FEBRUARY 2025

POUDRE FIRE AUTHORITY

COMMUNITY WILDFIRE PROTECTION PLAN

Working together to build fire adapted communities, resilient to wildfire

SWCA®
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Poudre Fire Authority

IN COLLABORATION WITH:

SWCA® ENVIRONMENTAL CONSULTANTS

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

COLORADO STATE FOREST SERVICE
COLORADO STATE UNIVERSITY

City of Fort Collins

City of Fort Collins Natural Areas

LARIMER CONSERVATION DISTRICT

LARIMER COUNTY
EMERGENCY MANAGEMENT

LARIMER COUNTY SHERIFF
STATE OF COLORADO 1876
SHERIFF'S OFFICE

Xcel Energy®

We would like to formally thank the Core Team and all stakeholders for contributing their time and expertise throughout the planning process. Your participation has contributed to creating resilient landscapes, implementing public education, reducing structural ignitability, and ensuring safe and effective wildfire response.

For additional information, questions, or concerns regarding this project, please contact Project Manager Robert Fenwick at mallory.phillips@swca.com or Battalion Chief Geoff Butler at geoff.butler@poudre-fire.org.

For all your planning and implementation needs, please visit www.swca.com.

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DISCLAIMER

The purpose of the risk assessment contained in this plan is solely to provide a community and landscape-level overview of general wildfire risks within the assessment area as of the date hereof, and to provide a potential resource for community pre-fire planning. This risk assessment is premised on various assumptions and models which include and are based upon data, software tools, and other information provided by third parties (collectively, “Third-Party Information and Tools”). SWCA, Incorporated., doing business as SWCA Environmental Consultants (“SWCA”) relied upon various Third-Party Information and Tools in the preparation of this risk assessment and SWCA shall have no liability to any party in connection with this risk assessment including, without limitation, as a result of incomplete or inaccurate Third-Party Information and Tools used in the preparation hereof. SWCA hereby expressly disclaims any responsibility for the accuracy or reliability of the Third-Party Information and Tools relied upon by SWCA in preparing this risk assessment. SWCA shall have no liability for any damage, loss (including loss of life), injury, property damage, or other damages whatsoever arising from or in connection with this risk assessment, including any person’s use or reliance on the information contained in this risk assessment. Any reproduction or dissemination of this risk assessment or any portion hereof shall include the entirety of this plan disclaimer.

The entities listed below participated in the development of and/or reviewed and are in support of the Poudre Fire Authority Community Wildfire Protection Plan (CWPP) and agree that the CWPP is viable, complete, and realistic in terms of risk reduction and implementation:

Derek Bergsten

Signature

Derek Bergsten

Name

2/07/2025

Date

Poudre Fire Authority, Fire Chief

Agency

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Max Erickson

Name

3/6/2025

Date

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EXECUTIVE SUMMARY

The Poudre Fire Authority (PFA) Community Wildfire Protection Plan (CWPP) is an update to the previous 2011 CWPP and serves multiple purposes in addressing the risk of wildfires and protecting human life and property. It aims to provide a comprehensive assessment of wildfire risk and protection needs across the district, bringing together various stakeholders involved in wildfire management and suppression. The CWPP provides a framework for future planning and implementation of mitigation measures. It also includes a list of actionable projects to mitigate the identified risks.

Development of the PFA CWPP update involved a core planning team (the Core Team) consisting of local agencies, state agencies, and community organizations with extensive experience in fire management and prevention. The planning process brought together wildfire responders and land managers in a collaborative effort, modeling, and mapping wildfire risk, identifying physical hazards, and incorporating public input. Public meetings, surveys, workshops, and online platforms facilitated community engagement and awareness. The project recommendations and draft plan underwent review and feedback from community members.

The PFA CWPP meets the Colorado State Forest Service (CSFS) CWPP minimum standards as outlined in Colorado Senate Bill 09-001 by fulfilling the required and recommended components, involving the necessary participants, and adhering to the appropriate level of specificity. It is suggested that the plan be updated every 5 years, or following significant landscape, planning, or legislative changes, to remain effective and eligible for funding opportunities.

The PFA service area covers approximately 230 square miles across Weld and Larimer Counties, including urban, suburban, and rural landscapes. This region has a diverse fire environment, with significant portions of the area located within the wildland-urban interface (WUI). The western portion of the area, characterized by steep terrain and dense vegetation, poses significant fire risks due to heavy continuous fuels and complex topography, which makes suppression challenging. The eastern portion, with urban communities, agricultural lands, and grasslands, also faces fire risks due to high population density and frequent ignition sources. This plan aims to address the entire fire district more comprehensively. While the western region's characteristics present the highest risk for large fires, neighborhoods adjacent to wildlands (undeveloped areas) throughout PFA are also at risk. Recent history has seen significant wildfires in the region, including the devastating Cameron Peak Fire in 2020 and the High Park Fire in 2012, both of which underscore the region’s potential for destructive wildfire. The area's fire regime has been shaped by natural fire occurrences, but human activities, such as development and fire suppression, have disturbed the natural ecological role of fire and exacerbated risks.

Several key areas of mitigation were identified through collaboration with the Core Team in the development of the CWPP:

- **Hazardous Fuels Reduction**: Partnering with local collaborating agencies to focus on reducing vegetation in areas where natural lands meet urban development, particularly around communities and key access routes, to decrease wildfire risk and improve safety during emergencies.
- **Collaboration and Funding**: Working with various agencies and organizations to secure financial resources and develop partnerships that support community-wide wildfire mitigation efforts, particularly for neighborhoods and homeowners.

- **Community Engagement**: Fostering ongoing communication with residents through outreach initiatives, education, and preparedness activities, ensuring alignment with local emergency management efforts.
- **Emergency Response**: Continuing to develop firefighting capabilities and resources, exploring new technologies for wildfire detection and decision support, and enhancing collaboration with local agencies to improve district-wide response readiness.
- **Evacuation Planning**: Developing and refining interagency evacuation strategies, ensuring clear communication, signage, and regular preparedness exercises to improve community response during emergencies.

SWCA Environmental Consultants (SWCA) conducted a CWPP risk assessment by leveraging data from the 2021 Colorado All-Lands (COAL) Quantitative Wildfire Risk Assessment developed by Pyrologix LLC in partnership with several federal and state land management agencies across Colorado. The COAL Quantitative Risk Assessment is a comprehensive project developed by state and federal partners and was designed to update wildfire risk data for Colorado using real world data and custom fire behavior models. This assessment uses advanced datasets, fire modeling, and machine learning techniques to enhance the accuracy of wildfire risk predictions. Key inputs include updated surface fuels data, fire behavior models, and various geospatial datasets that account for factors like burn probability, fire intensity, and the vulnerability of highly valued resources and assets (HVRAs) such as buildings, forest assets, and watersheds. The purpose of the assessment is to provide detailed, spatially accurate wildfire risk outputs, which can inform proactive measures for wildfire mitigation, prevention, community resilience, and forest management planning.

CWPPs do not have the intent or authority to mandate the implementation of any recommendations. However, the core message of this document is that the most effective fire mitigation can be achieved through the joint actions of individual property owners and local, state, and federal governments. The true value of CWPPs lies in their ability to provide a framework for collaboration among the public, governments, agencies, and other entities to develop solutions and strategies for wildfire management and mitigation.

Furthermore, the PFA CWPP should be viewed as a dynamic document that requires regular updates, especially following significant fire events. It is essential to consistently revise the plan to incorporate any changes, modifications, or new information. These updates play a vital role in effectively reducing wildfire risks across the PFA service area and help preserve the plan's core ideas and priorities for the long-term benefit of the communities it serves.

The plan was formally approved by the CSFS on March 7, 2025. Poudre Fire Authority will oversee the plan's governance to ensure project progression.

CHAPTER 1 – INTRODUCTION

The United States is facing urgent forest and watershed health concerns. In recent years, wildfires have shown a trend of increasing severity, with the total acres burned and the average acres burned per fire rising significantly over time (National Oceanic and Atmospheric Administration [NOAA] 2024a). From 2013 to 2022 an average of 7.2 million acres were impacted annually due to wildfire, more than doubling the annual average of acres burned in the 1990s (Congressional Research Service [CRS] 2023). The 2015 fire season had the greatest area impacted in a single year (between 1960 and 2022) at 10.13 million acres. 2020 was the second most extensive year for wildfire with 10.12 million acres burned (CRS 2023). These statistics demonstrate that wildfires are becoming larger and harder to control.

Colorado's Forest Action Plan of 2020 states that forests and rangelands in Colorado, like other western states, face urgent issues concerning longer fire seasons and uncharacteristic wildfires that threaten the sustainability and ecological function of the state's ecosystems. Table 1.1 illustrates that wildfires around the state are burning larger, with the largest wildfires in 2020 burning more combined acreage than the largest fires from 2002 to 2016 combined, and half of the state's 20 largest wildfires have occurred since 2018. Larimer County, home to the Poudre Fire Authority (PFA), has experienced several major wildfires, including the 2020 Cameron Peak Fire and the 2012 High Park Fire. While these fires occurred outside of PFA boundaries, their proximity underscores the region's high fire risk, especially during extreme weather.

A top priority in Colorado is aligning current and future wildfire management strategies with designated fire and fuel priority areas. This approach aims to direct federal, state, local, and private program funds toward projects that restore natural forest conditions, support communities in coexisting with wildfire, protect watersheds, conserve wildlife, and enhance the public benefits provided by trees and forests (Colorado State Forest Service [CSFS] 2020).

As wildfire severity and extent increases, communities need a plan to help prepare for, reduce the risk of, and adapt to wildland fire events. CWPPs help accomplish these goals. A CWPP provides recommendations that are intended to reduce, **but not eliminate**, the extreme severity or risk of wildland fire. This CWPP is an update to the 2011 PFA CWPP, reflecting changes in the fire environment, community growth, and the latest mitigation strategies. It incorporates new data, lessons learned from

past fire incidents, and revised priorities to ensure that the community remains prepared and resilient against evolving wildfire risks.

Table 1.1. Colorado's 20 largest fires (in terms of acreage burned) from 2002 to 2020

Rank	Fire Name	Acres Burned	Year
1	Cameron Peak	208,913	2020
2	East Troublesome	193,812	2020
3	Pine Gulch	139,007	2020
4	Hayman	137,760	2002
5	Spring Creek	108,045	2018
6	High Park	87,284	2012
7	Missionary Ridge	70,285	2002
8	West Fork	58,570	2013
9	416	54,129	2018
10	Papoose	49,628	2013
11	Bridger	25,800	2008
12	Last Chance	45,000	2012
13	Bear Springs	44,662	2011
14	MM 117	42,795	2018
15	Beaver Creek	28,380	2016
16	Bull Draw	36,549	2018
17	Badger Hole	33,421	2018
18	Grizzly Creek	32,631	2020
19	Logan	32,546	2020
20	Burn Canyon	31,300	2002

Source: Colorado Division of Fire Prevention and Control (n.d.).

It is important to note that at the time of drafting this plan in 2024, no new fires have entered this list.

The development of the CWPP is rooted in meaningful collaboration among many stakeholders, including local, state, and federal officials. The planning process involves examining past fires and treatment accomplishments and using the knowledge and expertise of the professional fire managers who work for PFA and adjacent agencies. From there, the CWPP ultimately identifies the current local wildfire risks and needs that occur in the county, which is further supported with relevant science and literature from the western region of the United States.

GOAL OF A COMMUNITY WILDFIRE PROTECTION PLAN

A goal of the CWPP is to enable local communities to improve their wildfire mitigation capacity while working with government agencies to identify high fire risk areas and prioritize areas for mitigation, fire

suppression, and emergency preparedness. Another goal of the CWPP is to enhance public awareness by helping residents better understand the natural and human-caused risk of wildland fires that threaten lives, safety, and the local economy. The minimum requirements for a CWPP, as stated in the Healthy Forests Restoration Act of 2003 (HFRA), are the following:

Collaboration: Town, county, and state government representatives, in consultation with federal agencies or other interested groups, must collaboratively develop a CWPP (Society of American Foresters [SAF] 2004).

Prioritized Fuel Reduction: A CWPP must identify and prioritize areas for hazardous fuels reduction and treatments and recommend the types and methods of treatment that will protect one or more communities at risk (CARs) and their essential infrastructures (SAF 2004).

Treatments of Structural Ignitability: A CWPP must recommend measures that local governments, homeowners, and communities can take to reduce the ignitability of structures throughout the area addressed by the plan (SAF 2004).

The intent of this 2025 CWPP update is to assess wildfire risk and protection needs at the fire district level, bringing together responsible parties to address these needs and supporting them in planning and implementing necessary mitigation measures. Additional information on the planning process is available in Appendix A.

ALIGNMENT WITH COHESIVE STRATEGY

The 2025 CWPP is aligned with the Cohesive Strategy and its Phase III Western Regional Action Plan by adhering to the nationwide goal “to safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and collectively, live with wildland fire.”

