topography. The city is surrounded by mountains to the north, east, and west, and fertile agricultural lands to the south. Extensive forests cover more than half of the county's land area with commercially productive forest systems. The most distinctive geographical feature in the area is the Sacramento River, which flows through the city in a general north-south direction. The Shasta Dam, completed north of the city in 1945, is one of the tallest dams in the U.S. and provides a considerable level of flood protection for Redding. Several tributaries and creeks also run through the area with some having carved gullies and ravines with depths of up to 200 feet.[2]

In addition to Interstate 5, State Highways 299, 273, and 44 also pass through Redding, connecting the city with the Pacific Coast and Nevada. The main north-south line of the Union Pacific Railroad runs through the community as well. Although land use patterns reflect a heavy dependence on automobiles, the city's current planning goals and policies are intended to encourage less reliance on cars and provide more pedestrian-friendly connections between neighborhoods, transit, recreational amenities, schools, employment centers, and services.[3]

An iconic feature for Redding is the Sundial Bridge for pedestrians and bicycles which crosses the Sacramento River in the heart of the city, linking downtown with Redding's extensive river trail system. Other significant features in the region include: Shasta Lake, the largest reservoir in the state; Mount Shasta, the fifth-highest peak in the state at more than 14,000 feet; and Lassen Peak, the southernmost active volcano in the Cascade Range.

Land Area, Ownership, and Distribution

Redding's municipal limits encompass approximately 60 square miles, making it California's 17th largest city by total land area.[4] Yet based on persons per square mile, it ranks among the least-densely populated metropolitan areas in the upstate region. The relatively low-density, discontinuous nature of Redding's development pattern is due in part to the complex topography, flood-prone lands, and physical barriers such as the Sacramento River, Interstate 5, and the Union Pacific Railroad.

Redding has grown significantly over the years through the annexation of lands which were formerly outside its jurisdictional control but within its Sphere of Influence—defined as the probable ultimate physical boundaries and service area of the city. Although there are still large tracts of land within this area for potential future annexations, current city policies are designed to encourage new development within its existing boundaries.[5] Redding's General Plan addresses approximately 110 square miles of planning area that encompasses land both within its city limits and potentially annexable areas, and it includes 23 land use designations. Residential land uses encompass approximately 37,000 acres, with non-residential land uses encompassing approximately 35,000 acres. These non-residential land uses include office, commercial, heavy commercial, industrial, public facilities/institutional, airport service, greenway, park, and recreation.[6]

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[2] City of Redding 2000-2020 General Plan. Natural Resources Element.
[3] City of Redding 2000-2020 General Plan. Transportation Element.
[4] U.S. Census Bureau. 2010.
[5] City of Redding 2000-2020 General Plan. Community Development and Design Element.
[6] City of Redding Local Hazard Mitigation Plan, 2015. Community Description.

Key Demographics and Economic Trends

Redding's population grew steadily in the mid- to late-20th century through a combination of annexations and economic development, including a housing boom in the late 1980s that continued until the mid-1990s. Recently, however, the city's population has remained relatively stable, growing by only 2.1 percent between 2010 and 2017 as compared with the statewide average of 6.4 percent.[7] Table 1 describes several key demographic characteristics of the community with some additional notes, including comparisons to county and statewide statistics.

TABLE 1. DEMOGRAPHIC AND ECONOMIC OVERVIEW

Statistic	Redding	Shasta County	California
Total Population	91,236[a]	178,919[a]	38,982,847[a]
Population Density (ppl/ sq. mile)	1,507[b]	47[b]	239[b]
Median Age (years)	38.2[a]	41.8[a]	36.1[a]
Housing Units	39,321[a]	78,211[a]	13,996,299[a]
Median Home Value	$245,100[a]	$233,500[a]	$443,400[a]
Median Household Income	$46,389[a]	$47,258[a]	$67,169[a]
Poverty Rate	18.9%[a]	18.1%[a]	15.1%[a]
Unemployment Rate	6.4%[a]	6.81%[a]	7.7%[a]

Data Sources:
a. U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates.
b. U.S. Census Bureau. 2010.

The Redding metropolitan area is the regional center of northern California for health and legal services, retail shopping and employment—creating a growing hub of commerce and industry. Redding maintains a diversified and stable economic base, with education, health care and social assistance combining with retail trade and recreational services to make up nearly 50 percent of local industries. Remaining occupations and industries are spread across many sectors similarly to statewide averages.[8]

The outdoor lifestyle and air quality of the Redding metropolitan area have attracted many highly skilled people from larger urban areas, creating a choice labor force. The city's overall job growth in a recent five-year period was more than double the national average, and the increase in the number of businesses in the city is almost triple the national average for the same period. Favorable zoning laws, affordable commercial and residential real estate, and the availability of low-cost skilled labor in Redding give many industries a competitive advantage that has

[7] U.S. Department of Commerce. 2018. Census Bureau, American Community Survey Office, Washington, D.C, as reported in Headwaters Economics' Economic Profile System (headwaterseconomics.org/eps).
[8] Ibid.

contributed to the city's economic growth. Redding's City Council has also developed local incentives for industrial development and businesses that create new jobs.[9]

Fire Environment and Wildfire History

Generally, the Redding area consists of mixed conifer forests and interspersed brush vegetation. Outside of Redding, low to moderate load slash is common on private timber lands. Specifically, madrone, manzanita, white fir, red fir, scrub oak, cedar, white oak, douglas fir, sugar pine, and ponderosa pine are the dominant species representing the Fire Behavior Prediction System fuel model classes. Fuels are typically continuous throughout the area.

Fire history information from the Shasta County Community Wildfire Protection Plan (CWPP) and the CAL FIRE fire history database demonstrates a history of extensive and frequent wildfires in the areas within and surrounding the City of Redding. The majority of fires were successfully suppressed while they were small; however, there have been a number of fires that have escaped successful suppression due to an extended drought period, forest health, and climatic conditions that resulted in extreme fire behavior.

The most notable fire that recently impacted Redding was the Carr Fire. The Carr Fire started on July 23, 2018, in Whiskeytown National Park due to a motor vehicle breakdown on highway 299.[10] The fire grew to 229,651 acres and resulted in the evacuation of more than 36,000 people, with six fatalities and the destruction of 1,820 structures.

Other notable large fires within the last 10 years include the 2008 Shasta-Trinity Lightning Complex Fire at 86,500 acres, the 2014 Eiler Fire at 32,416 acres, and the 2012 Ponderosa Fire at 27,676 acres. Shasta County has three fires listed on CAL FIRE's 20 most damaging incidents: the Carr Fire, the 1992 Fountain Fire at 63,960 acres and 636 structures, and the 1999 Jones Fire at 26,200 acres and 954 structures. Other notable fires in Shasta County in the last two decades are the 1999 Canyon Fire near Happy Valley which burned 2,580 acres, and the 2004 French Fire which burned 12,675 acres. All of these fires exhibited extreme fire behavior and resulted in significant losses.[11]

TABLE 2. SIGNIFICANT RECENT WILDFIRES IN OR NEAR REDDING[10, 11]

Date	Fire Name	Size (acres)	Start Location	Community Impacts
August 22, 2019	Mountain	600	Bear Mountain Road and Dry Creek Road, north of Bella Vista	• 14 structures destroyed • 7 structures damaged • 3 injuries
September 5, 2018	Delta	63,311	I-5 and Lamoine, 2 miles northwest of Lakehead	• 20 structures destroyed • Over $55 million in suppression costs

[9] Redding Chamber of Commerce. Accessed on April 1, 2018. Available at: www.reddingchamber.com/about-the-chamber/about-redding/.
[10] California Department of Forestry and Fire Protection. Accessed September 19, 2019. Incident Database. https://www.fire.ca.gov/incidents/IncidentSearch?q=shasta.
[11] Western Shasta Resource Conservation District. 2016. Shasta County Community Wildfire Protection Plan. County of Shasta, California.

TABLE 2. SIGNIFICANT RECENT WILDFIRES IN OR NEAR REDDING[10, 11]				
Date	Fire Name	Size (acres)	Start Location	Community Impacts
August 9, 2018	Hirz	46,150	Off Gilman and Moore Creek Campground, east of Lakehead	• Information on community impacts unavailable
July 23, 2018	Carr	229,651	Whiskeytown National Park Land	• 6 fatalities (2 firefighters and 4 civilians) • 1,820 structures destroyed • 61 structures damaged • More than 36,000 evacuated • 7th most destructive fire in California history
June 24, 2018	Creek	1,678	Clear Creek Rd & American Rd, west of Redding	• 11 structures destroyed • 1 injured
July 18, 2017	Laverne	180	Off Laverne Ln & Saddle Trail, 6 miles southeast of Redding	• 5 structures destroyed
July 29, 2015	China	212	China Gulch, Happy Valley, Southwest of Redding	• 5 structures destroyed • 1 structure damaged • 2 injuries
September 10, 2014	Gulch	1,375	On Backbone Ridge, east of Bella Vista, 15 miles northeast of Redding	• 4 structures destroyed • 4 injuries
July 31, 2014	Eiler	32,416	12 miles southeast of Burney near Old Station	• 21 structures destroyed • 11 injuries
July 26, 2014	Bully	12,661	Plantina Road at Bland Road, Igo	• 20 structures destroyed • 21 injured
September 15, 2013	Clover	8,073	Community of Igo, 10 miles southwest of Redding	• 1 fatality • 6 injured • 201 structures destroyed • 10 structures damaged • Happy Valley, Igo, Cottonwood and other areas evacuated • $65 million in damages
August 18, 2012	Ponderosa	27,676	Off Ponderosa Way, southeast of Manton	• 134 structures destroyed • 5 structures damaged • 7 injuries
July 5, 2012	Dale	1,038	Dale Lane & Cloverdale Rd, Happy Valley, southwest of Redding	• 2 structures destroyed • 5 damaged • I injured
2009	Sugarloaf	9,350	Hack Creek area 60 miles east of Redding	• Information on community impacts unavailable

TABLE 2. SIGNIFICANT RECENT WILDFIRES IN OR NEAR REDDING[10, 11]				
Date	Fire Name	Size (acres)	Start Location	Community Impacts
2008	Noble	12,856	Tehama County	• Information on community impacts unavailable
July 26, 2008	Shasta-Trinity Lightning Complex	86,500	Throughout Shasta and Trinity Counties	• 22 structures destroyed • 51 injured

Redding Community Analysis

CPAW identified challenges and opportunities related to wildfire and land use planning in Redding. These findings inform the development of the most effective recommendations and help anticipate potential barriers that could occur during the implementation process.

Local Planning Challenges

- **Active history of wildfires and other natural hazards.** Fire is part of the natural environment in Redding. The city is also at risk to floods, severe winter storms, extreme heat, dam overflow, and other hazards—all of which require active and ongoing planning, management, and resources.
- **Access constraints.** Evacuation challenges experienced during the Carr Fire were due to a number of reasons, including the rapidly-spreading conditions of the fire, high volume of evacuees, and areas with access constraints. Access constraints were based on several factors: In some cases, several subdivisions in the city have only one means of egress—these were phased subdivisions approved with the intention of additional connectivity but completion of all phases did not occur, resulting in undeveloped or incomplete access routes. In other cases, unimproved (dirt or gravel) secondary access routes were designated for emergency use only, but these routes did not serve this purpose during the Carr Fire due to poor signage or lack of local familiarity.
- **Ignition sources.** Similar to other communities with outdoor recreational areas and a transient population, the city regularly experiences human-caused wildfire ignitions in some areas due to open camp (or cooking) fires. Other human-caused ignition concerns include downed power lines, escaped debris burning, fireworks, and equipment sparks. The city is striving to prevent unwanted ignitions through updated burn permit rules and regulations and collaborative work with stakeholders, but must also rely on education and personal responsibility.

Figure 6. A concern during the Carr Fire was potential ignitions from power lines. REU is working closely with other city departments to implement a wildfire mitigation plan.