The primary, national goals identified as necessary to achieving the vision are:

- **Resilient Landscapes –** Landscapes, regardless of jurisdictional boundaries are resilient to fire, insect, disease, invasive species, and climate change disturbances, in accordance with management objectives.
- **Fire-Adapted Communities –** Human populations and infrastructure are as prepared as possible to receive, respond to, and recover from wildland fire.
- **Safe, Effective, Risk-based Wildfire Response –** All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions.

For more information on the Cohesive Strategy, please visit: https://www.forestsandrangelands.gov/documents/strategy/natl-cohesive-wildland-fire-mgmt-strategy-addendum-update-2023.pdf

This CWPP update recognizes that PFA plays a critical role in wildfire preparedness, response, and community outreach. The management of fuels and vegetation to create fire-resilient landscapes falls under the jurisdiction of other land management agencies and partners within the region. Alignment with these Cohesive Strategy goals is described in more detail in Chapter 4, Hazard and Risk Reduction Strategies.

In addition to aligning with the Cohesive Strategy, the CWPP also incorporates information on post-fire recovery, the significant hazards of a post-fire environment, and the risk that post-fire effects pose to communities (Figure 1.1).

Figure 1.1. The CWPP incorporates the three primary goals of the Cohesive Strategy with post-fire recovery to serve as holistic plan for fire prevention and resilience.

ALIGNMENT WITH PLANS AND AGREEMENTS

This CWPP is an update to the 2011 PFA CWPP and is aligned with multiple local, state, and federal planning documents. These documents or agreements are summarized below (Table 1.2) and described in further detail in Appendix A. Many of these documents focus on fuels management, which falls outside of the authority of PFA but is relevant for overall wildfire resilience efforts by PFA partners. Notably, as the PFA CWPP and adjacent Larimer County CWPP are revised, the two plans should be aligned to ensure that opportunities to collectively reduce wildfire risk outside of PFA's jurisdiction can be addressed. Rural areas abutting PFA boundaries are often at higher wildfire risk, and fires originating in these areas could pose a threat to lands within PFA boundaries.

In addition, fire policy and legislative direction is also summarized in Appendix A.

Table 1.2. Relevant Plans for Alignment with the PFA CWPP Update

Plan/Agreement Title	Alignment with 2025 PFA CWPP
Colorado Strategic Wildfire Action Program	• Reducing wildfire risk through collaborative efforts. • Opening opportunities for grant funding. • Advocating for development of strategic mitigation projects.
Colorado Forest Action Plan	• Promoting the effective and sustainable management of natural resources. • Building an adaptive planning process and learning to live with wildfire. • Advocating for ecologically sound forest treatments.
2022 U.S. Department of Agriculture (USDA) and U.S. Forest Service (USFS) Wildfire Crisis Strategy Implementation Plan	• Identifying the right locations and tools for fuels and forest health treatments that are science-based and equitable. • Developing needed workforce capacity and investing in the enabling conditions required for success. • Working with partners across jurisdictions to develop and implement projects that are landscape scale, outcome-driven, and community ready. • Supporting planning and investments in fire-adapted communities and on partnerships to restore and reforest areas already impacted by fire and mitigate risks associated with post-fire events.
2021 Colorado Statewide Post-Wildfire Susceptibility Analysis	• Providing a mapped assessment of post-fire watershed impacts including risk to transport systems, life and property, aquatic ecosystems, and water infrastructure. • Assessing post-fire impacts, including debris flow, flooding, erosion and sedimentation, water quality, and hill slope erosion. • Identifying priority watersheds and locations within watersheds most susceptible to post-fire hazards.
Northern Colorado Fireshed Collaborative (NCFC) https://nocofireshed.org/	• Providing collaborative efforts to work strategically across land ownerships to increase the pace and scale of forest restoration. • Integrating using prescribed burning into forest and watershed management. • Increasing understanding of wildland fire risk management activities at the landscape scale.
Larimer County CWPP (under revision)	• Ensuring recommendations align with those in the PFA CWPP. • Addressing heightened wildfire risk and threat to PFA's jurisdictional areas along and beyond their boundaries. • Including recommendations to address land use planning and zoning regulations and adoption of codes aimed at hardening structures in order to support PFA operational effectiveness.

PLANNING AND REGULATORY BACKGROUND

Detailed information regarding planning and regulatory background and land management strategies can be found in Appendix A, Planning and Policy Background.

CORE TEAM

PFA personnel invited engagement from government agencies and other stakeholder groups in the development of this 2025 CWPP, forming the "Core Team." Stakeholder involvement is critical in

producing a meaningful document that includes all collaborators' diverse perspectives. The Core Team drives the planning process through decision making, data sharing, experience, and communication with community members. The project was kicked off on December 14, 2023; the Core Team met for the first time on January 30, 2024, and convened again on June 20, 2024, and December 10, 2024.

Members of the Core Team are listed in Table 1.3 below.

Table 1.3. Core Team Members for the PFA CWPP Update

Name	Organization	Title	Project Role
Geoff Butler	PFA	Emergency Management Battalion Chief	Core Team Member
Gene Maccarini	PFA	Special Operation Battalion Chief	Core Team Member
Brandon Garcia	PFA	Operations Chief	Core Team Member
Dennis Day	City of Fort Collins	Lead Specialist, Emergency Management	Core Team Member
Max Erickson	CSFS	Supervisory Forester, Fort Collins	Core Team Member
Janae Coston-Malpas	CSFS	Wildfire Resilience Coordinator	Core Team Member
Derek Rosenquist	Larimer County Sheriff's Office Emergency Services Unit	Sergeant	Core Team Member
Raina Eshleman	Larimer County Sheriff's Office Emergency Services Unit	Wildfire Partner Program Coordinator*	Core Team Member
Victoria Amato	SWCA	Principal Fire Planner	Plan Preparer
Robert Fenwick	SWCA	Project Manager	Plan Preparer
Mallory Phillips	SWCA	Assistant Project Manager	Plan Preparer

** Raina Eshleman held this position at the start of the planning process but no longer holds it.*

PUBLIC INVOLVEMENT

A key element in the CWPP process is the meaningful discussions it generates among community members regarding their priorities for local fire protection and forest management (SAF 2004). To help facilitate these discussions, the draft CWPP was made available for public review from January 15, 2025, to January 28, 2025. The draft was announced and accessible through several different media outlets for review (see Appendix G).

The CWPP Core Team worked to include adequate representation in their outreach efforts, using various communication methods to reach the PFA community. Methods included an online community survey, an in-person open house event at the PFA Training Center, and a public review period for the draft CWPP. Feedback gathered from community members through these outreach strategies was integrated into the final CWPP where relevant. Further details on public engagement and outreach are available in Appendix G.

ACCOMPLISHMENTS SINCE THE 2011 CWPP

The previous PFA CWPP focused on several key objectives that include reexamining and updating the wildland-urban interface (WUI) areas and associated risks, engaging WUI communities in fire mitigation and preparedness, and providing updated, prioritized recommendations for mitigation, preparedness, response, and recovery. The plan also aimed to create a detailed action plan for implementing these recommendations while reinforcing strategic guidance for the PFA WUI Program and the City of Fort Collins Natural Areas Program. These efforts involved a collaborative approach among multiple stakeholders, ensuring comprehensive wildfire risk management across the region. Table 1.4 below identifies accomplishments since the 2011 CWPP.

Table 1.4. WUI Accomplishments since the 2011 PFA CWPP

Mitigation Accomplishment		
Year(s) Completed	**Lead Entity**	**Project Details**
2011	PFA	Conducted 1,300 home assessments as part of the WUI Outreach and Planning Initiative (WOPI).
2011	PFA	Finalized WOPI assessments in the south Horsetooth area.
2011	City of Fort Collins Natural Areas Program	Completed Bobcat and Soapstone Natural Area fuels treatments.
2012	PFA	Continued home assessment program.
2012	PFA with Larimer County and citizens	Explored potential for chipping program in WUI neighborhoods to support defensible space efforts.
2012	Larimer County	Horsetooth Mountain Open Space fuels treatment continued.
2011–2024	PFA	Continued support of citizens' mitigation and cooperators' prescribed fire efforts.
2011–2024	CSFS, Colorado Parks & Wildlife (CPW), and Colorado Division of Fire Prevention and Control (DFPC)	300 acres of fuels reduction forest management in Lory State Park.
2011–current	PFA	Continued neighborhood-scale WUI outreach.
2011–current	Redstone Canyon volunteers	Planning, implementing, and maintaining hazardous fuel treatments in the Redstone Canyon community. Could be a model for other community volunteer efforts.
2024	Various	WOPI replaced by Wildfire Partners conducting parcel level home assessments.
Ongoing	Larimer County	Horsetooth Mountain Open Space fuels treatments; began in 2005.

Preparedness and Response Accomplishments		
Year(s) Completed	**Entity**	**Project Details**
2011	PFA, CSU, Larimer County	Pre-incident planning for hosting/supporting large incidents.
2011–2024	PFA	Updated and distributed tactical WUI maps.
2011	Station 11 (PFA)	Pursued establishment of cistern or other water supply improvement in Redstone Canyon.
Ongoing since 2022	PFA	Increased incident command system training for officers and command staff.
Ongoing since 2023	PFA	Advanced wildland training for command staff.
Ongoing	PFA	Updating and expanding the wildland engine fleet.
Ongoing	PFA	Building the wildland team capabilities and experience through deployments and pursuit of new qualifications.
Ongoing	City of Fort Collins Natural Areas Program	Continued annual wildland refresher training. Additional equipment purchases and upgrades to Type 6 engine.
Ongoing	Larimer County	Continued interagency coordination for wildland fire preparedness.
Recovery Accomplishments		
Year(s) Completed	**Entity**	**Project Details**
2012	Fort Collins Office of Emergency Preparedness and Security (EPS)	Fort Collins Recovery Plan
2024	Larimer County Emergency Management	Fort Collins Debris Management Plan

CHAPTER 2 – FIRE ENVIRONMENT

SERVICE AREA

The PFA service area is delineated by geographic and political boundaries (Figure 2.1).

Formed in 1981 from the merger of the City of Fort Collins and Poudre Valley Fire Departments, the PFA has grown to cover approximately 230 square miles of urban and rural landscapes across Colorado's Weld and Larimer Counties (PFA 2011). The agency is responsible for the protection of an estimated $45 billion worth of total property value (PFA 2022a). The PFA service area comprises a population of approximately 212,000 across the City of Fort Collins, the Town of Timnath, the communities of Laporte and Bellvue, Horsetooth Reservoir and Redstone Canyon, and a range of other unincorporated areas in Larimer and Weld Counties (PFA 2011).

The majority of people in the PFA service area reside in the city of Fort Collins. Fort Collins, covering 57.2 square miles, has seen significant population growth, increasing by nearly 20% between 2010 and 2023 (U.S. Census Bureau 2023a). The city's current population is estimated at 170,376, with 2,979 people per square mile and projections indicating an additional 70,000 residents by 2040 (PFA 2020; U.S. Census Bureau 2023a). Fort Collins is also home to Colorado State University (CSU), which continues to expand with a growing student population, further driving development in the area. Beyond Fort Collins, the town of Timnath, located southeast of the city, has seen rapid growth, with its population increasing from 625 residents in 2010 to an estimated 9,991 resident in 2023 (U.S. Census Bureau 2023b). This makes Timnath the fastest-growing community in the PFA service area, potentially requiring further fire station development east of Interstate 25. In contrast, the unincorporated communities of Bellvue and LaPorte, located northwest of Fort Collins, have seen population declines and minimal development. PFA also serves unincorporated areas of Larimer County, which remains largely rural with limited growth. The diverse PFA service area includes a significant employment base, including CSU, the healthcare sector, technology firms, and breweries. The legalization of marijuana in Colorado has also contributed to job growth but poses unique fire safety challenges (PFA 2020).

While Larimer County's demographics do not reflect the exact population characteristics of the PFA service area, they provide valuable insight and provide a general idea of the demographics found in the area served by PFA. Larimer County is predominantly non-Hispanic White (82.5%), with smaller

populations of other ethnic groups including Hispanic or Latino (11.7%), Black or African American (0.9%), American Indian and Alaska Native (0.5%), Asian (2.1%), and two or more races (2.1%). This demographic breakdown is similar to the broader population of Colorado, which has a lower percentage of non-Hispanic White residents (68.3%) and a higher percentage of Hispanic or Latino residents (21.4%). Other ethnic groups make up smaller portions of both populations.

The region is a mix of urban, suburban, and rural communities situated along the Colorado Front Range, a region with notable history and contemporary fire history. Additional Information regarding the regional fire dynamic is provided in this chapter, and further details on the PFA service area are provided in Appendix B, Community Background and Resources (PFA 2020).

LAND OWNERSHIP

The PFA service area encompasses a diverse array of land ownerships. The majority of the land, 80.85%, is privately owned, covering 119,224.40 acres. The City of Fort Collins Natural Areas is the second-largest landholder, managing 11,457.12 acres, which accounts for 7.77% of the PFA service area. County lands cover 8,645.62 acres, making up 5.86% of the area, while State land comprises 7,138.83 acres, or 4.84%. The Colorado Parks & Wildlife manages 430.46 acres, representing 0.29%. Smaller portions of land ownership in the service area include the Bureau of Land Management's (BLM's) 224.43 acres (0.15%), the U.S. Forest Service's (USFS's) 154.56 acres (0.10%), Colorado State University's (CSU's) 181.19 acres (0.12%), and the City of Loveland's 1.60 acres (0.001%).

Additional details regarding land in the PFA service area, such as topography and land management direction, are summarized in Appendices A and B.

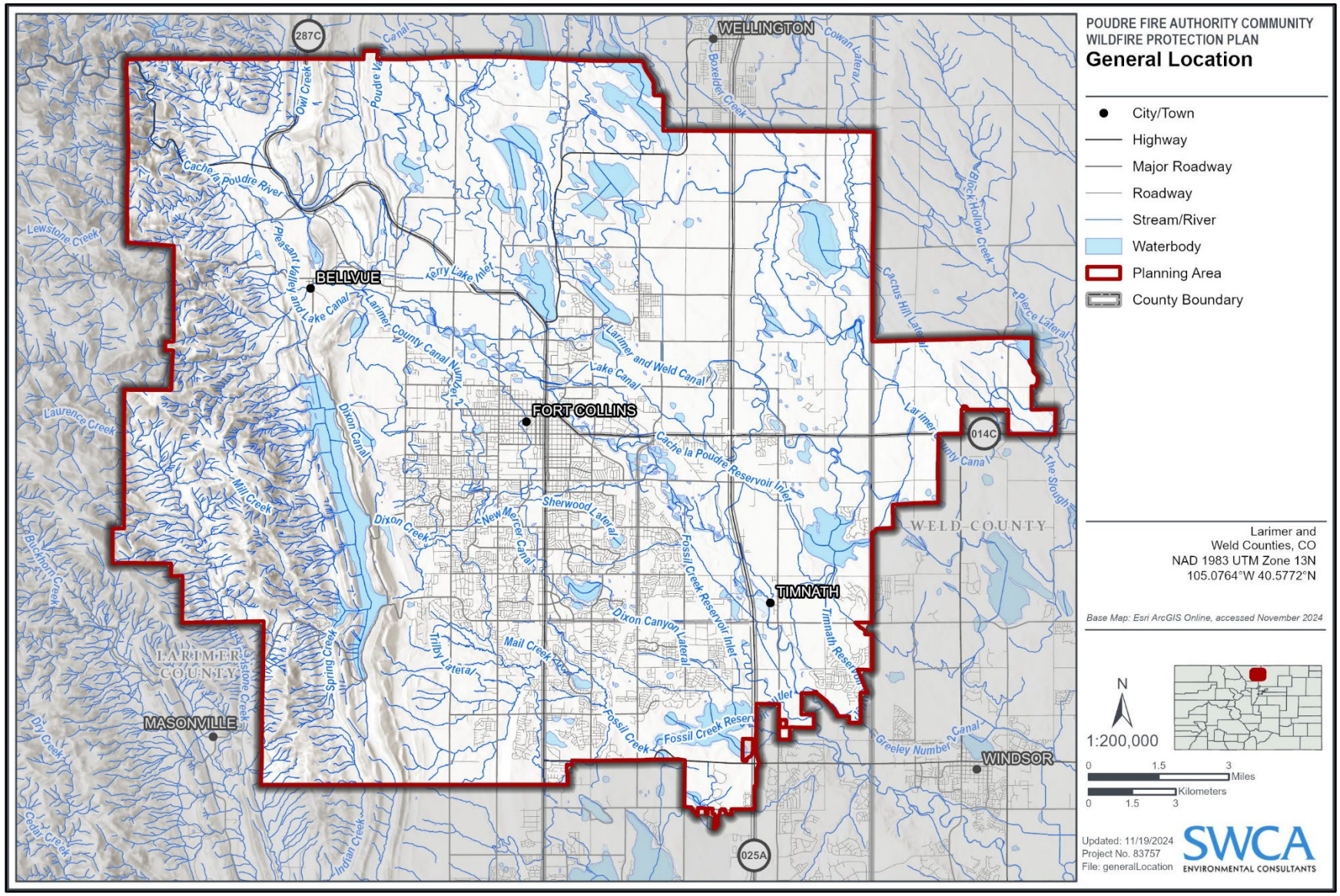

Figure 2.1. PFA service area general location.

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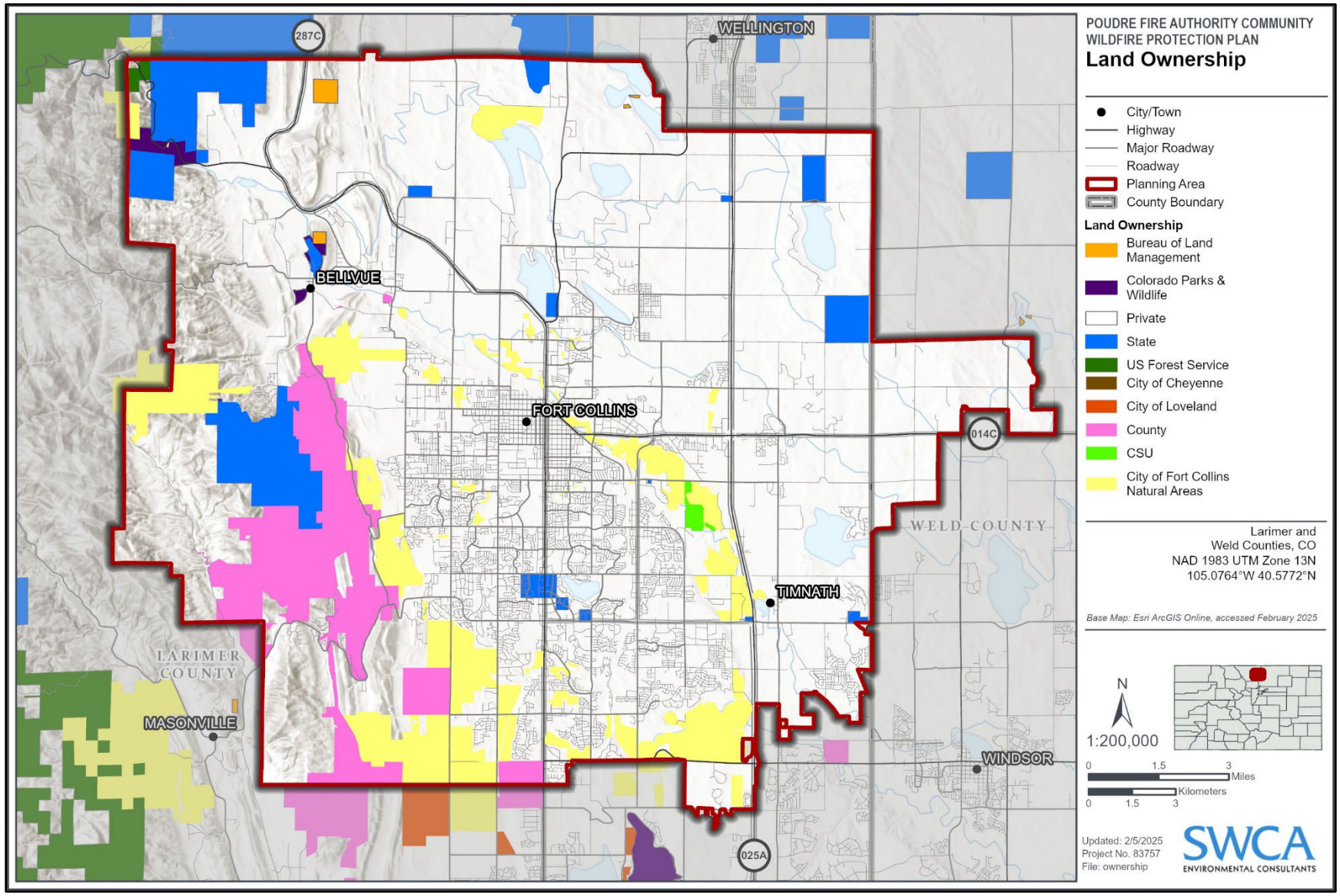

Figure 2.2. PFA service area land ownership.

WILDLAND-URBAN INTERFACE

The WUI is defined by areas where human habitation and development meet or intermix with wildland fuels (U.S. Department of the Interior [DOI] and U.S. Department of Agriculture [USDA] 2001:752–753). Wildland-urban intermix areas are those areas where structures and other human developments intermingle or are found within wildland vegetation. Wildland-urban interface areas are those where continuous wildland fuels meet an urban community or other built environment such as a subdivision. A CWPP offers the opportunity for collaboration of land managers to establish a definition and a boundary for the local WUI; to better understand the unique resources, fuels, topography, and climatic and structural characteristics of the area; and to prioritize and plan fuels treatments to mitigate for fire risks. PFA's WUI is categorized into three distinct types (Figure 2.3): agricultural/grassland intermix east of the foothills, occluded interface within Fort Collins, and classic wildland-urban intermix in the western part of the jurisdiction:

- **Classic Wildland-Urban Intermix:** A mosaic of grass, brush, and forested lands, posing complex suppression challenges due to diverse and heavy fuels.
- **Agriculture/Grassland Intermix**: Small neighborhoods, agricultural lands, and larger subdivisions adjacent to preserved grasslands, with hazards from high population density and numerous ignition sources.
- **Occluded Interface**: Numerous natural areas and undeveloped private lands within the City of Fort Collins surrounded by densely populated regions, where fires can quickly move between wildland fuels and developed structures.

The western portion of the PFA service area is classified as the classic wildland-urban intermix, comprising a mosaic of grass, brush, and forested lands. This area poses as the jurisdiction’s most complex areas due to its diverse and heavy fuels, fragmented land management boundaries, and complex suppression difficulty for fire responders. Winds, particularly along ridge lines and within steep canyon areas, tend to funnel through narrow valleys, driving fire at extreme speeds. This increases the difficulty of containment and response efforts. Wind-driven fires in these areas also pose a threat to evacuation routes, which may become compromised due to topographical constraints. Due to these conditions, fuel treatments such as thinning, creating defensible space, and maintaining fuel breaks are critical for reducing fire spread potential.

The areas to the north, south, and east of Fort Collins are classified as agriculture/grassland intermix, characterized by a blend of small neighborhoods, agricultural lands, and larger subdivisions adjacent to preserved grasslands. Agricultural land fuels are often modified by irrigation and other practices, making them unpredictable depending on the season, whereas fuels in natural areas, no longer irrigated or cultivated, can be more easily modeled. Despite the light fuels and relatively easy emergency access, the hazards in these WUI areas are significant due to high population density and numerous ignition sources, such as escaped agricultural burns and misuse of fire by residents.

Within Fort Collins, there are numerous natural areas and undeveloped private lands surrounded by densely populated regions. The fragmented nature of these areas increases the challenge of fire containment, as fires can quickly move between wildland fuels and developed structures (PFA 2011). Though these fires are typically smaller in size, the proximity of these areas to urban infrastructure, including homes and critical utilities, heightens the potential impact and highlights the importance of addressing the risks presented in this portion of the WUI.

Throughout the United States, the expansion of the WUI into areas with high fire risk, combined with the collective effects of aggressive suppression policies, resource management practices, land use patterns, climate change, and insect and disease infestations, has created an urgent need to modify fire management practices and policies and to understand and manage fire risk effectively in the WUI (Pyne 2001; Stephens and Ruth 2005). The WUI is an area where wildfire hazards pose a risk to HVRAs. Therefore, preparedness, structure hardening, and creation of defensible space should be prioritized to provide additional protection to the community from potential wildfire occurring within, or spreading to, the WUI. Mitigation techniques for fuels and fire management can be strategically planned and implemented in WUI areas (e.g., with the development of defensible space around homes and structures) through collaboration between residents, PFA, and partner agencies.

The categorized WUI boundaries are shown below in Figure 2.3.