- **Ember ignitions in the Structure Ignition Zone.** Based on post-fire damage reports, interviews, and field observations following the Carr Fire, most property losses that occurred within the city of Redding were a result of embers that ignited combustible materials in the structure ignition zone (SIZ) on private property. Although the city complies with state construction requirements for development in the Very High Fire Hazard Severity Zone (VHFHSZ), existing gaps will leave properties vulnerable unless voluntary or mandatory compliance is addressed. These gaps primarily exist with landscaping and the storage of combustible items within the SIZ.
- **Previous staffing cuts.** Following budget cuts resulting from the 2008 economic downturn, many city staff positions were eliminated—including those from the planning and building divisions and fire department. A key position that was eliminated was the fire prevention specialist who handled weed complaints and provided other wildfire mitigation services. Although some positions are now being added back, this specific service has not yet been filled.

Local Planning Opportunities

- **Experienced staff and committed leadership**. Despite the limited capacity of current staff, the city is fortunate to have qualified and experienced planning and fire experts—as evidenced by participation in the CPAW program. Leadership, including from the fire and planning departments, have backgrounds in natural hazard management and an intimate understanding of the city's land use challenges.
- **New wildfire mitigation plan funding.** California Senate Bill 901 (2018) included new and revised requirements for public utilities regarding fire safety activities and development of wildfire mitigation plans. As a result, Redding Electric Utility (REU), a department within the City of Redding, is preparing and submitting a wildfire mitigation plan to the California Public Utilities Commission. This plan has four programs and multiple strategies to improve staffing levels to support improved emergency response, increase public education, reduce ignitions and fire spread through fuel mitigation treatments, and more.[12]
- **Active fuels management program.** Prior to recent funding becoming available from the REU wildfire mitigation plan, the city was already undertaking hazardous fuels management activities. Budgets for this have been limited, but funds have been efficiently used to work on city-owned property (parks, open space, greenways, trails) to remove or thin fuels (Figure 7).
- **New development requirements**. Although legacy land use planning issues such as access constraints (see Planning Challenges, above)

Figure 7. Fire Marshal Craig Wittner (right) discusses a shaded fuel break along the Palatine Trail during a CPAW site visit.

[12] The Redding Electric Utility Wildfire Mitigation Plan (June 2019) is available at: www.cityofredding.org/departments/redding-electric-utility.

may have come to light during the Carr Fire, the city has been taking corrective action to ensure that future developments in the Very High Fire Hazard Severity Zone meets or exceeds minimum requirements necessary to ensure public and first responder safety. Some of these activities include working with neighborhoods to update subdivision gate requirements to a standardized approach, and ensure that all subdivisions have a minimum of two access/egress points.

SUMMARY OF RECOMMENDATIONS

The 2019 CPAW report for Redding provides the city with three recommendations to implement the most appropriate tools for addressing local conditions. Each recommendation includes background information describing current conditions, an analysis of challenges or shortcomings, and recommendations for moving forward. Following these recommendations is an implementation section that provides more information on potential resources, program examples, and funding opportunities.

TABLE 3. OVERVIEW OF RECOMMENDATIONS

Recommendation	Why This Matters	Key Actions
1. Locally Assess and Identify the Wildland-Urban Interface (WUI) and Wildfire Risk	The city does not specifically identify or delineate the WUI beyond requirements for the Very High Fire Severity Zones (VHFHSZ) identified by the state, creating anomalies within neighborhoods and between parcels. Further identification and spatial delineation of the WUI is also necessary to provide decision support for developing and implementing land use policies and regulations that reduce wildfire risk.	• Define the WUI by locally adopting the state VHFHSZ map with locally refined amendments to remove anomalies and inconsistencies. • Create a comprehensive approach to determine wildfire risk by developing a parcel-level assessment process.
2. Implement a Roadmap for Current and Future Wildfire Plans and Activities	The city currently has several planning efforts in place to address wildfire. Some of these are plans that require updates in the short-term; others must be developed and formalized for long-term implementation. All of these efforts require stronger linkages and coordination.	• Update Local Hazard Mitigation Plan and the General Plan Health and Safety Element. • Develop a Community Wildfire Protection Plan and create a dedicated Wildfire Committee. • Link plans to ensure a cohesive approach to policy implementation.
3. Update the City's Wildfire Regulations to More Comprehensively Reduce Risk in the WUI	Several ordinances contain robust wildfire requirements that apply to new construction. Addressing regulatory gaps and finding potential areas to strengthen regulations is important to address additional vulnerabilities witnessed during the Carr Fire, such as ember intrusion in the Structure Ignition Zone (SIZ).	• Adopt additional wildfire regulations in the Fire Code and Subdivision Regulations. • Integrate the Fire Safe Construction and Methods Application Manual for WUI Areas with applicable codes and ordinances. • Reconcile zoning ordinance provisions with wildfire safety requirements.

RECOMMENDATION 1

Locally Assess and Identify the Wildland-Urban Interface (WUI) and Wildfire Risk

Define the WUI by adopting the state VHFHSZ map with locally-refined amendments to remove anomalies and inconsistencies. Create a comprehensive approach to determine wildfire risk by developing a parcel-level assessment process.

Overview

The California Department of Forestry and Fire Protection Fire Hazard Severity Zone Map delineates the Very High Fire Hazard Severity Zones within the City of Redding (Figure 8). To date, there have not been any local modifications to address inconsistencies and anomalies that exist.

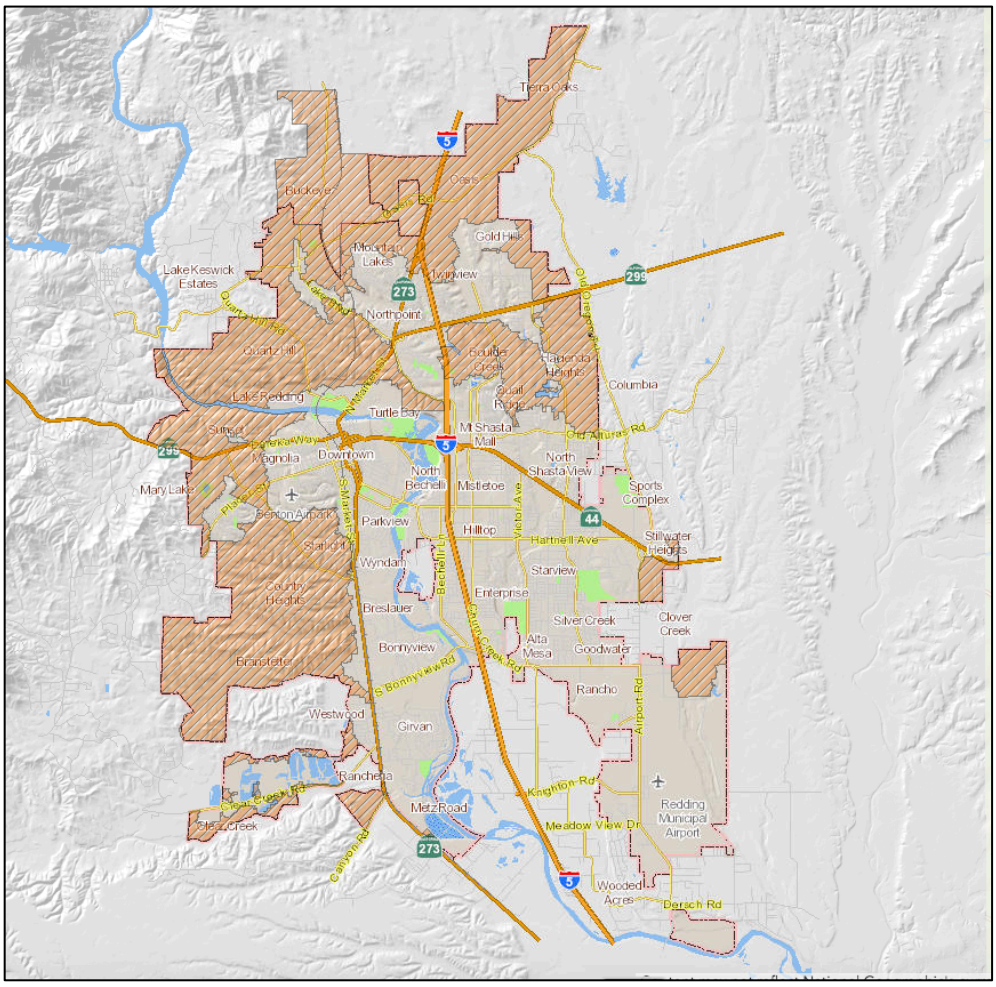

Figure 8. Very High Fire Hazard Severity Zone as determined by the California Department of Forestry and Fire Protection. Source: City of Redding

Considerations in Identifying City Wildland-Urban Interface Areas

Current WUI research and best practices typically describe the wildland-urban interface as a "set of conditions" in which both vegetation (i.e., wildland fuels) and the built environment (i.e., built fuels) are influenced by weather and topography to create an environment where fire can ignite and spread through this combined fuel complex (i.e., the combination of wildland and built fuels). The identification and spatial delineation of the WUI is necessary to provide consistent decision support for developing and implementing land use policies and regulations that reduce wildfire risk. The City of Redding does not specifically identify or delineate the WUI beyond requirements for the "Very High" Fire Severity Zones (VHFHSZ) identified by the state. This results in the current delineation of the VHFHSZs within Redding creating some anomalies and inconsistencies within neighborhoods and between parcels.

What is Wildfire Risk?

Wildfire risk can be visualized as a triangle, consisting of three components:

1. Likelihood of a wildfire occurring based on topography, weather, and ignition patterns; this can also include ignition sources from hazardous land uses (e.g., sawmills or propane storage facilities);

2. Predicted intensity of a wildfire (usually measured in flame length) based on vegetation type and weather conditions;

3. Susceptibility of values, sometimes referred to as Highly Valued Resources and Assets (HRVAs). For land use planning purposes, values typically consist of communities, structures, and infrastructure, but other values that may be considered can include:

- Recreation, tourism-based activities
- Viewsheds
- Watersheds
- Timber
- Ecosystem values
- Other community values

Together, these components complete the wildfire risk triangle (Figure 9).

Figure 9. Components of the wildfire risk triangle

Land use planning largely focuses on mitigating the susceptibility portion of the wildfire risk triangle. Two important susceptibility inputs that should be evaluated to appropriately determine wildfire risk in the context of land use planning:

- The location and density of structures and infrastructure;
- The ignition potential of individual structures and infrastructure.

Current City of Redding Wildfire Hazard Severity Map

The City of Redding currently relies on the 2007 California Department of Forestry and Fire Protection (CAL FIRE) Wildfire Hazard Severity Assessment that was developed by the Fire and Resource Assessment Program (FRAP).

According to the CAL FIRE[13] FRAP project website and associated literature, the project uses the following criteria:

- **Defining Fuel Hazard** - Fire behavior potential of the wildland fuel, given average bad fire weather conditions.
- **Probability of Burning** - Vegetative fuel condition, weather, ignition source, fire suppression response, and other factors based on historical data between 1950 and 1997.
- **Defining the Urban-Interface** - Structure density of 1 house per 40 acres, or denser, as calculated from the 1990 census block data.
- **Assessing Fire Threat** - Numerical rating based on hazard rank and probability.

[13] Fire Hazard Severity Zone Re-Mapping Project http://frap.fire.ca.gov/projects/hazard/fhz.

- **Identifying Fire Threatened Wildland-Interface Areas** - All areas within 1.5 miles of a fire threat.

As a final output, the FRAP project produces the following three Fire Hazard Severity Zones as recommendations for local jurisdictions:

- Moderate
- High
- Very High

CAL FIRE is updating the FRAP Fire Hazard Severity Assessment Process and expects to have draft outputs completed within the next few years.

Parcel-Level Susceptibility Assessments

Individual parcel-level assessments complete the risk triangle by providing the susceptibility component. This focuses on assessing each structure and the immediate surroundings, or Structure Ignition Zone (Figure 10, also referred to as the Home Ignition Zone). In order to address the susceptibility component of the risk triangle, comprehensive parcel-level assessments that include the entire Structure Ignition Zone (SIZ) should be conducted for both existing and new development.