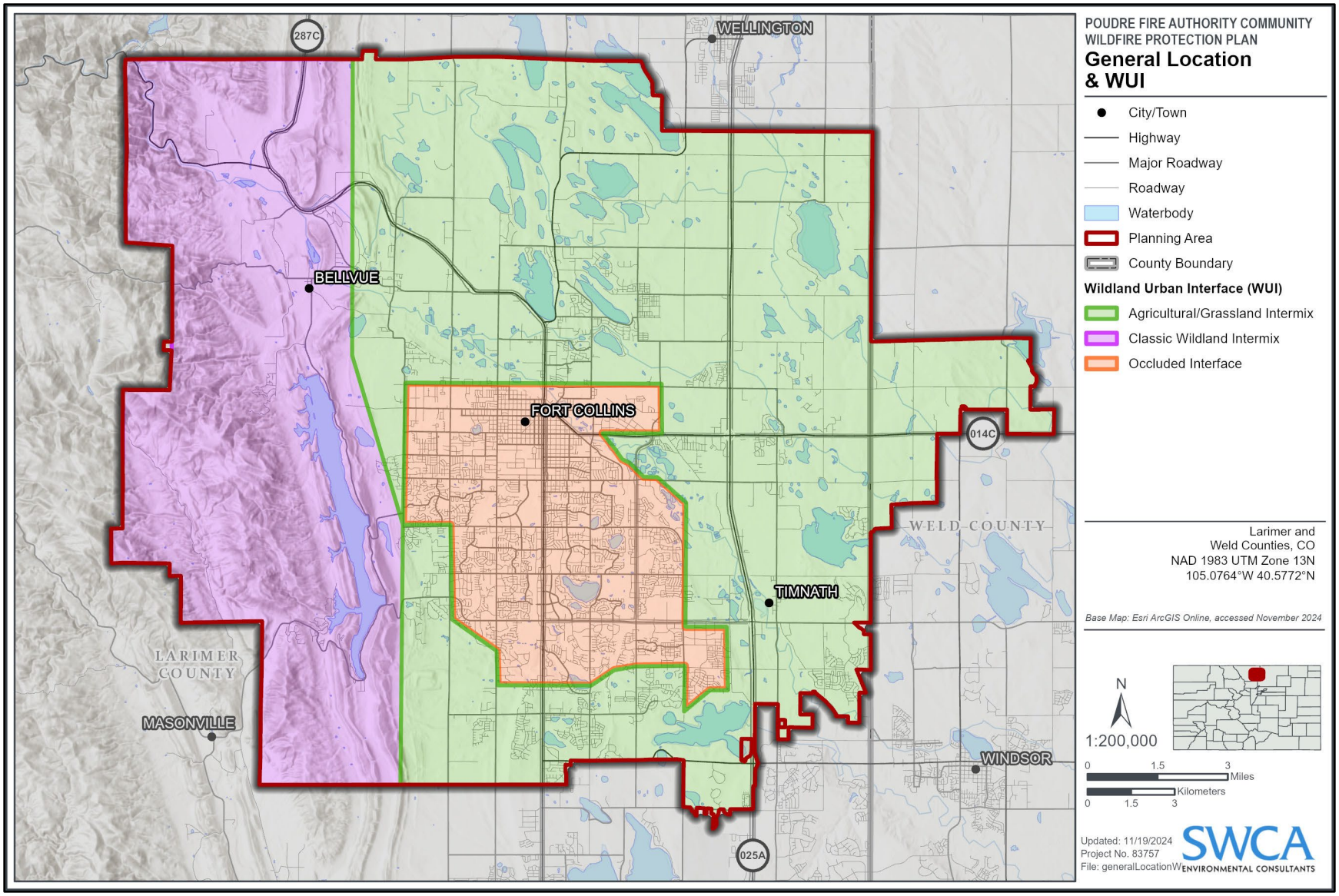

Figure 2.3. PFA service area WUI map.

WILDLAND-URBAN INTERFACE LAND USE

PFA's jurisdiction encompasses a variety of land uses within the WUI, which vary significantly based on the specific WUI category (Figures 2.4 and 2.5). The eastern agricultural/grassland intermix is characterized by small neighborhoods, agricultural lands, and grasslands that are either preserved or unmanaged. The occluded interface comprises pockets of natural areas and undeveloped lands surrounded by dense urban development. The classic WUI intermix zone is composed of open spaces and sparse housing communities that are surrounded by various fuel types. These areas also provide the community with recreational opportunities such as hiking, biking, and other outdoor activities.

Figure 2.4. Example of classic WUI intermix in the PFA service area, looking north.

Figure 2.5. Example of classic WUI intermix in the PFA service area, looking east.

VEGETATION AND LAND COVER

Vegetation zones within PFA are primarily a function of elevation, slope, aspect, substrate, associated climatic regimes, and land use. The PFA service area displays elevations ranging from 5,000 to 7,500 feet, across which three major vegetative zones are found: plains grassland, lower ecotone, and lower montane (Kaufmann et al. 2006). These zones have been increasingly affected by invasive, nonnative, ornamental, and encroaching species; fire exclusion; and other factors exacerbating potential fire behavior to varying degrees. Urban developed land also constitutes a significant portion of the PFA service area's land cover, including the city of Fort Collins and surrounding towns and communities such as Bellevue and Timnath.

Dominant vegetation types within the PFA service area are described based on a large spatial scale and represent the overall vegetation community structure, which plays a general role in fire occurrence and behavior. Figure 2.6 showcases a simplified overview on the general vegetation classification found throughout the PFA service area. Although the vegetation types are outlined for the PFA service area, site-specific evaluations of the vegetative composition and structure in each area of focus should be taken into consideration when planning fuels treatments.

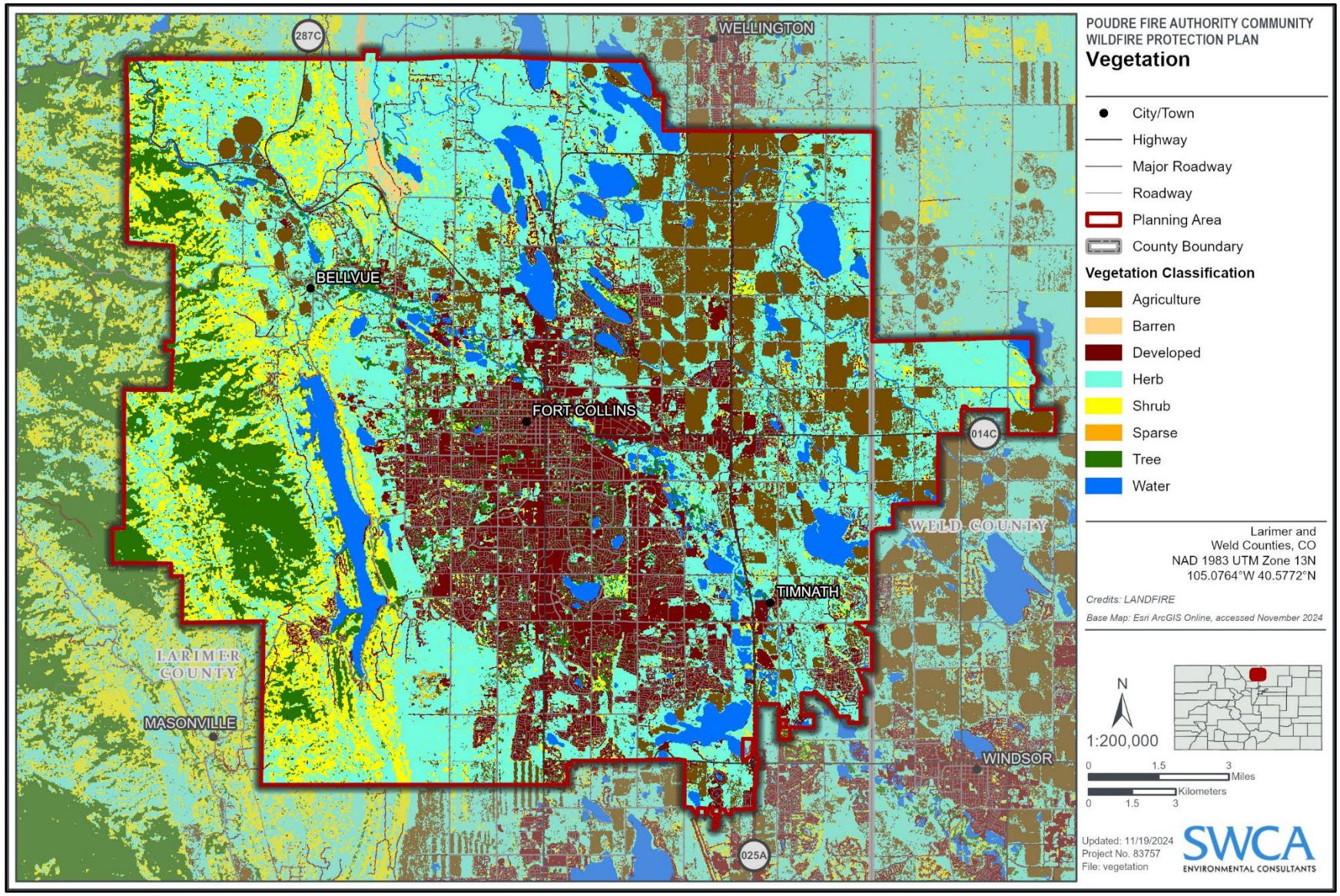

Figure 2.6. General vegetation types in PFA service area.

FUELS AND TOPOGRAPHY

Fuels in the PFA service area were estimated using the updated Scott and Burgan 40 fuels model (Table 2.1; Figure 2.7) (Roos et al. 2005). The burnable landscapes within the district are composed largely of grass, brush, timber, and urban fuels, each of which are significantly influenced by slope, aspect, and elevation.

Grass fuels (GR) can be found throughout the service area and are particularly prevalent in the undeveloped lands east of the foothills and surrounding the districts urban center. These grasses often present as contiguous fuels, leading to rapid rates of spread and moderate flame lengths. Brush fuels (GS), though also found throughout the service area, are particularly common on hogbacks and south-facing slopes in the foothills. Fire behavior here is marked by high spread rates and moderate flame lengths, particularly in early spring before green-up, in fall when brush is dormant, and during droughts. Fire exclusion has led to an increase in live and dead fuel loads across these stands. Timber fuels (TL) are mostly supported in the western portion of the PFA service area, with varying rates of spread flame lengths ranging from moderate to extreme depending on specific fuel compositions. These include stands of cottonwood (*Populus* spp.), ponderosa pine (*Pinus ponderosa*), and Douglas-fir (*Pseudotsuga menziesii*) occurring at mixed densities and exhibiting understories of shrubs, grass, and young trees. Burnable urban (BU) fuels are widely present in the PFA service area and occur throughout the service area's urban center and surrounding WUI areas.

The topography of the PFA service area is relatively uniform aside from the portion west of Fort Collins, which extends into the foothills and includes more mountainous terrain. The eastern and central portions of the PFA service area are characterized by grasslands and plains with minimal topographic variation. The highest elevation is west of Horsetooth Reservoir where the Front Range mountains begin.

Table 2.1. Most Common Fuel Types in PFA Service Area

Existing Fuel Type	Acres	Percent
GR2 – Low-load dry climate grass	54,869.295	37.2%
BU1 – Burnable developed areas	22,089.171	15.0%
NB3 – Agricultural field, maintained in non-burnable condition	16,789.099	11.4%
GR1 – Short, sparse dry climate grass	12,090.096	8.2%
NB8 – Open water	10,638.732	7.2%
GS2 – Moderate-load dry climate grass-shrub	9,735.326	6.6%
GS1 – Low-load dry climate grass-shrub	3,603.235	2.4%
TL3 – Moderate-load conifer litter	3,272.771	2.2%
BU2 – Burnable roads	2,540.502	1.7%
TU2 – Moderate-load humid climate timber-shrub	1,667.854	1.1%
TL8 – Long-needle litter	1,602.111	1.1%
TU1 – Light-load dry climate timber-grass-shrub	1,555.108	1.1%
Other – various remaining fuel types combined	7,005.496	4.75%

Sources: Scott and Burgan (Roos et al. 2005); Pyrologix (2022a)

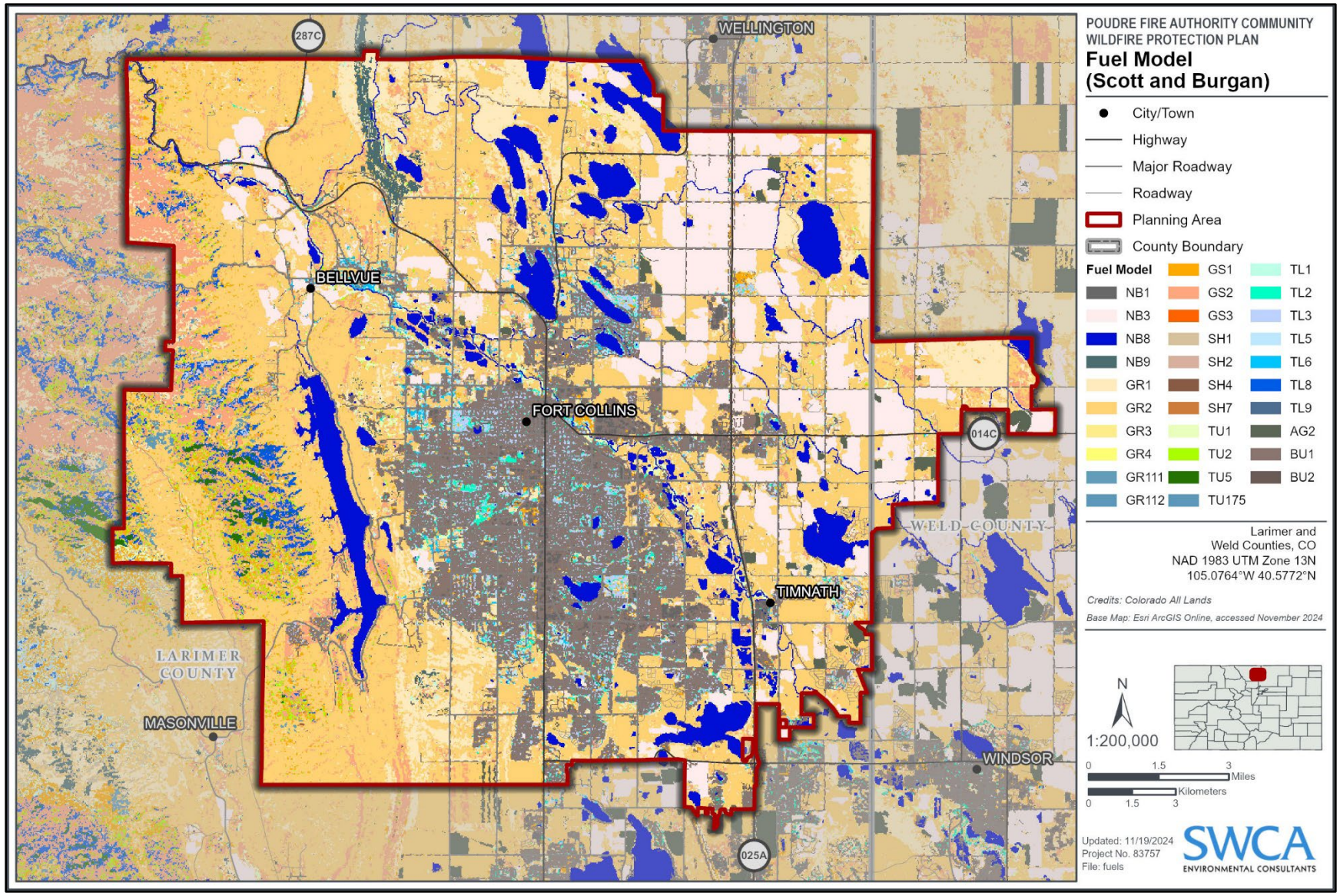

Figure 2.7. Scott and Burgan 40 fire behavior fuel models within the PFA service area.

Topography directly influences fire behavior and poses tactical challenges, leading to increased response efforts and greater suppression difficulties. As outlined above, the PFA service area is vastly characterized by flat landscapes to the east with more topographically complex landscapes to the west. As elevation increases, predominant fuels transition from burnable urban and grass, to brush, to timber. The dynamic interplay of terrain and heightened fuel densities on the west side creates difficulties in terms of wildfire management and suppression. Fuel treatments in the service area should consider fuel types, suppression difficulty, and slope percentage when deciding on treatment methods and objectives.

To learn more about the how the wildfire hazard was measured, please visit: http://pyrologix.com/reports/COAL_HazardReport.pdf

Additional information on fuels is provided in Appendix C, Fire Behavior Modeling/GIS Background and Methodology.

FIRE ECOLOGY

Fires are characterized by their intensity, the frequency at which they occur, the season in which they occur, their spatial pattern or extent, and their type. Combined, these attributes describe the fire regime. In order to classify, prioritize, and plan for fuels treatments across a fire management region, methods have been developed to stratify the landscape based on physiographic and ecological characteristics.

The service area's vegetation types (see Table 2.1; see Figure 2.7) have their own unique fire regimes and ecology and have played an important role in shaping the ecology of PFA service area. As mentioned previously, three major vegetative zone are encountered throughout the PFA service area (plains grassland, lower ecotone, and lower montane), each of which has been increasingly affected by invasive species, fire exclusion, and human development, exacerbating wildland fire behavior and presenting increased concerned for WUI fire risk.

GRASSLANDS COMMUNITIES

Grassland communities are present at varying elevations throughout PFA (Figure 2.8) and comprise short-grass prairie species like buffalograss (*Buchloe dactyloides*) and blue grama (*Bouteloua gracilis*) at lower elevations, to mid-grass types like western wheatgrass (*Pascopyrum smithii*), sideoats grama (*Bouteloua curtipendula*), needle-and-thread (*Stipa comata*), little bluestem (*Schizachyrium scoparium*), and Indian ricegrass (*Oryzopsis hymenoides*) throughout the foothills.

Historically, fire regimes in these grasslands would be short-interval (typically less than 20 years) stand-replacement events that could vary in size due to topography and weather effects (Zouhar 2021). The size of a fire in these grasslands would vary substantially. Large, extensive wildfires would typically occur during dry years following a fuel buildup during antecedent wetter growing seasons (NatureServe 2023). Dense monocultures formed by invasive grass species, such as cheatgrass (*Bromus tectorum* or *Bromus japonicus*), are of significant concern and can result in increased fire intensity. Agricultural areas are widespread throughout the eastern portion of the PFA service area and are typically not subject to natural fire regimes (note: fires can and do occur on farmlands, especially during hot and dry conditions [Western Farm Press 2017]).

Figure 2.8. Example of grasslands within Lory State Park in the PFA service area.

MOUNTAIN SHRUBLAND COMMUNITIES

The western portion of the service area is located in the low-elevation Rocky Mountain Front Range foothills, where a transition occurs from grassy fuels to shrub and timber fuels (Figure 2.9). These shrubs can form dense communities or, if situated higher in elevation, can act as understory in open ponderosa pine or ponderosa pine/Douglas-fir stands. Dominated by true mountain mahogany (*Cercocarpus montanus*), these communities host various species such as chokecherry (*Prunus virginiana*), skunkbush (*Rhus trilobata*), rubber rabbitbrush (*Chrysothamnus nauseosus*), common snowberry (*Symphoricarpos albus*), bitterbrush (*Purshia tridentata*), and common juniper (*Juniperus communis*) (PFA 2011).

Fire regimes for these shrublands vary, with return intervals from less than 35 years in grass communities to 40 to 100 years as an understory in forested stands. While mountain mahogany burns less readily than other shrubs, it poses a wildfire threat when stands become decadent or live fuel moisture is low. Growing on droughty soils and rocky sites, mountain mahogany typically experiences small, low-severity fires without high winds. However, fire exclusion can lead to hazardous fuel build-up and conifer encroachment. In more productive soils, the shrub's understory of grass and litter can provide a contiguous fuel bed, facilitating fire spread (PFA 2011) and creating significant suppression challenges under windy conditions.

Figure 2.9. Example of shrublands within Lory State Park in the PFA service area.

PONDEROSA PINE AND PONDEROSA/DOUGLAS-FIR COMMUNITIES

As elevation rises in the western portion of the PFA service area, timber fuels become increasingly prevalent. Ponderosa pine and codominant ponderosa pine and Douglas-fir communities are common throughout the portion of Rocky Mountain foothills captured within the service area (Figure 2.10). The dominant tree in these communities is ponderosa pine, with Douglas-fir also widespread, especially on north-facing slopes. Other common tree species include Rocky Mountain juniper (*Juniperus scopulorum*) and aspen (*Populus tremuloides*). The understory consists of litter, grasses, and shrubs such as mountain mahogany and common juniper (PFA 2011).

Fire regimes in these woodlands can vary from low-severity to mixed-severity events. CSU's Colorado State Forest Institute found ponderosa pine–mixed conifer forests to have a fire interval range of 2 to 70 years (Colorado Forest Restoration Institute [CFRI] 2021). Other studies conducted along the Front Range estimated that most ponderosa pine woodlands have mixed-severity events with variable return frequencies that are typically greater than 30 years (McKinney 2019). More frequent (less than 30 year return interval) lower-severity fire events typically occur in the lower elevations (~5,500–7,000 feet) where the ponderosa pine woodlands border more fire-prone grasslands (McKinney 2019). A mixture of low-, moderate-, and high-intensity fire events at less frequent intervals occur at slightly higher elevations (~6,000–9,000 feet), where denser ponderosa pine stands intermixed with Douglas-fir are prevalent. These forests, especially at lower elevations, are outside their historic range of variability, with increased stand density and susceptibility to disease and insect infestation, leading to heightened fire behavior and management challenges (PFA 2011).

Figure 2.10. Example of ponderosa pine–dominated communities in Lory State Park within the PFA service area.

CLIMATE AND WEATHER PATTERNS

With the exception of the far western edge, most of the PFA service area has a relatively uniform topography and a similar climate. Thus, there is little to moderate variation in average climate and weather patterns for most of the PFA service area. Weather station data for the city of Fort Collins and eastern Fort Collins were gathered from NOAA weather stations (NOAA 2024b). The climate in the western portion of the PFA service area is best represented by the Redstone Canyon remote automated weather station (RAWS) (Western Regional Climate Center [WRCC] 2024) (Table 2.2).

Table 2.2. Mean Annual Temperature and Precipitation for Stations within the PFA service area.

			Mean Annual Temperature (°F)		
Station	**Period of Record**	**Mean Total Annual Precipitation (Inches)**	**Max**	**Min**	**Mean Annual**
Fort Collins	1991–2020	15.88	64.5	37.0	50.7
Fort Collins E.	1991–2020	14.83	63.4	35.2	49.3
Redstone Canyon RAWS	2003-2024	17.65	61.9	37.9	49.3

Source: NOAA (2024b); WRCC (2024)

July is typically the hottest month of the year in PFA, with average July daily maximum temperatures ranging from 84.5ºF at the Redstone Canyon RAWS to 87.6ºF in the eastern portion of the PFA service area. December and January are usually the coldest months of the year, with Fort Collins experiencing

average daily minimum temperatures of approximately 18ºF and the eastern portion experiencing somewhat colder average minimum temperatures of around 15.5ºF. The coldest month recorded by the Redstone Canyon RAWS was February, with an average daily minimum of 20.5º F. Figures 2.11 through 2.13 visually depict climate averages.

Mean annual precipitation totals vary minimally between the two Fort Collins weather stations, with Fort Collins receiving approximately 15.9 inches of precipitation per year, about 1 inch more than eastern Fort Collins' annual average total of 14.8 inches. The western portion of the PFA service area experiences more rain, with an annual precipitation total of 17.7 inches. Each station typically receives the highest precipitation in May, with March, April, June, and July also experiencing significant rainfall. Years where late summer precipitation is well below average and dry years preceded by very wet, productive conditions for vegetation create some of the most hazardous conditions in grassland dominated areas. The winter months of December and January are typically the driest months of the year. Particularly dry winters combined with strong, gusty winds can greatly increase the risk of wildfire spread during the winter months, as was seen with the Marshall Fire in Boulder County (Colorado Division of Fire Prevention and Control [DFPC] 2022a).

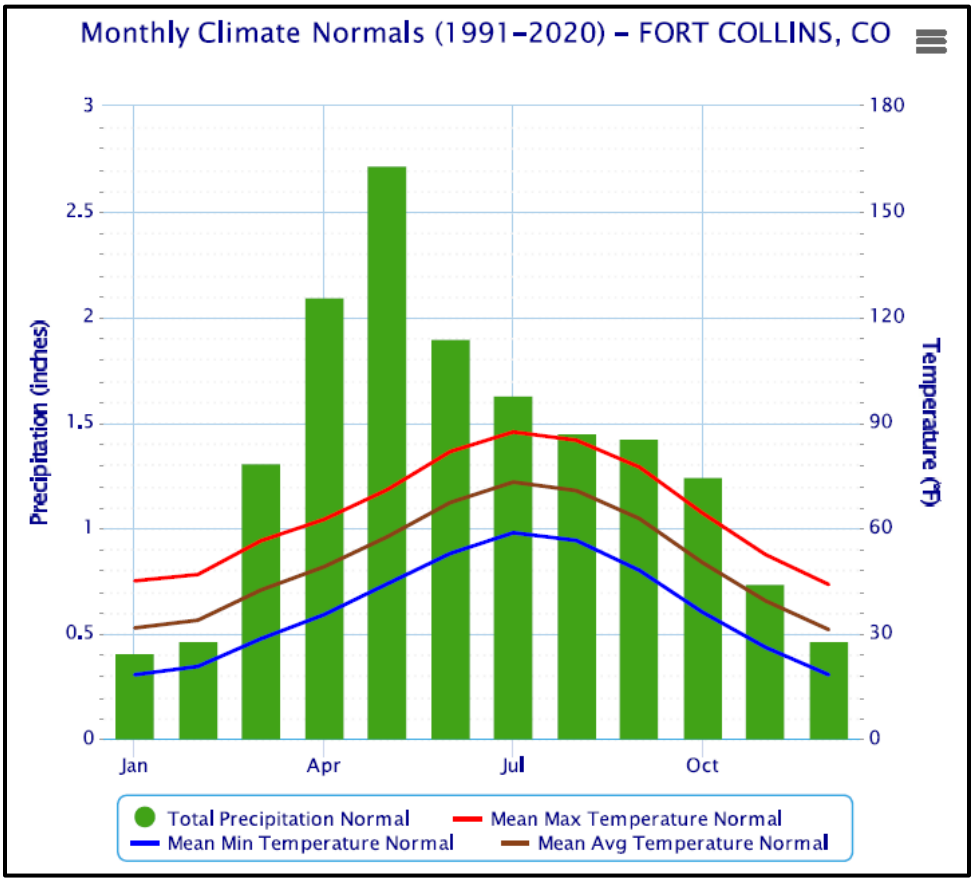

Figure 2.11. Monthly climate averages for Fort Collins, Colorado, 1991–2020 (source: NOAA 2024b).