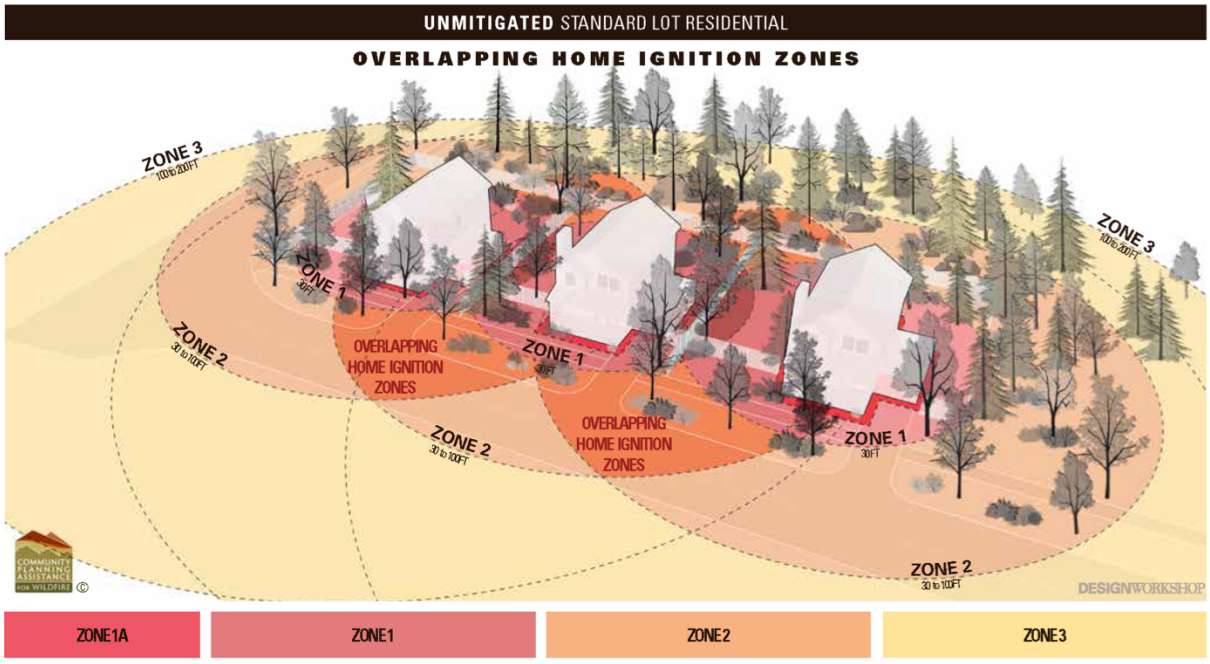

Figure 10. Overlapping nature of Structure Ignition Zones in a typical subdivision.

Findings

- The City of Redding has adopted locally amended (more restrictive) state building requirements, as well as some additional requirements through Title 17. Subdivisions of the City of Redding Municipal Code (discussed in greater detail in Recommendation 3).
- The building requirements are specifically tied to the current delineation of the VHFHSZ. The zoning ordinance, however, does not reference the VHFHSZ specifically.

- The requirements within the subdivision code and the relationship to the VHFHSZ mapping are largely left to a subjective, case-by-case decision of the fire marshal.
- City staff have identified a number of inconsistencies in the VHFHSZ mapping that further complicate the integration into building and zoning requirements.
- Currently, there are no standardized or ongoing parcel-level (SIZ) assessment requirements in place.

WUI and Risk Assessment Recommendations

To provide an effective decision support tool for the City of Redding in a timely manner, the CPAW team recommends that the city consider the following:

1. **Spatially Identify the WUI** by including the Moderate and High Fire Hazard Severity classifications of the Fire Hazard Severity Zone mapping; refine and adjust the boundaries of the classifications based on local subject matter expert knowledge.
2. **Enhance current minimum defensible space inspection requirements** to include a standardized and comprehensive SIZ assessment for new developments; consider integrating SIZ assessments for existing developments if capacity expansion is realized (see recommendation 3 for more details on defensible space requirements).
3. **Build capacity** to facilitate undertaking SIZ assessments on parcels by working with REU and other city departments (e.g., planning, building, fire, and code enforcement).
4. **Integrate the resulting SIZ assessment** information with the fire hazard severity zone information to support a comprehensive citywide wildfire risk assessment.
5. **Appropriately reference** the assessment in city policy and regulations as a consistent decision support tool (see Recommendation 2).

Property Assessment Programs

CPAW has prepared a set of resources and community examples—including programs that offer customized parcel-level SIZ assessments and one-on-one education opportunities—in the Implementation section of this report.

RECOMMENDATION 2

Implement a Roadmap for Current and Future Wildfire Plans and Activities

The city currently has several planning efforts in place to address wildfire. Some of these are plans that require updates in the short term; others must be developed and formalized for long-term implementation. All of these efforts require stronger linkages and coordination.

Overview

The City of Redding has five primary plans that directly or indirectly influence local wildfire planning decisions. These are either city-adopted plans (General Plan, Local Hazard Mitigation Plan, and the recent REU Wildfire Mitigation Plan), or plans developed by other county or state agencies. Table 4 provides an overview of these plans.

TABLE 4. OVERVIEW OF RELEVANT WILDFIRE PLANNING DOCUMENTS

Plan Name	Overview & Relationship to Wildfire Hazard	Lead
Redding General Plan (2000-2020)	• Elements (e.g., Health and Safety, Community Development and Design, Natural Resource) contain goals and policies intended to minimize impacts of wildfire hazard through improved fire protection resources and appropriate land use techniques and regulations in the built and natural environments. • Health and Safety Element must meet requirements of Senate Bill 1241 (2012); Government Code §65302 (g)(3) for fire hazard during next required update.	City of Redding - Planning Department
Redding Local Hazard Mitigation Plan (2015)	• Meets requirements of Disaster Mitigation Act (DMA) of 2000, §322 to address multiple hazards. • Provides an assessment of wildfire hazard in the city and mitigation actions to reduce life and property loss through code enforcement, fire protection resources, defensible space, landscape maintenance districts, public education, emergency coordination, and more.	City of Redding – Multiple Agencies
REU Wildfire Mitigation Plan (2019)	• Meets requirements of California Senate Bill 901 (2018); Public Utilities Code §8387. • Focuses on activities that REU is taking or may take to mitigate powerline-ignited wildfires.	City of Redding - Redding Electric Utility
Shasta County Community Wildfire	• Meets minimum requirements of Healthy Forests Restoration Act (2003).	Various, based on community and project type

TABLE 4. OVERVIEW OF RELEVANT WILDFIRE PLANNING DOCUMENTS		
Plan Name	Overview & Relationship to Wildfire Hazard	Lead
Protection Plan (2016)	• Consolidates fuel management plans and local CWPPs into one plan; identifies values at risk; provides actions to encourage Firewise, increase collaboration, reduce wildfire hazard through fuel treatments, and seek additional funding.	
Shasta-Trinity Unit Strategic Fire Plan (2018)	• Aligns with CAL FIRE's Strategic Plan and California Fire Plan pursuant to Public Resources Code §§4114 and 4130. • Provides pre-fire management strategies (fire prevention, engineering & structure ignitability, education and information, vegetation management, defensible space inspections) and post-fire management strategies and tactics.	CAL FIRE Shasta-Trinity Unit

In addition, the city has other community wildfire efforts related to planning, preparedness, or recovery that may not be formalized in plans, such as:

- Redding Fire Department maintains an internal list of annual planning priorities to address wildfire risk, including planned fuel treatment areas and areas that require maintenance of hazardous vegetation.
- Redding Fire Department, Redding Parks Department, Redding GIS/MAPS Division have collaboratively developed the "Are You Ready" website that promotes education to help residents know their role in wildfire prevention and preparedness.[14]
- Post-fire recovery planning for the Carr Fire continues to be supported by various city departments.

Plan Analysis

Findings based on discussions with local stakeholders and CPAW's internal review indicate a need to re-evaluate how plans relate to one another and potential changes during future updates, specifically considering the following:

- **No plan currently provides the level of comprehensive and detailed planning required for wildfire to be addressed in the city**. Both the city's General Plan and Local Hazard Mitigation Plan (LHMP) provide goals, information, and actions that address wildfire. However, the General Plan is updated infrequently, making it difficult to track progress on specific actions. The Local Hazard Mitigation Plan is intended for all hazards; neither plan currently provides a sufficient level of detail to accurately plan for fine-grained wildfire considerations on public and private property—nor is it necessarily appropriate that these plans house this type of detailed information. Similarly, the new REU Wildfire Mitigation Plan is designed specifically for mitigation of utilities and does not capture challenges or opportunities for wildfire risk reduction on private property or

[14] Available at: https://stories.opengov.com/reddingca/published/M7s-H0M9

engagement with other stakeholders such as local businesses, residents, and non-profit organizations.

- **The CWPP planning process is underutilized.** Redding does not currently use the Shasta County CWPP as a coordinating mechanism for its wildfire activities. The Shasta County CWPP actions primarily target other communities in the county, and the plan does not provide sufficient detail to address the complexity of the city's wildfire hazard needs. Further, there are several county-led coordinating groups that the city participates in (Shasta Task Fire, Shasta County Prevention Officers); other groups (e.g., CAL FIRE fire chief meetings) may locally influence fire preparation activities. None of these groups, however, focuses specifically on the city's wildfire planning priorities. Similarly, a dedicated project team composed of city staff that supported the Local Hazard Mitigation Plan update provided guidance on all hazards (not just wildfire), and was discontinued following adoption of the plan.
- **Plan linkages are inconsistent**. Finally, while some of the city's plans connect, others do not. For example, the General Plan Health and Safety Element and the recently adopted REU Wildfire Mitigation Plan both reference the Local Hazard Mitigation Plan; similarly, the Local Hazard Mitigation Plan references the General Plan. None of these plans is linked to the Shasta County CWPP or Shasta-Trinity Unit Strategic Fire Plan.

As a result, there are some linkages across several existing plans, but there is currently no one plan that captures and organizes the city's wildfire goals, priorities, and activities into a coordinated approach at a level of detail that addresses wildfire risk reduction for city departments and community members. Similarly, there is no dedicated stakeholder group that regularly meets to evaluate, plan, and implement the city's wildfire priorities.

Planning Recommendations

The city has an opportunity to address these findings during the scheduled updates of the LHMP and General Plan Health and Safety Element and a new approach to the CWPP. Based on the timeframes underway for the LHMP and General Plan updates, the following recommendations are presented in a logical sequence of prioritization and are not assumed to concur simultaneously.

1. Update Local Hazard Mitigation Plan

On the immediate horizon, Redding must update its LHMP to ensure it does not expire before the end of 2020. The city will be convening its Hazard Mitigation Project Team to begin an update in fall 2019 and complete the plan update within a year. This update provides the city with an opportunity to review the Wildland Fire section and make necessary changes. Recommended changes include the following:

- Update WUI and VHFHSZ references to the current maps available on the city website. Any changes to these designated areas will then remain current. For example, any changes made to the VHFHSZ based on Recommendation #1 will still be accurate during the lifespan of this plan.
- Discuss any anticipated changes in future fire behavior based on a predicted increase in extreme weather events (prolonged drought, extreme heat, wind, heavy snowfall) that can affect the severity of wildfire hazard and effectiveness of mitigation.
- Develop mitigation actions that are measurable and achievable. Several of the actions listed in section 7.4.8 are unlikely to be successfully implemented as currently worded.

For example, “Ensure that defensible space is being provided for all new and existing homes” would require resources and compliance mechanisms that are beyond the city’s current capacity. Use this opportunity to also develop mitigation actions that can garner support for other actions listed in this report.

- Crosswalk the LHMP with other plans to establish clear and consistent linkages, as outlined below.

2. Update General Plan Health and Safety Element

The LHMP update will prompt a review and update to the Health and Safety Element to address climate adaptation and resiliency strategies, and ensure the city is positioned for more funding opportunities.[15] In addition, the city is due for a Housing Element update, which also triggers a subsequent Safety Element update. To the extent possible, these element updates should be coordinated to reduce the need for multiple Safety Element reviews and updates.

During the Health and Safety Element update, CPAW recommends that the city work closely with the CAL FIRE Land Use Planning Program (LUPP) regional coordinator assigned to Redding to ensure that revised goals and policies meet state planning requirements.[16] To assist in this update, CPAW reviewed with staff the status of the current Healthy and Safety Element policies related to Goal HS4 *Minimize the Potential for Loss of Life, Injury, and Property Damage Resulting from Urban and Wildland Fires*, as summarized in Table 5.