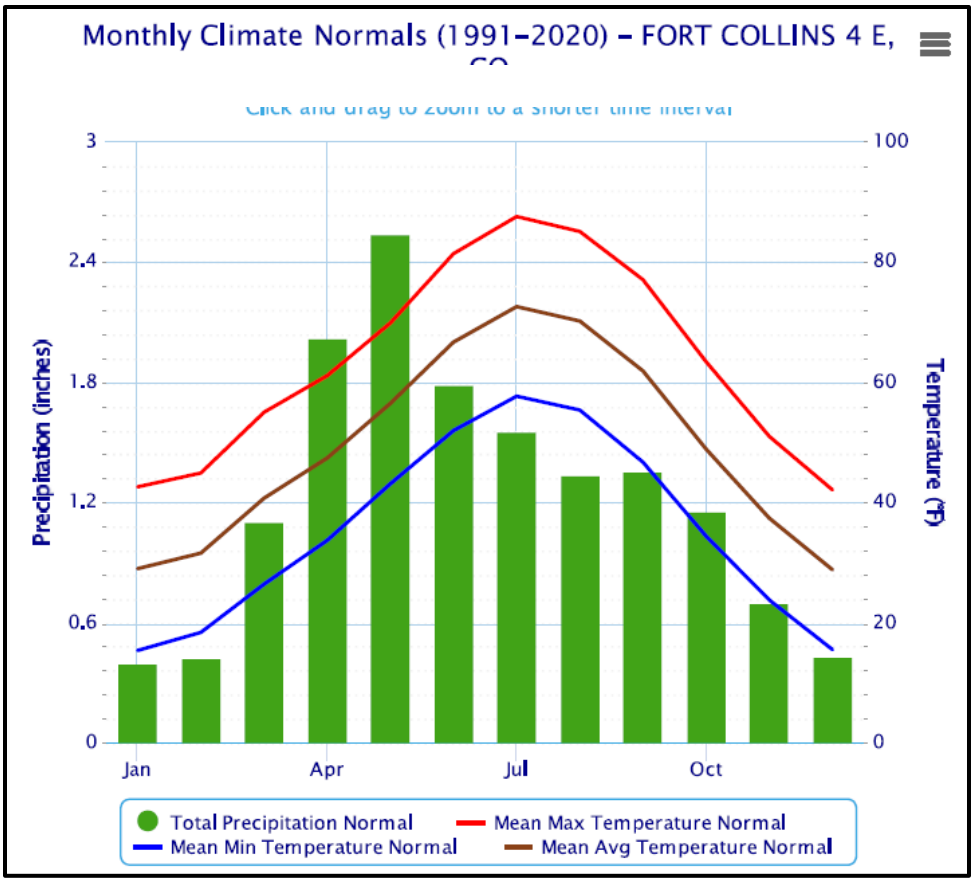

Figure 2.12. Monthly climate averages for eastern Fort Collins, Colorado, 1991–2020 (source: NOAA 2024b).

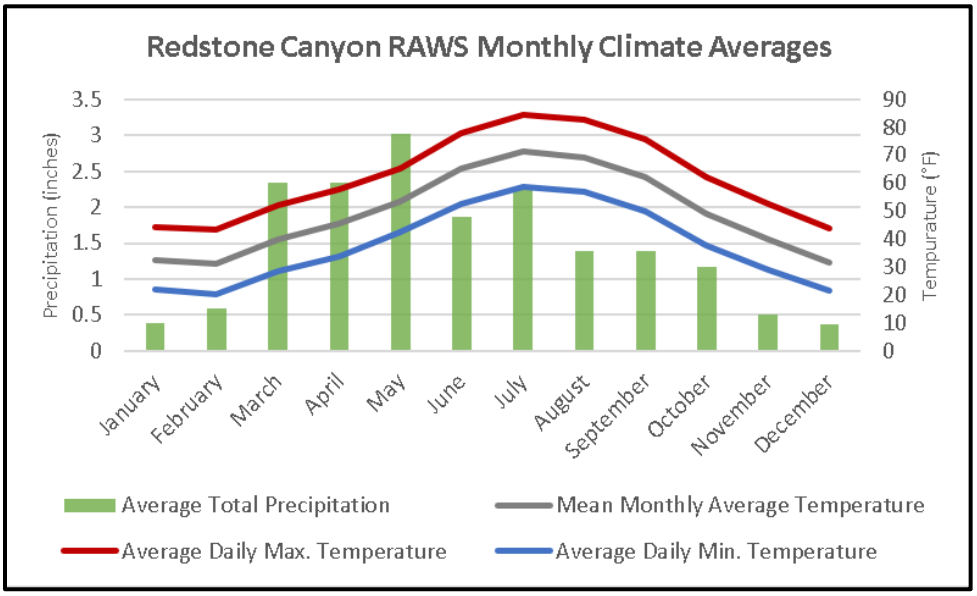

Figure 2.13. Monthly climate averages for the Redstone Canyon, Colorado, 2003–2024 (source: WRCC 2024).

It should be noted that, with climate change, Colorado is expected to experience significant changes in weather, which will likely exacerbate future fire behavior. Under all climate change scenarios, Colorado is expected to have increased summer temperatures and lengthening of the fire season. Precipitation totals are less likely to change, but the timing and duration of precipitation events will be more variable (Colorado Water Conservation Board 2023). Overall, the warmer temperatures will bring about drier weather in the PFA service area, which will exacerbate the fire risk.

WIND

In addition to temperature and precipitation, wind is a critical factor influencing fire behavior across the PFA service area and the dominant determining factor for the direction and rate of spread of wildfires. It is inherently challenging to predict due to its dependence on numerous variables such as topography, landforms, atmospheric pressure, convective energy, and the Earth's rotation (National Wildfire Coordinating Group [NWCG] 2024a). High winds significantly increase flame length, fire intensity, and the rate of fire spread. Further, wind events can lead to fire spotting, which occurs when strong winds carry burning embers, or firebrands, ahead of the main fire front, igniting new fires in receptive fuels (Mendez and Farazmand 2022).This phenomenon can make containment more challenging as firefighters must contend with multiple ignitions over a broader area, often in unpredictable patterns.

Figure 2.14 shows a WindNinja model output of average summer wind speeds and directions, calibrated specifically for the PFA service area. For this analysis, 'summer' refers to the months of June, July, and August, which were selected based on their alignment with the peak wildfire season in the region. During these months, elevated temperatures, lower humidity, and prevailing wind patterns create conditions conducive to increased wildfire activity (NWCG 2024a). This model incorporates an average input wind speed of 6.5 mph at 32.8 feet (10 meters) height, a temperature of 80°F, 20% cloud cover, and a prevailing direction of 320 degrees—parameters selected based on regional wind rose data (see Appendix B). The resulting visualization provides a granular view of wind behavior under typical summer conditions, highlighting areas where wind speeds and directions may pose elevated wildfire risks.

The color-coded vectors illustrate wind speeds across the PFA region, with darker hues indicating stronger winds, particularly over elevated terrain and near ridgelines. These areas, such as those around Storm Mountain and Sheep Mountain, exhibit accelerated wind speeds where the valleys and mountain gaps concentrate wind flow (Whiteman 2000). This effect can significantly enhance fire spread, increase flame lengths, and elevate the risk of spot fires due to ember transport over long distances (Whiteman 2000). These high-wind zones are particularly vulnerable to wind-driven fire behavior, which can overwhelm containment lines and rapidly escalate fire severity.

In contrast, areas with lighter colors in the figure, indicating lower wind speeds, are generally located on the lower plains. While these zones might initially experience slower fire spread, they remain susceptible to rapid changes in wind behavior due to local weather fluctuations. Additionally, these lower-speed areas can still contribute to significant ember spotting under specific conditions, especially if adjacent to high-wind zones. It is crucial to understand wind behavior to anticipate how a fire will respond to prevailing conditions, which in turn informs effective management strategies. Refer to the Environmental Challenges section of Appendix B for more in-depth information on visualizing wind patterns and understanding how wind behavior influences wildfire risk.

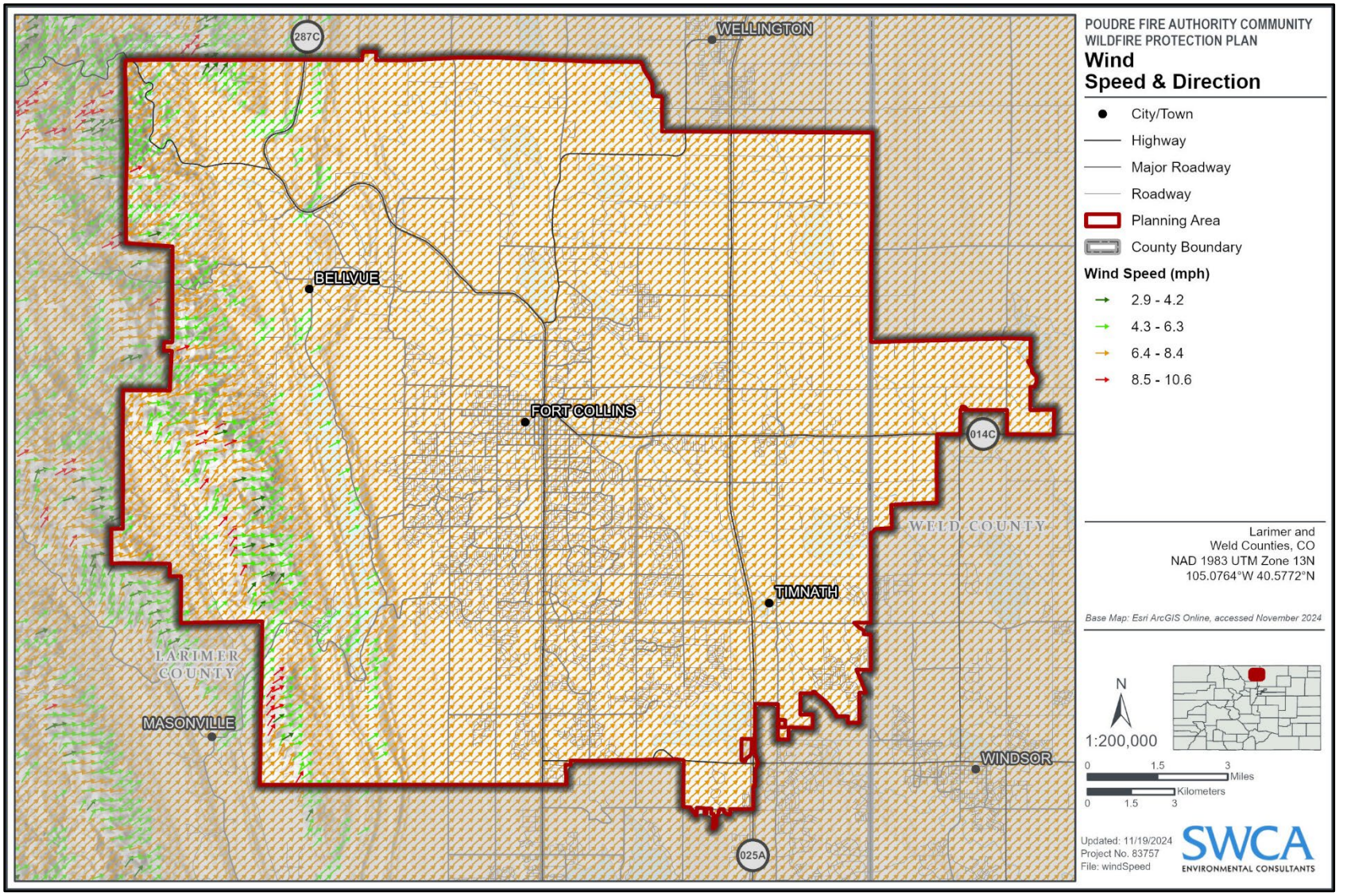

Figure 2.14. Modeled summer wind speed and direction for the PFA area, generated using WindNinja. Input parameters include an average wind speed of 2.9 m/s at 10 meters height, 80°F, 20% cloud cover, and a prevailing northwest wind direction (320 degrees). The visualization reveals higher wind speeds along ridges and mountain valleys, where topographic effects accelerate airflow, contributing to elevated wildfire risk (See Appendix H, Figure H.8 – H.13).

FIRE HISTORY

Fire is a natural part of Colorado's diverse landscapes and is essential to many ecosystems across the state. Almost all of Colorado's diverse ecosystems are fire-dependent or fire-adapted. For centuries, many Colorado Native American tribes recognized this interdependence between fire and the ecosystem and used prescribed burning to maintain and restore ecosystem health. However, in the 1800s, a shift in management actions—settlers began enforcing strict fire suppression regimes—led to challenges such as dense stand conditions, unhealthy rangelands, and increased ecosystem and community vulnerability to fire. Evidence suggests that, in many ecosystems, fire exclusion can lead to increased fire intensity, severity, and size as well as an increased likelihood of disease epidemic and severe watershed impacts. Furthermore, other actions such as human expansion into wildlands, climate change, and forest health degradation have likely resulted in an imbalance between wildfire and ecosystem interactions (Higuera et al. 2021).