TABLE 5. STATUS OF SAFETY ELEMENT HS4 POLICIES (Urban and Wildland Fires)

Policy (as Stated in General Plan)	Status of Policy / Implementation Notes
HS4A. Maintain an Insurance Service Office (ISO) rating of 3 or better.	✓ City currently meets this policy and efforts to maintain rating are ongoing. (Current ISO Rating is a 2.)
HS4B. Require that all new development and redevelopment meet state and local standards for fire protection; encourage the upgrade of existing structures to current standards.	✓ City currently meets the first part of this policy for implementing required state and local standards. ✓ Second part of this policy is ongoing and may require an updated policy to further support its future implementation through incentives.
HS4C. Work with local water districts to ensure that district systems are developed, maintained, and monitored to provide minimum fire-flow, rates, and peak-load capacity for fire suppression.	✓ City currently meets this policy and continues to work with water districts; maintenance and monitoring is ongoing.
HS4D. Require remote hillside developments to maintain sufficient water supplies on-site, when appropriate, to provide wildland fire protection.	✓ Implementation of this policy is ongoing and varies depending on local circumstances. It cannot always be enforced; alternatives for

[15] To meet requirements of SB 379; CA Government Code §65302

[16] Government Code (GC) 65302.5(b) 14 CCR §§ 1265.00-1265.03 requires the draft element of or draft amendment to the safety element of a county or a city's general plan be submitted to the State Board of Forestry and Fire Protection for any county that contains state responsibility areas or city or county that contains very high fire hazard severity zones. More information is available on the Board of Forestry and Fire protection website: https://bof.fire.ca.gov/projects-and-programs/local-government/

TABLE 5. STATUS OF SAFETY ELEMENT HS4 POLICIES (Urban and Wildland Fires)	
Policy (as Stated in General Plan)	Status of Policy / Implementation Notes
Water supplies may be stored in the form of ponds, storage tanks, or other features acceptable to the Fire Marshal.	improving roadways or reducing hazard vegetation are often sought to meet intent of policy.
HS4E. Utilize appropriate techniques, such as those illustrated in Figure 4-8 *(Fire Protection Measures)*, to reduce fire damage in those areas with a high wildland fire potential. The actual combination of these and/or other techniques required for a particular project will be determined by the Fire Marshal based on the level of hazard involved.	✓ City currently meets this policy through adoption of state and local standards. ✓ Future policies could also expand intent of current policy to further address wildfire risk in the home ignition zone through inspections, regulations, and incentives, and specific actions on open space.
HS4F. Construct emergency-vehicle access routes to open-space areas at optimal locations within developments.	✓ City currently meets this policy and no further action is required.
HS4G. Develop a comprehensive vegetation management and weed-abatement program for open-space areas, including those that are located in existing subdivisions and in new development areas.	✓ City partially meets this policy but additional and ongoing work is necessary, depending on specific locations. ✓ Future policies could support the adoption and implementation of a weed abatement ordinance for existing subdivisions.
HS4H. Consider establishing a program to construct and maintain fire-access roads in ravine areas considered to have a very high fire danger to enhance the ability to suppress wildland fires. These roads need not be surfaced and may also function as part of the City's trail system. Erosion and impacts to native vegetation and natural features shall be minimized.	✓ This policy is no longer relevant / applicable and has been met through other strategies or provisions.
HS4I. Amend subdivision regulations to ensure that cul-de-sac lengths are generally no greater than 600 feet and that sufficient emergency-vehicle turnaround areas are provided. Longer cul-de-sacs may be considered if fire-protection measures, such as residential fire sprinkler systems, are incorporated to ensure the safety of residents and emergency response personnel.	✓ City currently meets this policy and no further action is required.
HS4J. Generally require each residential development having 50 or more dwelling units and each commercial development employing 150 or more people to have at least two connected points of public access as may be determined necessary by the Fire Marshal.	✓ This policy is no longer applicable. ✓ Future policies should support emergency access and requirements for multiple access routes that meet road standards.
HS4K. Maintain and augment mutual and automatic aid agreements with the California Department of Forestry & Fire Protection (CAL FIRE) and Shasta County.	✓ City currently meets this policy and support for agreements should be carried forward in future policies.
HS4L. Continue to promote fire prevention through education and public-awareness programs.	✓ City partially meets this policy but implementation is ongoing based on capacity and resources.

As noted in the table, many policies have been implemented while others are ongoing and could be carried forward to show continued priorities or the need to ensure resources. There is also an opportunity to develop new policies that focus on the city's wildfire planning needs, including a stronger focus on the home ignition zone (to support Recommendation #3) and support for the development of a coordinated approach to planning (see CWPP recommendation below). These policies will build the foundation for a more detailed planning approach to wildfire through a city-specific CWPP, as recommended below.

3. Develop a Community Wildfire Protection Plan

Many communities use CWPPs as the primary planning document for developing, implementing, and tracking wildfire priorities. Given its size, fire history, and urban complexity (i.e., different wildland-urban interface development patterns compared to Shasta County), Redding should either develop its own city-specific CWPP and create a dedicated group to oversee implementation, or ensure that a city-specific Redding addendum is included in the next update of the Shasta County CWPP.

CWPPs have been a national standard of practice since 2003 when the Healthy Forests Restoration Act (HFRA) was signed into law. CWPPs can be implemented at a number of scales, such as neighborhood, fire district, city, and county. CWPPs can also overlap across scales and jurisdictional boundaries. For example, many counties and individual communities develop CWPPs, which can either be formally linked through an adoption process or may be implemented more autonomously at these different scales.

Developing a CWPP that targets the defined local WUI offers many benefits:

- CWPPs are community-based, and ideally engage neighborhood and citizen groups to contribute to the planning process and participate in its implementation. This encourages stakeholders to focus on local risk factors and prioritized actions unique to the city, and also provides the community with a plan that represents multiple local interests.
- The CWPP can become the "collector" of local wildfire and WUI information and track implementation efforts in a coordinated and organized manner.
- A CWPP complying with HFRA provides an avenue for increasing grant and funding opportunities.
- Developing CWPPs on both city and county scales would meet multiple stakeholders' objectives for community risk reduction.
- A CWPP provides an opportunity to address topics and projects that may not fit well in other plans, such as neighborhood evacuation planning and post-fire recovery activities.
- A CWPP is an easy mechanism to report accomplishments, track progress, and prioritize budget requests to city council and the public.

CWPPs must meet three minimum requirements: 1) demonstrate collaboration between local and state agencies, in consultation with federal agencies and other interested parties; 2) identify and prioritize fuel treatments to reduce hazardous fuel areas; and 3) recommend strategies to reduce the ignitability of structures. Beyond these requirements, communities can develop a structure and plan content that fits their needs. An example outline of a CWPP is provided in Appendix A.

Maintaining updated plans and CWPPs are also incentivized by recent legislation that amends the Public Resources Code (Section 4290.1),[17] which states that on or before July 1, 2022, the board shall develop criteria for and maintain a "Fire Risk Reduction Community" list of local agencies located in a state responsibility area or a very high fire hazard severity zone, identified pursuant to Section 51178 of the Government Code, that meet best practices for local fire planning. Criteria used to develop the Fire Risk Reduction Community list include recently developed or updated CWPPs, adoption of the board's recommendations to improve the Safety Element, participation in Fire Adapted Communities and Firewise/USA programs, and compliance with the board's minimum fire safety standards.

Figure 11. A recommended schematic approach for Redding where the CWPP becomes the centralized plan for detailed wildfire activities and links with other plans. Note that many other plan linkages exist, such as connections between the LHMP and General Plan.

[17] Assembly Bill No. 1823 Fire protection: local fire planning, as approved by Governor Newsom on October 2, 2019: https://leginfo.legislature.ca.gov/faces/billCompareClient.xhtml?bill_id=201920200AB1823.

4. Create a Dedicated Wildfire Committee

Successful wildfire planning efforts typically rely on dedicated groups, such as Fire Safe Councils or local wildfire committees, to regularly meet and coordinate planning activities and conduct community engagement activities. CPAW recommends that the city create a dedicated wildfire committee to support the development, update, and implementation of the LHMP wildfire hazard content, General Plan Health and Safety Element wildfire policies, and a future CWPP that meets local needs. The city can leverage expertise from the current Hazard Mitigation Project Team and include community representatives to provide diverse perspectives and promote a sense of shared responsibilities that are required for comprehensive wildfire risk reduction.

The city can formalize this steering committee through a local resolution to ensure the committee is tasked with responsibilities to:

- provide input, guidance, and oversight on plan development and implementation, including prioritizing actions;
- track progress and convene periodic reviews of applicable plans to review and update the action table;
- coordinate ongoing activities and projects.

5. Link Plans

As mentioned above, there are multiple plan linkages that should be implemented as the LHMP, Health and Safety Element, and future CWPP undergo updates or development. Specifically:

- The Health and Safety Element update must include specific references to the LHMP and CWPP. Sample language provided by CAL FIRE to link the Safety Element to the LHMP is provided below[18]:

  "The Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP) for the County/City of _____planning area was developed in accordance with the Disaster Mitigation Act of 2000 (DMA 2000) and followed FEMA's Local Hazard Mitigation Plan guidance. The LHMP incorporates a process where hazards are identified and profiled, the people and facilities at risk are analyzed, and mitigation actions are developed to reduce or eliminate hazard risk. The implementation of these mitigation actions, which include both short and long-term strategies, involve planning, policy changes, programs, projects, and other activities."

  CAL FIRE also recommends including an electronic link to the online LHMP location on the city or county website. This ensure that as the LHMP gets updated, the reference remains current.
- A city-specific CWPP can be connected to the county CWPP either by reference or through a formal adoption process, whereby the Redding CWPP becomes an addendum to the Shasta County CWPP.
- The new REU Wildfire Mitigation Plan should be considered during LHMP, General Plan, and CWPP updates.

[18] To meet requirements of AB 2140; CA Government Code §§65302.6 and 8685.9

CWPP Resources

CPAW has prepared an example CWPP outline that the city can refer to as a resource (see Appendix A). In addition, several guides are available to assist the fire service and communities in preparing CWPPs, as listed in the Implementation section.

RECOMMENDATION 3

Update the City's Wildfire Regulations to More Comprehensively Reduce Risk in the WUI

Revise city codes, including the development review and inspection process, to provide a consistent and comprehensive approach that is guided by hazard severity mapping to more effectively address wildfire hazard through regulation.

Overview of Current Regulations

The City of Redding Municipal Code includes the following codes and ordinances to regulate wildfire hazard: Title 9. Health and Safety (Chapter 9.20 Fire Code) and Title 16. Buildings and Construction, which both adopt the California Code of Regulations Title 24; Building Standards Code (including Chapter 7A) with local amendments; Title 17. Subdivisions; Title 18. Zoning. These regulations are summarized in Table 6.

TABLE 6. SUMMARY OF CURRENT WILDFIRE REGULATIONS IN CITY OF REDDING

Applicable Codes/ Regulations	Overview of Requirements for Wildfire Hazard	Administration and Enforcement	Important Notes
Title 16. Buildings and Construction *adopted by reference:* CCR Title 24 Building Standards California Residential Code (with local amendments)	• Building materials and construction methods for habitable and accessory dwellings over 120 sq. ft. in the VHFHSZ • Driveways • Additions • Fire impact fees	• Administered and enforced by building official	• Title 16 does not refer specifically to the VHFHSZ, or to Title 9 with respect to WUI • This ordinance does incorporate fire impact fees
Title 9. Health and Safety (§9.20 Fire Code) *adopted by reference:* CCR Title 24. Building Standards (Ch. 7A) California Fire Code (Ch.1-80) Appendix Chapters 4, B, C, D, E, F, and standards 2015 International Fire Code of the International Code Council	• Construction requirements • Fire apparatus access • Multiple community access (more than 50 dwellings) • Premise identification • Fire water supply • Open burning • Combustible storage	• Administered by fire code official as appointed by the chief appointing authority • Enforced by fire chief, fire marshal, assistant fire marshal, battalion chiefs, fire captains, fire inspectors, fire prevention specialist, and plans examiner	• §9.20 Fire Code includes locally adopted amendments that address new structures, including decks and patio covers, located in the VHFHSZ

TABLE 6. SUMMARY OF CURRENT WILDFIRE REGULATIONS IN CITY OF REDDING			
Applicable Codes/ Regulations	Overview of Requirements for Wildfire Hazard	Administration and Enforcement	Important Notes
City of Redding Fire Safe Construction and Methods Application Manual for Wildland-Urban Interface Areas (2008) document		(designated officials)	
Title 17. Subdivisions (§17.60.110 Fire Safety)	• Multiple public-street access and limitations on street lengths • Access to open space and natural areas for fire apparatus • Setbacks from adjacent natural areas • Fire-fuel reduction work and fire-fuel management easements • Maintenance of fire fuel reduction areas • Noncombustible fencing materials • Fire sprinkler systems and fire-resistant construction beyond minimum required by building codes • Keypads with emergency code, knox boxes, or other devices for emergency responses to gated communities or restricted-access areas • Other fire-protection measures as supported by the general plan and determined by fire marshal	• Administered and reviewed by development services director • Subdivision design for fire safety reviewed and approved by fire marshal • Advisory agencies are development services director, board of administrative review, and planning commission	• Title 17 includes locally adopted amendments that require "special fire-resistant construction measures for structures and enhanced fire safety and emergency-response accommodations in the final design of the subdivision" for areas in very high fire hazard zones • Provides for a maintenance district for fire-fuel reduction areas
Title 18. Zoning	• Impacts to fire service levels • Open space classifications for fire access and mitigation	• Administered and enforced by Development Services Director	• Does not reference the state fire hazard severity mapping

TABLE 6. SUMMARY OF CURRENT WILDFIRE REGULATIONS IN CITY OF REDDING			
Applicable Codes/ Regulations	Overview of Requirements for Wildfire Hazard	Administration and Enforcement	Important Notes
	• Requirement for fire department permits • Driveway surfacing • Temporary use fire protection, fire vehicle access, and weed maintenance requirements • Development limits on slopes exceeding 20%	• Review and approval powers and duties vary by application type; different authority is granted to City Council, Planning Commission, Board of Administrative Review • Referral agencies include Fire Department	• References adequate open space for fire safety as one purpose of the zoning ordinance • CEQA exemptions for ministerial projects include permits for wildland-fuel management, landscape maintenance districts, and fire department permits for life safety

Findings

Overall, Titles 9 (Fire Code), 16 (Building and Construction) and 17 (Subdivision) of the City of Redding Municipal Code currently contain robust wildfire requirements that apply to new construction. However, during CPAW site visits, document reviews, discussions with staff and stakeholders, and post-Carr Fire reports and observations, the CPAW team identified the following gaps and potential areas where the city can further improve its regulatory process to address wildfire hazard:

- **Fire severity mapping and ordinances.** The current fire severity mapping requires refinement with local amendments (see Recommendation 1). Titles 9, 17, and 18 should reference the WUI, defined as the (updated) combined moderate to very high fire severity zones to ensure the community vulnerabilities are appropriately addressed, including for the most extreme fire events.
- **Structure Ignition Zone (SIZ).** The condition of the individual SIZs in Redding played a significant role in determining the survival of buildings during the 2018 Carr Fire. Although there is some potential to strengthen the current building construction requirements, the primary determinant to structure survival was the presence and arrangement of significant combustible vegetation and other materials within 100 feet of individual structures (i.e., defensible space), and most importantly within the first 30 feet. In most areas in the city, due to development density, the vulnerability of individual structures was also dependent upon the condition of a neighboring property's SIZ conditions. These conditions provided for ember and radiant heat impingement from burning vegetation and other combustibles within the SIZ. These conditions exhibited during the Carr Fire are typical of most WUI fires. As a result, the *entire* SIZ (i.e., building

and defensible space) must be addressed during new construction and through ongoing property maintenance.

- **City of Redding (2008) Fire Safe Construction and Methods Application Manual for Wildland-Urban Interface Areas**. Wildfire regulations are located in multiple codes and ordinances, potentially resulting in a fragmented understanding of requirements for applicants. The Fire Safe Construction Methods and Application Manual is an excellent document referred to by city codes and ordinances pertaining to wildfire that helps address this issue. However, the manual requires updates on building and construction requirements. Moreover, the manual does not address any additional features such as driveways, vegetation, setbacks, and other requirements. Maintaining one central document that incorporates the requirements for the entire SIZ and additional subdivision requirements emphasizes the interdependent relationship between building construction, defensible space, and community design.
- **Subdivisions**. Current fire safety requirements in §17.60.110 are written as a list of provisions that *may* be required, as reviewed and approved by the fire marshal. In addition, there is no standard requirement for a fuel modification plan as part of the application submittal, and lot and block design criteria do not currently consider SIZ mitigation.
- **Zoning**. There are few direct connections between the zoning ordinance and fire safety for the WUI; several sections for other development requirements may also be at odds with reducing wildfire susceptibility in the SIZ. For example, additional conditions for site development permits may include buffers, fences, screening, installation and maintenance of landscape and erosion-control measures, regulation of vehicular ingress and egress, and preservation of trees. There is no apparent process to ensure that any additional conditions imposed by the director, board of administrative review, or planning commission would not inadvertently result in additional wildfire susceptibility on parcels in the WUI.

Regulatory Recommendations

Addressing the findings from CPAW's regulatory analysis will result in a more transparent and objective process for all types of applications, and more comprehensively reduce wildfire risk to people, property, and other values at risk. The following recommendations aim to achieve these goals:

1. Adopt Additional Wildfire Regulations in the Fire Code and Subdivision Regulations

Adopt additional wildfire regulations in the fire code and subdivision regulations, including defensible space and building standards, to supplement the city's current approach to wildfire risk reduction.

Applicability

The following standards should apply in all WUI-designated areas (areas of the city rated as moderate or above). See Recommendation 1 for more details.

New Requirements – Building

Although the City of Redding has adopted the state's WUI mitigation requirements with more stringent local amendments[19], as outlined in the City of Redding (2008) Fire Safe Construction and Methods Application Manual for Wildland-Urban Interface Areas, there is still some room for improvements guided by the latest science and industry best practices:

a) The current requirements for non-combustible wire mesh for attic, eave and cornice vents with 1/4-inch openings should be changed to non-combustible wire mesh with 1/8-inch wire mesh openings.

b) The current requirements for exterior windows, window walls, glazed doors and glazed openings with exterior doors should be changed from "…where there is a wildfire exposure such as on the sides of the structure that face the wildland areas..." to all sides of the structure.

c) Add a requirement for all wall vents and openings that provide access to interior spaces of the structure to be self-closing or screened with non-combustible screen with 1/8-inch opening, or its equivalent with self-closing louvers or flaps to prevent the entry of sparks or burning embers. Exception: dryer vents will only be equipped with self-closing louvers or flaps

d) Add requirement for 6 inches of vertical non-combustible surface above finished grade on all exterior walls.

New Requirements – Defensible Space

Add the following prescriptive landscaping requirements to Chapter 9.20 Fire Code, which are supported by state and nationally accepted science-based best practices for defensible space:

a) No combustible fencing material should be located within five feet of a habitable structure or its projections.

b) All accessory buildings* within 50 feet** of a habitable structure should be mitigated to the same WUI standard as the habitable structure.

c) There should be a minimum of five feet of non-combustible surface, free of vegetation and all combustible materials (e.g., mulch, construction storage, planters, outdoor furniture cushions, flammable materials) between the outer walls and projections of a habitable structure.

d) A minimum of 30 feet** horizontal distance between tree crowns, and the furthest extent of any habitable structure should be maintained as determined by the City Manager, Fire Marshal, or their designees.

e) All retained trees within 100 feet** of a habitable structure should be pruned to a minimum of 6 feet above grade level, to a maximum of 1/3 of the total crown height.

f) All grasses, weeds and forbs within 30 feet** of a habitable structure should be maintained at a height no higher than six inches.

g) All firewood and combustible material should be stored a minimum distance of 30 feet* from a habitable structure, or within an approved ember-proof structure.

[19]City of Redding. 2008. Fire Safe Construction and Methods Application Manual for Wildland-Urban Interface Areas

h) All surface litter, organic material or other vegetative debris within 30 feet* of a habitable structure should be maintained at a depth of no deeper than four inches.

i) All propane tanks should have a non-combustible surface maintained under and within five feet of them; and should have a minimum clearance of ten feet from any vegetation or combustibles.

j) Develop a list of fire-resistant plants that focuses on the specific structure and location characteristics of plants (size, spacing, species, dead plant material retention, chemical composition) that will minimize fire ignition and spread.

k) Develop a prohibited plant list; no trees or plants listed in the prohibited plant list should be planted or maintained on the property.

*** This includes accessory buildings not requiring a building permit.**
****Mitigation must occur to minimum slope adjusted distance stated, or property line, whichever is less**

New Requirements – Subdivision

Subdivision design requirements for fire safety should be provided during the initial subdivision design review phase to ensure consistency for all applicants. In addition, subdivision design requirements should support individual SIZ regulation implementation through lot design criteria. Applicable updates to Title 17. Subdivisions should reference other WUI requirements (e.g., fire code).

a) Provide current wildfire-specific subdivision requirements in the City of Redding (2008) Fire Safe Construction and Methods Application Manual for Wildland-Urban Interface Areas document and reference the requirements in Title 17.

b) Specifically reference wildfire in development setback requirements and ensure slope adjustments are made for defensible space.

c) For subdivisions that are intended to be platted in phases, require that fuel modification prescriptions and subdivision improvements for fire safety are identified within each phase.

d) Identify defensible space/fuel modifications around each building envelope (i.e., SIZ) and applicable common areas.

e) Update lot and block design criteria to include a provision that ensures all proposed lots are designed to accommodate fire mitigation prescriptions (i.e., defensible space) in the SIZ within their proposed lot boundaries and/or the parent parcel.

New Requirements – Existing Property Fire Hazard Abatement

Requirements for clearing of vegetation, or other combustible materials to address the conditions on existing properties that present a wildfire hazard to neighboring properties, or the community will reduce the potential for wildfire propagation between properties. These challenges are different with parcels of various size and use:

- Vacant parcels that pose a threat to adjacent land uses due to overgrown hazardous vegetation that is not being treated to mitigate wildfire through mowing, thinning, cutting, prescribed burning or other appropriate methods.
- Larger parcels that may have adequate defensible space for the structures on their property but pose a threat to neighboring properties (particularly structures) due to overgrown hazardous vegetation that has not been mitigated beyond their property's defensible space requirements.

- Smaller parcels that pose a threat to structures on their own property and adjacent neighbors due to overgrown hazardous vegetation, debris, or the storage of combustible materials (e.g., unused lumber, equipment, rubbish).

It is difficult to define size thresholds for “large” and “small” parcels due to multiple factors that may include: the location and size of existing structures on a parcel; setback requirements based on zoning; relationship (distance) between structures on adjacent property; and topography (slope) or other site features that would extend defensible space requirements beyond 100 ft. See Figure 12 for an example of overlapping Home (Structure) Ignition Zones.

As a result, fire hazard clearance requirements should **achieve the following outcomes**, regardless of parcel size:

- Vacant properties that pose no threat to adjacent properties and structures.
- Structures and properties that minimize the risk of wildland fires caused by a structure fire spreading to the property and adjacent properties.
- Properties that minimize the risk of wildland fires spreading and posing threats to existing structures and neighboring properties and structures.
- Properties that minimize the risk of wildland fires compromising the safety of the public and first responders.