RECENT FIRE OCCURRENCE

Larimer County and the surrounding region have experienced an array of major wildfires in recent history, including the 2020 Cameron Peak Fire, the 2012 High Park Fire, the 2011 Crystal Park Fire, the 2004 Picnic Rock Fire, and the 2000 Bobcat Gulch Fire. PFA's proximity to landscapes that exhibit extreme fire behavior necessitates thorough analysis and understanding of surrounding wildfire incidents to assess how they threaten people and resources, particularly under hazardous weather conditions. This also underscores the significance of effective interagency communication, mutual aid, and other cooperative agreements, as collaborations and support among agencies is crucial for effectively managing large-scale incidents.

The Cameron Peak Fire, the largest in Colorado's history, burned over 200,000 acres from August to December 2020, causing extensive damage to grassland, shrub, and forest habitats as well as infrastructure. Restoration efforts involved removing burned trees, reconstructing bridges and trails, and improving visitor amenities, leading to the reopening of Bobcat Ridge in September 2021 (City of Fort Collins n.d.). The High Park Fire, sparked by lightning on June 9, 2012, near Fort Collins, burned 87,284 acres over 3 weeks. It resulted in one fatality, destroyed 259 homes, and became the third-most destructive wildfire in Colorado's history (*Coloradoan* 2019). The Crystal Fire, occurring in April 2011, burned approximately 4,500 acres near Fort Collins, destroying at least 15 homes and leading to evacuations. Despite a cold front bringing rain and snow, the fire's containment was a challenge due to fluctuating weather conditions (Wildfire Today 2011). The Picnic Rock Fire, which started in March 2004, burned 8,900 acres near Poudre Canyon over 9 days, forced evacuations, and destroyed a home and a garage, eventually being contained with the help of cooler, wetter weather (Firehouse 2005). The Bobcat Gulch Fire, which started on June 12, 2000, burned 10,600 acres over several days and destroyed 18 homes (PFA 2011).

Figure 2.15 shows geographically and temporally referenced wildfire boundaries within the PFA service area. These data illustrate the trend of wildfire occurring in the higher elevations adjacent to the PFA service area boundary. The western portion of the PFA service area and surrounding western regions are home to the bulk of wildfire occurrences in the region throughout contemporary history, due to the topography and vegetative fuel conditions present. Wildfire causes in the area are varied, with both natural sources, such as lightning, and human activities contributing to ignition. This combination of causes highlights the need for comprehensive fire management strategies that consider both human influence and natural fire risks in the region.

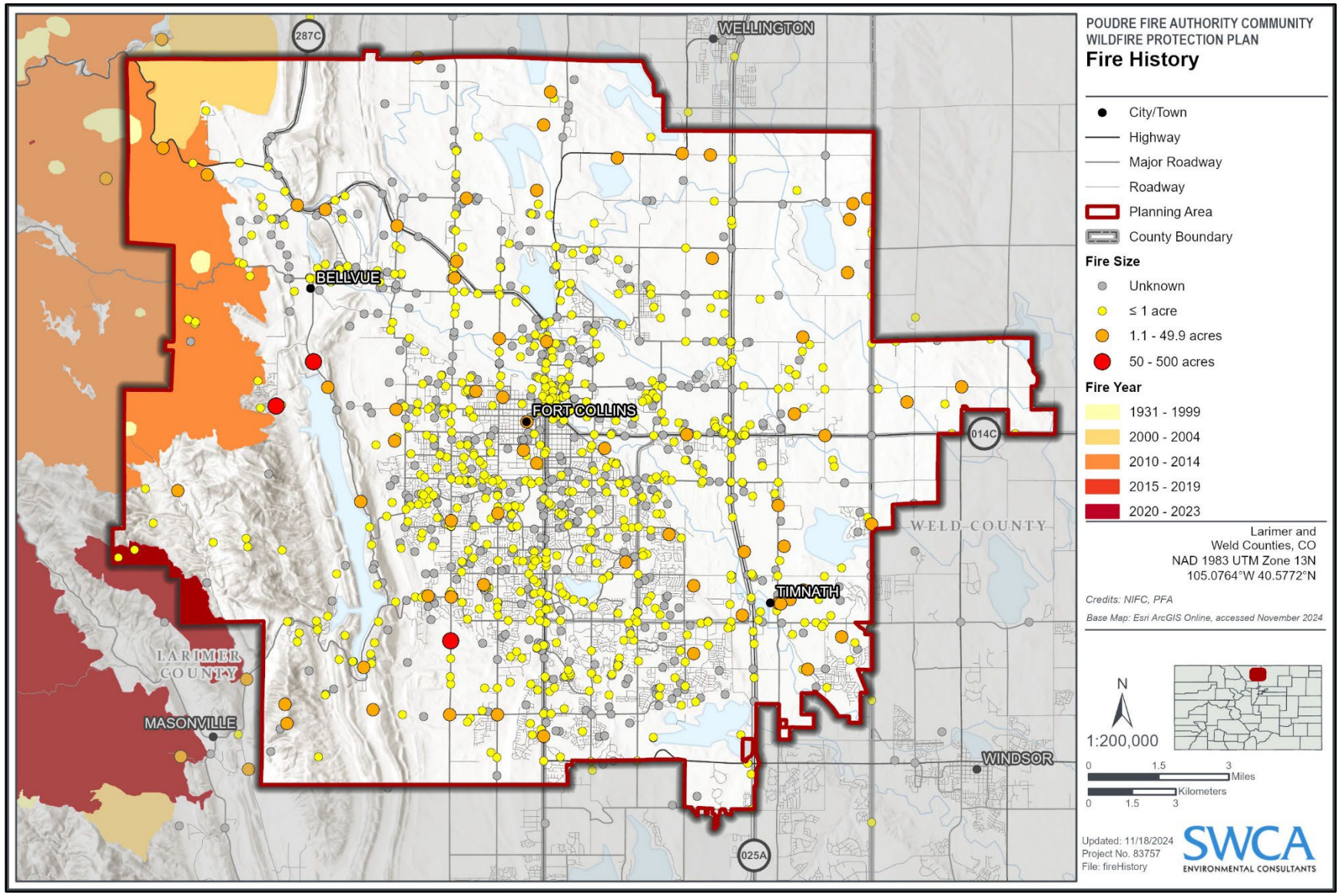

Figure 2.15. Recent wildfire history in the PFA service area.

FIRE SUPPRESSION RESOURCES

PFA ensures all firefighters are red carded and maintains an out-of-district team to build wildfire experience. Additionally, PFA supports robust seasonal and volunteer programs and uses drone technology for enhanced situational awareness. With multiple stations, a variety of fire apparatus, and a dedicated team of professional firefighters, PFA is well-equipped for wildfire response. The area also benefits from county, state, and federal suppression resources, including aviation units, ensuring a coordinated and effective response to wildfires.

Fire management in Colorado is accomplished through a cooperative interagency partnership among federal, state, and local entities. Within PFA's jurisdiction, wildland fire response may be dispatched by Larimer County dispatch, Fort Collins 911 dispatch, or the Northern Colorado Interagency Dispatch Center. The Northern Colorado Interagency Dispatch Center is part of the larger Rocky Mountain Area Coordination Center, which also includes Grand Junction, Montrose, Durango, and Pueblo Interagency Dispatch Centers within Colorado (Geographic Area Coordination Centers [GACC] 2022). Additional details regarding fire response resources are provided in Appendix B.

Xcel Energy will install Pano AI cameras in Larimer County beginning in 2025. These cameras are a tool to heighten situational awareness for early detection of wildfires. This technology uses panoramic, 360-degree camera networks enhanced with artificial intelligence (AI) to detect the presence of smoke. AI algorithms, coupled with 24/7 human monitoring, provide near real-time awareness and alerts of potential wildfires and enable notifications to fire protection agencies and first responders. Pano AI builds relationships with the different fire protection districts whose jurisdictions are covered by Pano cameras. Pano will conduct outreach and onboard fire protection districts, offices of emergency management, and sheriff's offices.

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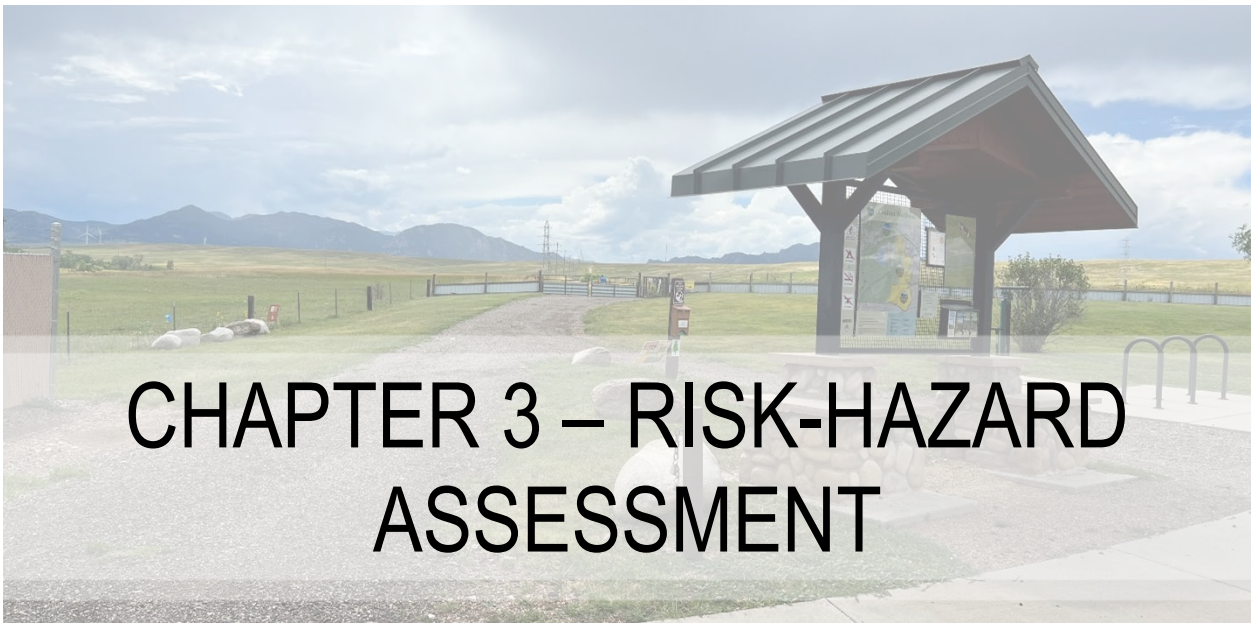

CHAPTER 3 – RISK-HAZARD ASSESSMENT

PURPOSE

Upon completion of a COAL Quantitative Wildfire Risk Assessment for the PFA service area, land use managers, fire officials, planners, and others can begin to prepare strategies and methods for reducing the threat of wildfire, as well as work with community members to educate them about methods for reducing the damaging consequences of fire. Fuel reduction treatments are a good tool to be used for reducing wildfire hazards. The Quantitative Risk Assessment can aid in the identification and prioritization of fuel treatments based on where risk is greatest. The fuels reduction treatments can be implemented on both private and public land, so community members can actively apply the treatments on their properties, as well as recommend treatments on public land that they use or care about. For more information about fuels treatments, see Chapter 4, Hazard and Risk Reduction Strategies.

Areas of high wildfire hazard and risk are identified by the Quantitative Risk Assessment through the modeling and mapping of fire behavior, analysis of HVRAs, and incorporation of stakeholder and expert input.

The Quantitative Wildfire Risk Assessment does not account for conflagration risks associated with urban fuels such as structures, fences, vehicles, outbuildings, and other built environment fuel sources. The following maps and modeling products in Chapter 3 do not incorporate risk modeling associated with urban conflagrations.

Detailed information on the modeling process is provided in Appendix C.

MODELING THE FIRE ENVIRONMENT

The wildland fire environment consists of three factors that influence the spread of wildfire: fuels, topography, and weather (see Chapter 2). Understanding how these factors interact to produce a range of fire behavior is fundamental to determining treatment strategies and priorities in the WUI. In the wildland environment, vegetation (alive or dead) is synonymous with fuels. When sufficient fuels for continued combustion are present, the level of risk for those residing in the WUI is heightened.

To understand wildfire modeling it is important to be aware of how wildfire spreads. Wildfire spreads via surface fire (Figures 3.1 and 3.2), crown fire (Figure 3.3), and spotting (Figure 3.4), with all three commonly occurring during red flag conditions. Surface fires can be low intensity (see Figure 3.1) or high intensity (see Figure 3.2) depending primarily on fuel loading and wind speed. High-intensity grass fires can move extremely quickly and generate immense amounts of radiant heat. Crown fire is when surface fire "ladders" up into the upper levels of the forest canopy and spreads through the tops (or crowns) independent of, or along with, the surface fire, and is often beyond the capabilities of suppression resources.