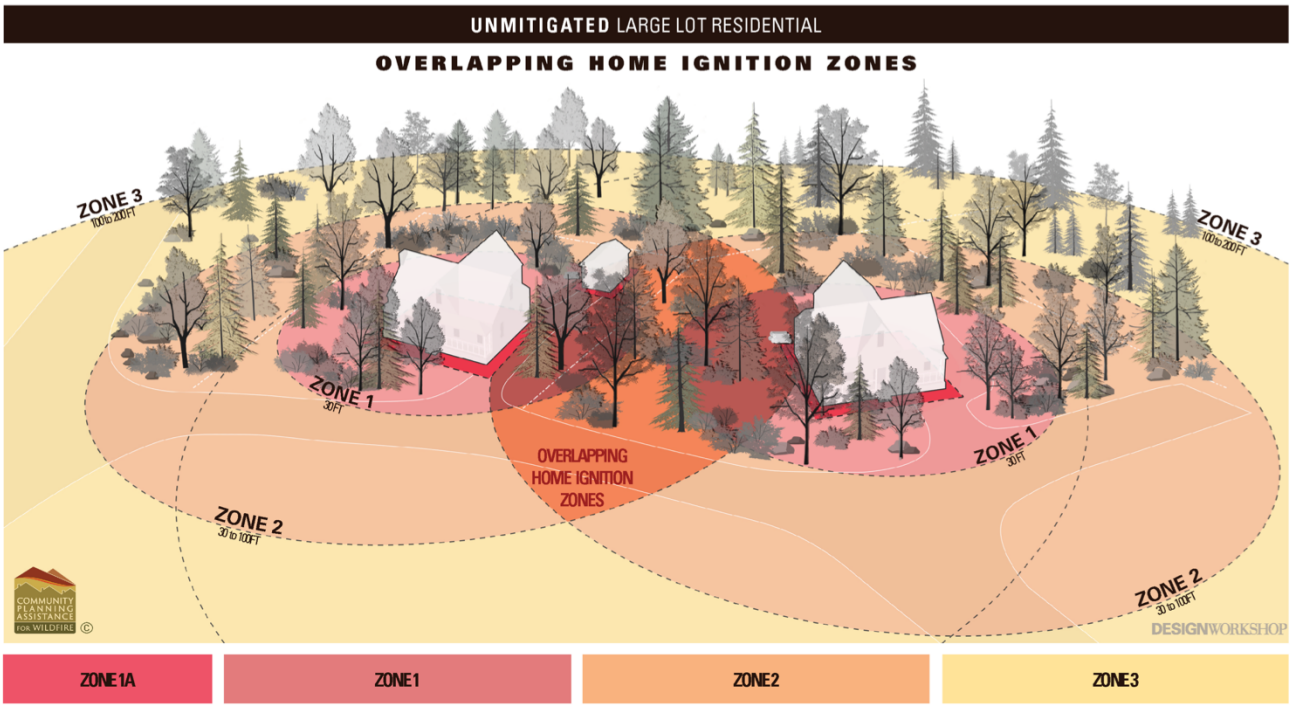

Figure 12. Property owners have a difficult time achieving defensible space requirements when the Home Ignition Zone overlaps with adjacent properties, as shown in this example of two unmitigated large residential lots.

To accommodate the number of factors that may exist across different sites, CPAW recommends that the city use a combination of prescriptive and performance-based hazard abatement approaches as described below:

- Maintain defensible space requirements of 100 feet per (see additional recommendations above) around all structures within the WUI.
- Maintain defensible space on any portion of the property that is within 100 ft. of adjacent habitable structures.
- Maintain defensible space along private driveways and all roads to achieve a minimum distance of 100 ft. (or further, when adjusting for slopes) from the center line of the road or driveway.

Reviews, Approvals, Inspections

Set up staff and applicants for increased success by making improvements to the development review and application process:

a) Evaluate the current permit application submittal and review process to identify where capacity issues can be addressed by streamlining the plan submission and tracking process. For example, planning staff can review and approve prescriptive regulatory requirements prior to the City Fire Department staff performing a review of performance-based alternatives for both individual lot and subdivision level developments to ensure they meet the same intent.

b) Provide an alternative process in which a wildfire mitigation plan developed by a qualified professional is submitted for review and approval by city staff for both the subdivision and individual lot scales.

c) Adopt a standardized SIZ assessment process that can be used by all staff conducting new and existing parcel level assessment that are triggered by permitting requirements.
    - Focus on integrating new development inspections into the current framework of subdivision and building permit site inspections, using existing staff by providing additional training for land-use planners and building officials.
    - Develop a standardized inspection program that is focused on new development, with the flexibility to expand to existing development in either a voluntary or regulatory framework, if capacity is available.

d) Establish a coordinated final inspection (new development for subdivisions or Certificate of Occupancy) and existing property inspection and enforcement process for city staff to address capacity issues, for example:
    - Fire staff conducting defensible space inspections in conjunction with other required certificate of occupancy inspections;
    - Building inspectors conducting defensible space inspections while conducting certificate of occupancy inspections.

e) Update existing city web pages to create a centralized location that hosts the above information and includes user-friendly summaries and guidance.

2. Update and Integrate the Fire Safe Construction and Methods Application Manual for Wildland-Urban Interface Areas with Ordinances

Update the City of Redding (2008) Fire Safe Construction and Methods Application Manual for Wildland-Urban Interface Areas document to include all of the new and existing SIZ requirements, including current requirements for decks and protruding structures that are not

contained in this manual. Add explanatory information for current and prospective property owners, developers, builders, landscapers, real estate and insurance agents, and other industry professionals and members of the public. This information could also cover the types of permits subject to wildfire regulations by the city, the process for application, review, approval, and inspection, guidance on achieving mitigation (e.g., photos, illustrations, design manuals), and any complementary programs and resources. This promotes wildfire as a top priority for the community and helps remove barriers for compliance. The document can also act as additional guidance on SIZ best practices for any existing properties not subject to regulation but interested in voluntary implementation of wildfire hazard reduction.

In addition, update Titles 9, 17, and 18 to reference this document. This will allow for the regular update of a single document to respond to the most current science and best practices and provide one single source of information for users.

3. Reconcile Zoning Ordinance with Wildfire Safety Requirements

Ensure that any conditions, exceptions, or alternatives to application submittal requirements do not result in increased wildfire hazard in the SIZ or adjacent uses. Where applicable, provide additional incentives to incorporate wildfire hazard into the development process. For example:

a) Zoning exceptions that allow for the reduction of buffer yard and building separation minimums should not result in increased wildfire hazard (§18.15.030).

b) Any reduction in site development standards to provide incentives to housing developers, such as reductions in the minimum lot sizes and/or dimensions or minimum building setbacks, should not result in increased wildfire hazard (§18.26.070).

c) Density increases may include site or building design features that increase fire-resistant plantings, noncombustible zones, or additional ignition-resistant construction (§18.31.040).

d) Small-lot subdivisions must meet fire safety standards as reviewed and approved by the fire marshal (§18.31.050).

e) Reasonable conditions on use permits and site development permits should include additional wildfire hazard mitigation (§18.13.100, 18.14.080).

f) Include a requirement to reference the WUI (i.e., the redefined areas of the VHFHSZ, per Recommendation 1) in zoning application materials for site development permits and use permits (§18.13.060, 18.14.040).

Capacity Resources and Guides

Capacity to implement more stringent wildfire regulations is a challenge experienced by many communities. The next section, Implementation, provides guidance and resources to address capacity concerns and support the development and adoption of additional wildfire requirements.

IMPLEMENTATION

Update Materials and Provide Resources to Support Increased Adoption of Wildfire Policies and Regulations

Explore recognition programs, educational materials, and funding opportunities to support and incentivize communities and residents in taking action to address local wildfire hazard.

Recommendations in this report are directed towards developing policies, regulations, and related activities to address critical gaps in the city's wildfire vulnerabilities—primarily in areas referred to as the Structure Ignition Zone (SIZ). The list of information and examples below has been created for Redding based on the three CPAW recommendations in this report.

Recognition Programs

Recognition programs are designed to motivate residents to take action on their properties and neighborhoods. These programs are typically voluntary and therefore are also helpful in reaching residents and properties that are not subject to regulatory requirements, or who are seeking to go above and beyond minimum WUI requirements. Recognition programs may also offer benefits such as discounted insurance rates.

Property Assessment Programs

Two examples of programs that offer customized parcel-level SIZ assessments and one-on-one education opportunities include the Wildfire Partners and REALFire programs—both in Colorado. These programs can align or integrate regulatory requirements; they also provide measurable and trackable risk reduction, with additional economic benefits to the property owners. Both programs consist of an assessment and follow-up inspection and provide a resulting property-specific report to the property owner. Upon completion of required actions outlined in the report, the property owner receives a certificate that can be used as proof of mitigation for insurance or real estate transactions.

- **Wildfire Partners Program,** Boulder County, CO. The Wildfire Partners program is part of Boulder County's Land Use Department and is incorporated into Boulder County's building code: www.wildfirepartners.org/.
- **REALFire,** Community Wildfire Planning Center, Eagle County, CO. The REALFire program was developed in partnership with the Vail Board of Realtors®. The program is part of Eagle County's Land Use Department and aligns with the county's building regulations: http://realfire.net/.

Firewise USA®

NFPA's Firewise USA® program teaches people how to adapt to living with wildfire and encourages neighbors to work together and take action to prevent home losses. Nationally, there are 1,500 recognized Firewise USA® sites; several sites near Redding are recognized, including Shasta Forest Village, Lewiston, Trinity Center, and Weaverville. The Departments of Insurance in seven states, including California, have approved filings by USAA to give

homeowners insurance discounts to USAA members living in communities recognized by the Firewise USA® program.[20] More information and free resources are available on firewise.org.

Resources and Guides

The City of Redding has a *Fire Safe Building Construction & Methods for Wildland-Urban Interface Fire Areas Application Manual* (2008) that provides information to prospective applicants on the requirements for new buildings located in the VHFHSZ or designated WUI area. Due to its publication date, some information has changed, such as the WUI products list (Appendix A); there are also additional requirements for decks and protruding structures that are not contained in this manual (see Recommendation 3). CPAW recommends that when this manual is next updated, the city can review additional resources to integrate into the next version.

CPAW Visuals

CPAW has developed a suite of technical visual materials that communities can use to explain home ignition zone concepts. These visuals are in multiple formats and will be delivered to the city during transmittal of the final report. See Figure 13 for an example.

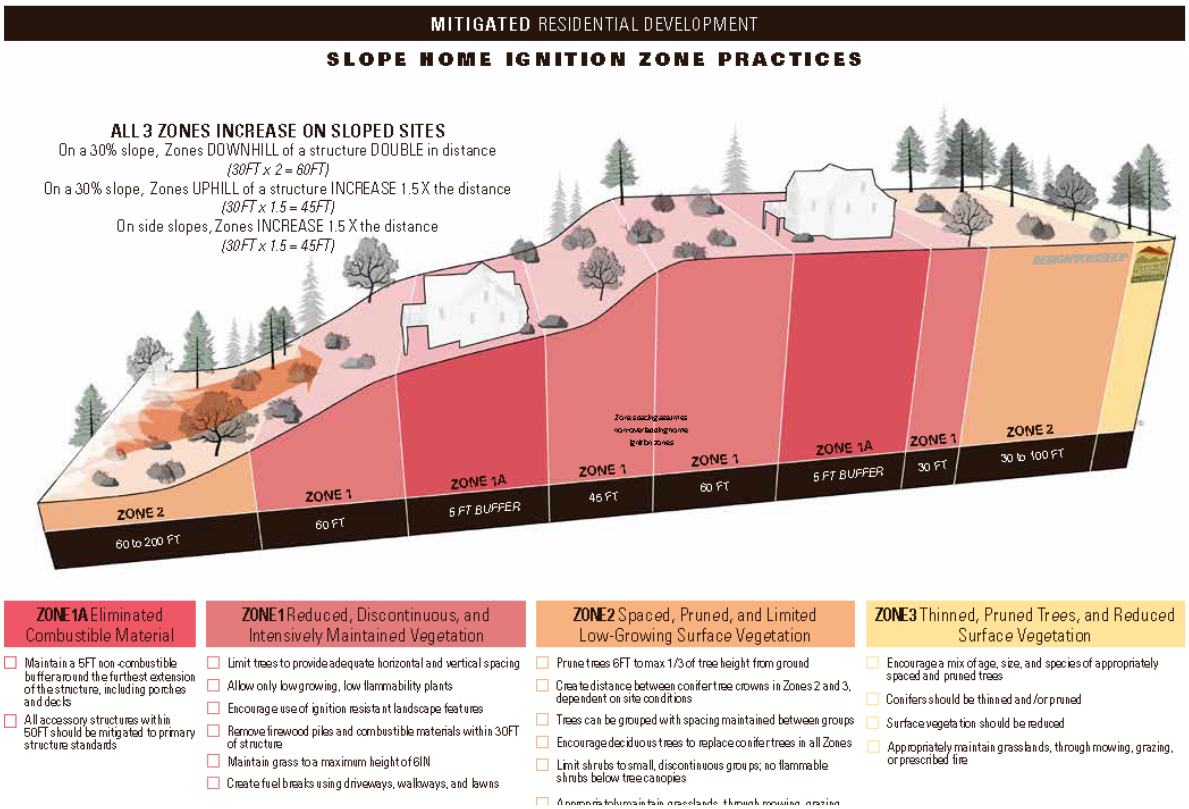

Figure 13. CPAW technical visuals may be a helpful aid to complement Redding's education and outreach efforts. The example above shows setbacks and vegetation management adjustments on a slope.

[20] More information is available at the Firewise USA website: https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA/Become-a-Firewise-USA-site/Program-benefits/Insurance-discounts-for-USAA-members-in-seven-states.

Educational Materials

- **Insurance Institute for Business and Home Safety (IBHS)** provides wildfire resources on its website, such as ember demonstration videos and how-to guides for homes and businesses. This includes a free downloadable 40-page Wildfire Retrofit Guide - California edition: https://disastersafety.org/wp-content/uploads/2019/03/Wildfire-Retrofit-Guide-California_IBHS.pdf.
- **University of California Cooperative Extension (UCCE) has a dedicated webpage on** Wildfire Preparation and Recovery, which lists resources and information to help property owners prepare their homes and landscapes, learn about evacuation planning, and more. Detailed explanatory information on roofs, vents, vegetation, decks, windows, eaves, and siding conforms with CA state requirements: https://ucanr.edu/sites/fire/Wildfire_Preparation_-_Recovery/.

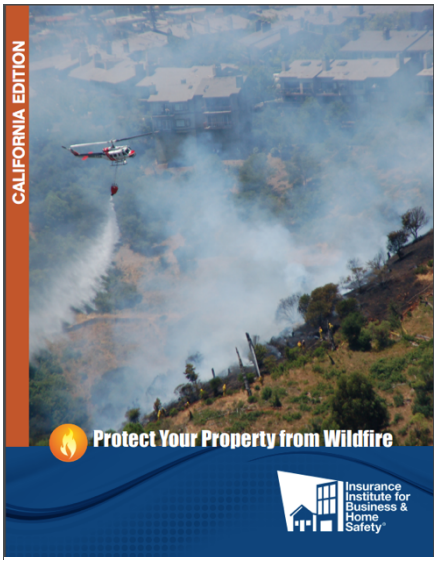

Figure 14. IBHS has a California edition of its home retrofit guide that includes information on Chapter 7A.

CWPP Resources

- The International Association of Fire Chiefs (IAFC) offers a **CWPP Leader's Guide** specifically aimed at leaders in the fire service: https://www.iafc.org/topics-and-tools/resources/resource/cwpp-leader-s-guide.
- Forests and Rangelands, a cooperative effort between DOI and USDA land management agencies, offers several **CWPP handbooks** on its website to help communities develop and implement these plans: https://www.forestsandrangelands.gov/resources/communities/index.shtml.

Fire-Resistant Plant Lists

The International Code Council's International Wildland-Urban Interface Code (IWUIC) contains an informational Appendix F: Characteristics of Fire-Resistive Vegetation that compiles eight characteristics of fire-resistive vegetation that can be used in WUI areas to reduce the likelihood of fire spread through vegetation.

Funding Opportunities

Redding Electric Utility

City fire and planning departments are encouraged to engage with REU to explore funding for wildfire mitigation position(s) that can support an SIZ inspection and education program.

California Fire Safe Council

The California Fire Safe Council maintains a website that provides resources and grants and funding information. Although many of the funding opportunities listed in the 2019 Grants Clearinghouse Application Handbook for Fire Prevention Grants for Non-Federal Lands have

already passed, others are typically available on an annual basis, and the city can anticipate similar opportunities in next year's cycle. Learn more: www.cafiresafecouncil.org.

Coalitions and Collaboratives

Coalitions and Collaboratives (COCO) offers the Action, Implementation and Mitigation (AIM) grant opportunity designed to help organizations increase their capacity to help accelerate fire adapted community concepts and reduce the risk from wildfire in the WUI. Activities such as the development of CWPPs are eligible. The 2019 application closed on October 11, 2019. The opportunity is open to non-profit organizations, collaborative groups, fire departments, tribes, counties and cities. More information is available at: https://co-co.org/get-involved/grants/aim-grant/.

CONCLUSION AND NEXT STEPS

Planning for wildfires is a dynamic process. At a state level, legislation in California is evolving to more comprehensively address risk reduction following years of devastating fires. At a local level, the City of Redding has multiple upcoming opportunities to update plans, revise or adopt new regulations, and re-evaluate their applicability across the city. While some of these local opportunities are approaching quickly, such as the LHMP update, others may take more time to fully develop and implement, such as the implementation of a CWPP.

This report is intended to serve as a long-term roadmap for the city in guiding a wildfire risk reduction process through appropriate land use planning strategies based on the following recommendations:

1. Locally Assess and Identify the Wildland-Urban Interface (WUI) and Wildfire Risk
2. Implement a Roadmap for Current and Future Wildfire Plans and Activities
3. Update the City's Wildfire Regulations to More Comprehensively Reduce Risk in the WUI

CPAW recommendations were developed at a specific point in time, and it's important to recognize that as local and state conditions progress, so too may the implementation details of each recommendation. In some cases, pressing issues of increasing wildfire risk and safety, changes in insurance coverage, the need to maintain healthy landscapes, and other local factors may necessitate swift action. In other cases, implementation of some recommendations may require more time and not all changes can occur overnight.

Finally, the intention of this report is to provide ambitious wildfire risk reduction, not additional onerous tasks for the community. While upfront work will be required, the ultimate goal is to create a more efficient process that results in shared responsibility of risk. For example, creating a multi-stakeholder group to guide the development of a new CWPP should ultimately create a system that spreads accountability, tracks successes, and informs and engages the public. Similarly, implementing additional structure ignition zone requirements reduces the long-term exposure of residents and decreases the disaster loss cycle in the WUI. With a previous track record of collaboration, the recent adoption of the REU Mitigation Plan and associated funding, and a strong recovery effort, the city is well-positioned to conduct future activities in a coordinated and effective manner.

APPENDIX A: CWPP Example Outline

CWPPs have been a national standard of practice since 2003 when the Healthy Forests Restoration Act (HFRA) was signed into law. CWPPs must meet three minimum requirements: 1) demonstrate collaboration between local and state agencies, in consultation with federal agencies and other interested parties; 2) identify and prioritize fuel treatments to reduce hazardous fuel areas; and 3) recommend strategies to reduce the ignitability of structures.

CWPPs can vary greatly in their size, scope, level of detail, and organization. The following table provides an example outline for a CWPP that aligns with the National Cohesive Wildland Fire Management Strategy[21] by incorporating its three primary goals: resilient landscapes, fire adapted communities, and safe and effective wildfire response.

TABLE A.1: EXAMPLE OUTLINE FOR COMMUNITY WILDFIRE PROTECTION PLAN	
Front Matter/ Introduction	
Acknowledgments and Signature Page	• Shows collaboration and required agency signatures per Healthy Forest and Restoration Act requirements
Executive Summary	• Provide overview of CWPP • Align CWPP goals with Healthy Forest Restoration Act requirements • Summarize key topics and takeaways, such as priority actions, highest risk areas; notable achievements from prior CWPP • Identify other plans, policies, and regulations that support the implementation of CWPP
Part 1: Understanding the Local Environment	
Area Description of Community, Key Demographics	• Provide information to help readers understand broad influences on the planning area, including: ○ Narrative description of geographic location and significant features ○ Local land ownership

[21] The Federal Land Assistance, Management, and Enhancement Act of 2009 (FLAME Act) mandated the development of a national cohesive wildland fire management strategy to comprehensively address wildland fire management across all lands in the U.S. Since that time, the National Cohesive Wildland Fire Management Strategy has worked collaboratively with federal, state, local, and tribal governments and non-governmental partners and public stakeholders to establish a national vision and priorities for wildland fire management. More information is available on the USDA Forests and Rangelands website: www.forestsandrangelands.gov.

TABLE A.1: EXAMPLE OUTLINE FOR COMMUNITY WILDFIRE PROTECTION PLAN	
	○ Key demographics to consider when planning for local/vulnerable populations
Defining the Wildland-Urban Interface	• Provide a formal definition and spatial delineation of WUI areas that reflect the set of conditions resulting in negative wildfire impacts on community
Fire Environment, Fire Weather, Fire History	• Include inputs to the current hazard assessment to illustrate the fire environment and explain general implications for the community • Reference other planning documents, such as the hazard mitigation plan, which may provide additional information on local fire history
Part 2: Risk Assessment	
Risk Assessment	• Explain wildfire risk triangle to ensure readers understand the three primary components that drive risk: likelihood, intensity, susceptibility • Describe the potential wildfire risk, and explain outputs with interpretations and general implications for the community • See CPAW Recommendations for additional information related to hazard and risk assessments
Part 3. Taking a Cohesive Strategy Approach	
Resilient Landscapes	• Describe resilient landscape concepts, including local fire ecology and ecosystems, habitat types, watersheds, and primary stakeholders engaged in resilient landscape activities: ○ Risk assessment outputs for landscapes ○ Prioritized recommendations for mitigation ○ Ecology/Ecosystem-based fire management ○ Fuel treatments for landscapes (public and private) ○ Role of prescribed fire and smoke management ○ Post-fire effects and recovery ○ Land management planning (state, national forest)
Fire Adapted Communities	• Describe fire adapted community concepts, including recent development trends and anticipated future growth in the WUI, and primary stakeholders engaged in fire adapted community activities: ○ Risk assessment outputs for communities ○ Prioritized recommendations for mitigation ○ Structural ignitability, property management and maintenance ○ Community values at risk (critical infrastructure, water supplies, cultural/tribal/historical sites, open space/recreation) ○ Public education/outreach programs ○ Local government land use planning tools (policies, regulations, codes)

TABLE A.1: EXAMPLE OUTLINE FOR COMMUNITY WILDFIRE PROTECTION PLAN	
Response and Suppression Capabilities	• Describe response and suppression capability concepts, including fire response topics, challenges and opportunities, and primary stakeholders engaged in response and suppression activities: ○ Risk assessment outputs for response agencies ○ Prioritized recommendations for mitigation ○ Response and suppression capabilities ○ Limitations in the community (fire flow, ingress/egress) ○ Emergency management/evacuation planning ○ Interagency cooperation ○ Existing coverage gaps
Part 4: Implementation and Action Plan	
Implementation Strategy and Action Plan	• Provide an action table to identify all CWPP actions • Include assigned lead agency, timeframe for implementation, funding or resources required, potential sources of funding, and other applicable notes for implementation
Implementation and Plan Monitoring	• Identify frequency of plan updates and other monitoring mechanisms (e.g., whether CWPP update is associated with other plan updates)
Appendices	
Definitions	• Include a glossary of definitions and list of acronyms
Additional Materials	• Include record of public engagement, additional resources

APPENDIX B: DEFINITIONS

The following list of definitions is intended to aid understanding of terms associated with CPAW recommendations.

Aerial Fuels - Standing and supported live and dead combustible materials not in direct contact with the ground and consisting mainly of foliage, twigs, branches, stems, cones, bark, and vines.[22]

Built Fuels - Combustible structures, including buildings and infrastructure.

Burn Probability - The probability or effect of a wildland fire event or incident, usually evaluated with respect to objectives.

Burn Severity - A qualitative assessment of the heat pulse directed toward the ground during a fire. Burn severity relates to soil heating, large fuel and duff consumption, consumption of the litter and organic layer beneath trees and isolated shrubs, and mortality of buried plant parts.[23]

Community Wildfire Protection Plan (CWPP) - A plan developed in the collaborative framework established by the Wildland Fire Leadership Council and agreed to by state, tribal, and local government, local fire department, other stakeholders and federal land management agencies managing land in the vicinity of the planning area. A CWPP identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment on federal and non-federal land that will protect one or more at-risk communities and essential infrastructure and recommends measures to reduce structural ignitability throughout the at-risk community. A CWPP may address issues such as wildfire response, hazard mitigation, community preparedness, or structure protection - or all the above.[24]

Conduction Heat - Transfer of heat through direct contact of material.

Convection Heat - The movement caused through the rising of a heated gas or liquid.

Critical Facilities - FEMA defines critical facilities as "facilities/infrastructure that are critical to the health and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police, fire stations, and

[22] National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.
[23] National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.
[24] National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.

hospitals." In addition, CPAW recognizes emergency water-pumping stations, egress routes, communication facilities, and backup power supplies as critical facilities.

Crown Fire - A fire that advances from top to top of trees or shrubs more or less independently of a surface fire. Crown fires are sometimes classed as running or dependent to distinguish the degree of independence from the surface fire.[25]

Defensible Space - The selection, location, grouping, and maintenance of vegetation on the property in such a manner that the opportunity for fire to burn directly to a structure is minimized.[26]

Ecosystem-Based Fire Management - The incorporation of the natural or desired ecological role of fire into the management and regulation of community's natural areas.

Effects - The anticipated benefits and losses associated with exposure to a hazard or event, in this case fire.

Embers - *See firebrand.*

Exposure - The contact of an entity, asset, resource, system, or geographic area with a potential hazard. Note: In incident response, fire responder exposure can be characterized by the type of activity.[27]

Fire Adapted Community (FAC) - A human community consisting of informed and prepared citizens collaboratively planning and taking action to safely coexist with wildland fire.[28]

Fire Effects - The physical, biological, and ecological impacts of fire on the environment, or, the physical, safety, health, social, and economic impacts of fire on humans and human development. This is often expressed as first order (immediate effects) and second order (subsequent effects as a result of first order effects).

Fire Intensity - Commonly referred to as fire line intensity, this is the amount of heat energy that is generated by burning materials.

Fire Weather - Weather conditions that influence fire ignition, behavior, and suppression.[29]

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[25] National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.
[26] National Fire Protection Association. 2018. NFPA 1144: *Standard for Reducing Structure Ignition Hazards from Wildland Fire.* Available at https://catalog.nfpa.org/NFPA-1144-Standard-for-Reducing-Structure -Ignition-Hazards-from-Wildland-Fire-P1414.aspx?icid=B575.
[27] Thompson, Matthew P., Tom Zimmerman, Dan Mindar, and Mary Taber. 2016. *Risk Terminology Primer: Basic Principles and A Glossary for the Wildland Fire Management Community.* Gen. Tech. Rep. RMRS- GTR-349. Fort Collins, Colo.: USDA Forest Service Rocky Mountain Research Station. Available at www.fs.usda.gov/treesearch/pubs/50912.
[28] Fire Adapted Communities Coalition. 2018. "What is a Fire-Adapted Community?" Available at https://fireadapted.org.
[29] National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.

Firebrand - Any source of heat, natural or human made, capable of igniting wildland fuels; flaming or glowing fuel particles that can be carried naturally by wind, convection currents, or by gravity into unburned fuels.[30]

Firewise USA - A program administered by the National Fire Protection Association that teaches people how to adapt to living with wildfire and encourages neighbors to work together and take action to prevent losses. Some communities have applied the term "firewise" more broadly to refer to wildfire mitigation activities.

Frequency - The number of occurrences of an event per a specified period of time.

Fuel Treatment - Manipulation or removal of fuels to reduce the likelihood of ignition or to lessen potential damage and resistance to control (e.g., lopping, chipping, crushing, piling, and burning).[31]

Fuels - All combustible materials in the wildland-urban interface, including but not limited to vegetation and structures.[32]

Ground Fuel - All combustible materials below the surface litter, including duff, tree or shrub roots, punky (rotted) wood, peat, and sawdust, that normally support a glowing combustion without flame.[33]

Hazard - Any real or potential condition that can cause damage, loss, or harm to people, infrastructure, equipment, natural resources, or property.[34]

Hazard Reduction - Coordinated activities and methods directed to reduce or eliminate conditions that can cause damage, loss, or harm from real or potential hazards.

Home Ignition Zone (HIZ) - Also see *structure ignition zone.* The area where the factors that principally determine home ignition potential during extreme wildfire behavior (high fire intensities and burning embers) are present. The characteristics of a home and its immediate surroundings within 100 feet comprise the HIZ.[2]

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30 National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.

31 National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.

32 National Fire Protection Association. 2018. NFPA 1144: Standard for Reducing Structure Ignition Hazards from Wildland Fire. Available at https://catalog.nfpa.org/NFPA-1144-Standard-for-Reducing-Structure -Ignition-Hazards-from-Wildland-Fire-P1414.aspx?icid=B575.

33 National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.

34 Thompson, Matthew P., Tom Zimmerman, Dan Mindar, and Mary Taber. 2016. Risk Terminology Primer: Basic Principles and A Glossary for the Wildland Fire Management Community. Gen. Tech. Rep. RMRS- GTR-349. Fort Collins, Colo.: USDA Forest Service Rocky Mountain Research Station. Available at www.fs.usda.gov/treesearch/pubs/50912.

Hydrophobic Soils - Resistance to wetting exhibited by some soils, also called water repellency.[35]

Infill Development - Development characterized by development or redevelopment of undeveloped or underutilized parcels of land in otherwise built-up areas, which are usually served by or have ready access to existing infrastructure and services.

Infrastructure - The basic physical structures and facilities (e.g., buildings, roads, and power supplies) needed for the operation of a community.

Initial Attack (IA) - A preplanned response to a wildfire given the wildfire's potential. Initial attack may include sizing up, patrolling, monitoring, holding action, or suppression.[36]

Ladder Fuels - Fuels that provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help initiate and assure the continuation of crowning.[37]

Landscape Scale - A large spatial scale, which addresses multiple land uses, ecosystem services, and conservation objectives. Landscape-scale approaches focus on achieving multiple environmental, economic, and social objectives across the defined area.

Mitigation - The act of modifying the environment or human behavior to reduce potential adverse impacts from a natural hazard. Mitigation actions are implemented to reduce or eliminate risks to persons, property, or natural resources, and can include mechanical and physical tasks, specific fire applications, and limited suppression actions.[38]

Natural Hazard - Source of harm or difficulty created by a meteorological, environmental, or geological event.

Preparedness - Activities that lead to a safe, efficient, and cost-effective fire management program in support of land and resource management objectives through appropriate planning and coordination.[39]

Prescribed Fire - Any fire intentionally ignited by management actions in accordance with applicable laws, policies, and regulations to meet specific objectives.[40]

Prevention - Activities directed at reducing the incidence of fires, including public education, law enforcement, personal contact, and reduction of fuel hazards (fuels management); actions

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[35] National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.
36 National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.
37 National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.
38 National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.
39 National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.
40 National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.

to avoid an incident, to intervene for the purpose of stopping an incident from occurring, or to mitigate an incident's effect to protect life and property.[41]

Radiation Heat - Transmission of heat through waves or particles.

Residual Risk - Risk that remains after risk control measures have been implemented.

Resiliency - The ability to prepare and plan for, absorb, respond, recover from, and more successfully adapt to adverse events.[42]

Risk - A measure of the probability and consequence of uncertain future events.[43]

Risk Acceptance - A strategy that involves an explicit or implicit decision not to take an action that would affect all or part of a particular risk.

Risk Assessment - A product or process that collects information and assigns values (relative, qualitative, quantitative) to risks for the purpose of informing priorities, developing or comparing courses of action, and informing decision making.

Risk Assessment - Product or process that collects information and assigns values to risks for the purpose of informing priorities, developing or comparing courses of action, and informing decision making.[44]

Risk Avoidance - A strategy that uses actions or measures to effectively remove exposure to a risk.

Risk Based Decision Making - A decision-making process that relies on the identification, analysis, assessment, and communication of wildland fire risk as the principal factors in determining a course of action to improve the likelihood of achieving objectives.

Risk Communication - An exchange of information with the goal of improving the understanding of risk, affecting risk perception, or equipping people or groups to act appropriately in response to an identified risk.

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41 National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.

42 National Academies of Sciences. 2018. "Resilience at the Academies." Available at www.nationalacademies.org/topics/resilience.

43 Thompson, Matthew P., Tom Zimmerman, Dan Mindar, and Mary Taber. 2016. Risk Terminology Primer: Basic Principles and A Glossary for the Wildland Fire Management Community. Gen. Tech. Rep. RMRS- GTR-349. Fort Collins, Colo.: USDA Forest Service Rocky Mountain Research Station. Available at www.fs.usda.gov/treesearch/pubs/50912.

44 Thompson, Matthew P., Tom Zimmerman, Dan Mindar, and Mary Taber. 2016. Risk Terminology Primer: Basic Principles and A Glossary for the Wildland Fire Management Community. Gen. Tech. Rep. RMRS- GTR-349. Fort Collins, Colo.: USDA Forest Service Rocky Mountain Research Station. Available at www.fs.usda.gov/treesearch/pubs/50912.

Risk Management - A comprehensive set of coordinated processes and activities that identify, monitor, assess, prioritize, and control risks that an organization faces.

Risk Mitigation - The application of measures to alter the likelihood of an event or its consequences.

Risk Perception - Subjective judgment about the characteristics and magnitude of consequences associated with a risk.

Risk Reduction - A decrease in risk through risk avoidance, risk control, or risk transfer.

Risk Transfer - A strategy that uses actions to manage risk by shifting some or all of the risk to another entity, asset, resources, system, or geographic area.

Structure Fire - Fire originating in and burning any part or all of any building, shelter, or other structure.[45]

Structure Ignition Zone (SIZ) - *Also see home ignition zone.* The area around a specific structure and associated accessory structures, including all vegetation that contains potential ignition sources and fuels.[46]

Suppression - A wildfire response strategy to "put the fire out" as efficiently and effectively as possible while providing for firefighter and public safety.[47]

Surface Fire - A fire that burns loose debris (e.g., dead branches, leaves, and low vegetation) on the surface of the ground.[48]

Surface Fuel - Fuels lying on or near the surface of the ground, consisting of leaf and needle litter, dead branch material, downed logs, bark, tree cones, and low-stature living plants.[49]

Urban Conflagration - A large, destructive fire that spreads unimpeded by fire suppression efforts or barriers, destroying large areas of structures and infrastructure.

Values - Items identified by a community as having measurable or intrinsic worth that could be negatively impacted by a wildfire. Values include property, structures, physical improvements, natural and cultural resources, community infrastructure, and economic, environmental, and social values.[50]

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45 National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.
46 National Fire Protection Association. 2018. "NFPA 1: Fire Code Fact Sheet." Available at www.nfpa.org/Assets/files/AboutTheCodes/1/ NFPA1_Fact%20Sheet.pdf.
47 National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.
48 National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.
49 National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.
50 National Wildfire Coordinating Group. 2018. "Glossary A-Z." Available at www.nwcg.gov/glossary/a-z.

Values-At-Risk - Those ecological, social, and economic assets and resources that could be impacted by fire or fire management actions.

Vulnerability - The physical feature or attribute that renders values susceptible to a given hazard.

Wildfire - An unplanned wildland fire, including unauthorized human-caused fires and escaped prescribed fire projects. Wildfire management objectives may vary based on site-specific circumstances and conditions.[51]

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.

Wildfires - Unplanned wildland fires resulting in a negative impact.

Wildland - An area in which development is essentially nonexistent, except for roads, railroads, power lines, and similar transportation facilities. Structures, if any, are widely scattered.[52]

Wildland Fire - Any non-structure fire that occurs in vegetation or natural fuels. Wildland fire includes prescribed fire and wildfire.[53]

Wildland Fuels - All vegetation (natural and cultivated).

Wildland-Urban Interface (WUI) - Any developed area where conditions affecting the combustibility of natural and cultivated vegetation (wildland fuels) and structures or infrastructure (built fuels) allow for the ignition and spread of fire through the combined fuel complex.

Wildland-Urban Interface Hazard - Combustibility of the wildland or built fuels, fuel type or fuel complex.

Wildland-Urban Interface Risk - The WUI hazard accounting for factors that contribute to the probability and consequences of a WUI fire.

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51 USDA Forest Service. 2009. Guidance for Implementation of Federal Wildland Fire Management Policy. February 13. Available at www.nifc .gov/policies/policies_documents/GIFWFMP.pdf.
52 National Wildfire Coordinating Group. 2018. “Glossary A-Z.” Available at www.nwcg.gov/glossary/a-z.
53 National Wildfire Coordinating Group. 2018. “Glossary A-Z.” Available at www.nwcg.gov/glossary/a-z.