Active crown fires are extremely difficult to control. Removing ladder fuels and reducing fuel loading near communities before a fire ignites is the best way to limit crown fire and reduce wildfire risk. Additionally, crown fires can produce many embers. If embers are plentiful and/or long range (>0.5 mile), rates of spread and intensity can be very high and wildfire risk for homes can be high even if they are far away.

Crown fire and spotting activity have been a concern for fire managers, particularly under extreme weather conditions. In areas where homes are situated close to timber fuels and/or denser shrubs and trees, potential spotting from intensely burning fuels to adjacent unburned fuels should always be acknowledged (see Figure 3.4). See the Ember Ignition Hazards subsection and Figure 3.5 for a map of ember load index and explanations describing the factors that affect ember production and travel.

Figure 3.1. A low-intensity surface fire. Source: PFA.

Figure 3.2. A high-intensity surface fire. Source: PFA.

Figure 3.3. Active crown fire. Source: PFA.

EMBER IGNITION HAZARDS

Ember exposure from wildland fires can pose a significant threat to homes and other structures in the WUI (see Figure 3.4) (Maranghides and Mell 2013). “Ember load index” refers to the quantity of embers released into an area during a wildfire incident (Figure 3.4). Spotting occurs when embers travel in advance of the flaming front; long-range spotting can be miles ahead of the main fire. Many factors determine whether an ember will result in an ignition (firebrand source and size, wind, humidity, receiving materials, exposure duration, etc.). Burning structures and other materials (vehicles and ornamental vegetation) have been identified as another source of embers that can ignite additional combustible materials in the WUI, particularly when there is a low structure separation distance (Maranghides et al. 2022; Suzuki and Manzello 2021).

Homeowners should note surrounding tree species and implement home hardening practices, such as installing vent covers, regularly clearing gutters, and sweeping leaf litter from decks and foundation, to reduce structural ignitions from ember wash. Programs to aid landowners in preventative efforts and cases of wildfire are provided in Appendix E, Homeowner Resources.

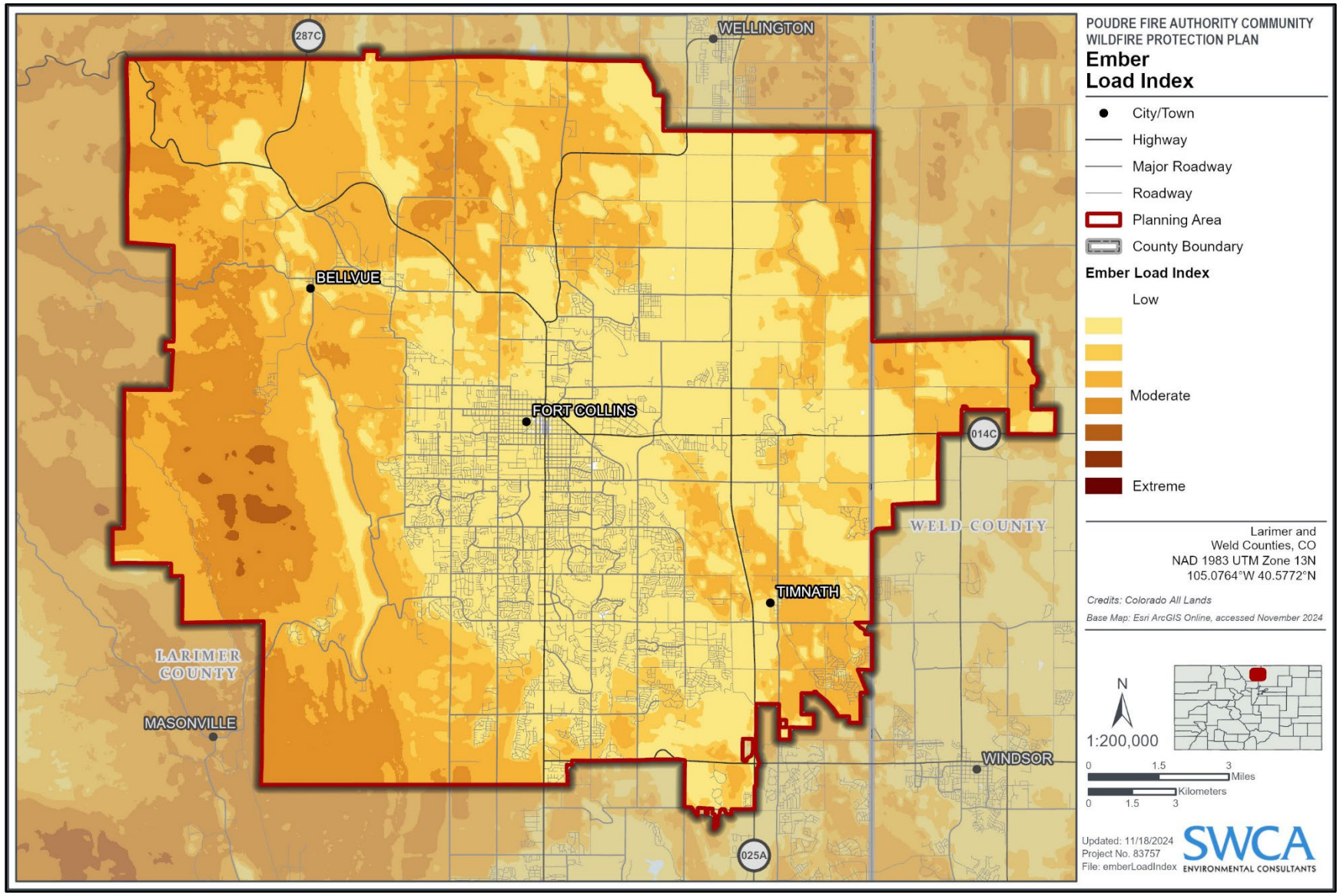

Figure 3.4. Ember load index for the PFA service area. High ember load risk represents areas that may receive high amounts of embers during a wildfire.

COLORADO ALL-LANDS (COAL) QUANTITATIVE RISK ASSESSMENT

The COAL Quantitative Wildfire Risk Assessment developed by Pyrologix was created collaboratively with CSFS and USFS experts. The purpose for developing this risk assessment was to provide the communities of Colorado with a standardized assessment of hazard, vulnerability, and risk across the landscape using state-of-the-art modeling methods and up-to-date source data on existing conditions. This allows officials and land managers to compare risk across jurisdictional boundaries and apply successful strategies in reducing wildfire risk in multiple communities throughout Colorado. Many of the shortcomings of previous wildfire risk assessments have been addressed and accounted for in the COAL Quantitative Risk Assessment. Important examples include:

- Recalibrating the Colorado fuelscape to account for past disturbances (wildfires)
- Recalibrating the burnability of urban and agricultural fuels in fire behavior modeling
- Removing data seam lines
- Using a set of collaboratively approved HVRAs standardized across Colorado.

The COAL Quantitative Wildfire Risk Assessment is a unique tool for evaluating the risk of wildland fires to communities within the PFA service area. In the context of wildfire risk modeling, risk is a combination of hazard and vulnerability. Although many definitions for risk exist, for the purpose of this document, risk is a product of four factors defined by the Quantitative Wildfire Risk Framework (Figure 3.5):

Burn probability is the likelihood of 30-square-meter pixel burning.

Intensity is an expression of the rate of energy release (kW/m) and is used to describe heat of combustion, fuel consumed, and linear rate of spread. Flame lengths correlate, directly, to intensity.

Exposure is the proximity of HVRAs to hazards on a landscape (e.g., homes in the WUI or a source watershed in an alpine environment).

Susceptibility is a measure of how easily an HVRA is damaged by wildfire. Resiliency is a common term used to describe the susceptibility of an HVRA.

A detailed methodology of the COAL Quantitative Wildfire Risk Assessment can be found in Appendix C, Fire Behavior Modeling/GIS Background and Methodology.

Figure 3.5. Pyrologix's Quantitative Wildfire Risk Framework for the COAL Quantitative Wildfire Risk Assessment, derived from Scott et al. (2013).

An overview of **wildfire hazard** within the service area including intensity (Figure 3.6) and probability (Figure 3.7) can be found below. Factors used to determine wildfire hazard include the predicted fire behavior if a wildfire were to occur represented by outputs such as flame length, rate of spread, and fireline intensity. These fire behavior outputs are directly influenced by fuel type, fuel density, and crown height, as well as other landscape characteristics such as slope and aspect. While wildfire hazards are present throughout the jurisdiction, they are most pronounced in the dense timber and brush fuels of the western areas, where the combination of heavy vegetation and challenging terrain significantly increases the potential severity of wildfires.

Vulnerability in the above equation is a function of the exposure and susceptibility of values on the landscape, based on their position and the intensity of expected fire. Vulnerability is incorporated into the risk maps provided as Figures 3.8 and 3.9.

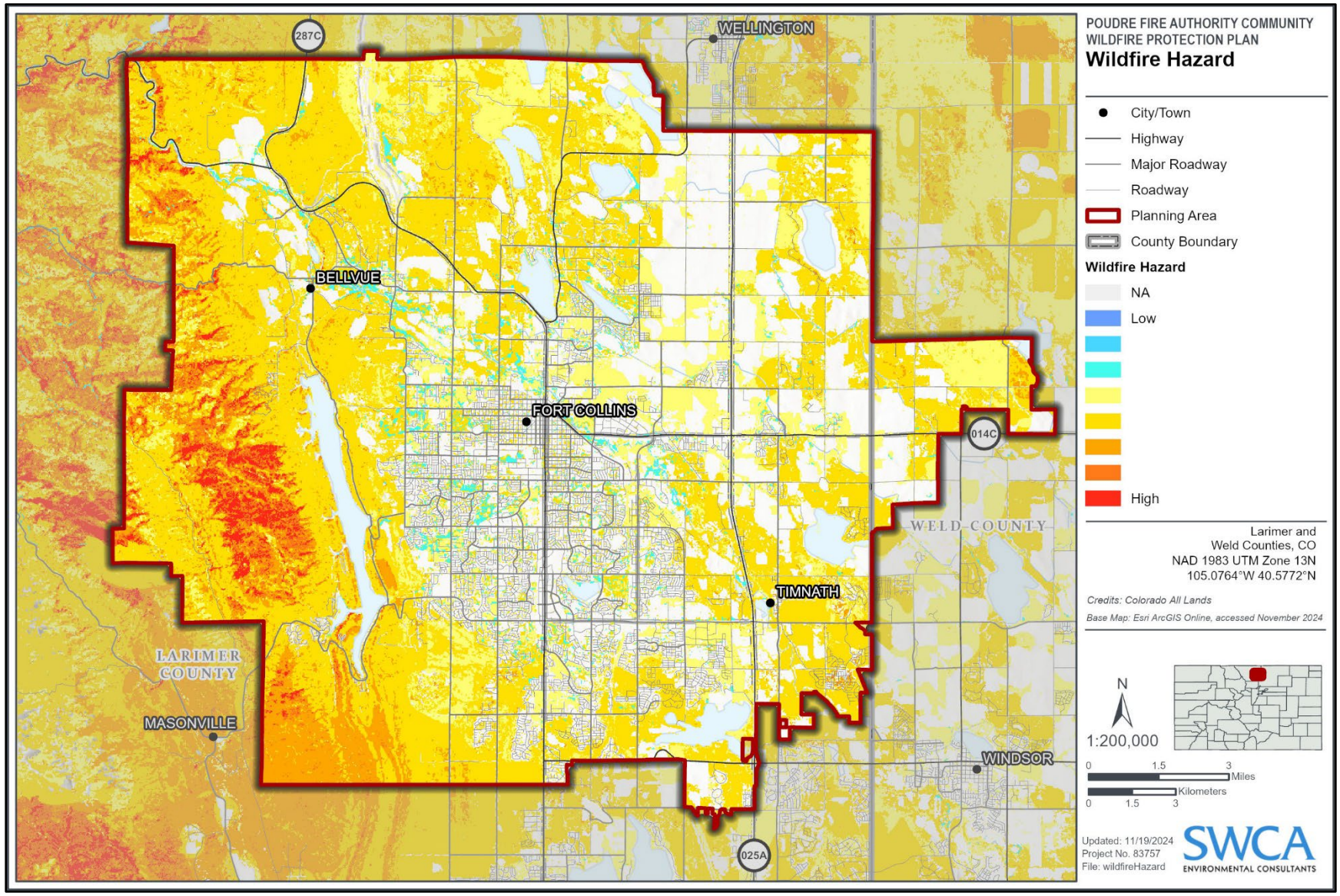

Figure 3.6. Wildfire hazard across the PFA service area. Wildfire hazard is modeled from the probability of the landscape burning and the predicted fire behavior when it does. See Appendix C for a detailed modeling methodology.

Source: Pyrologix 2022b.

WILDFIRE RISK IN THE PFA SERVICE AREA

Wildfire risk in the PFA service area is quantified in this CWPP using the COAL Quantitative Wildfire Risk Assessment and is further defined through field-based community hazard assessments. Wildfire risk is a relative measure that encompasses both the likelihood of wildfire occurrence and the potential consequences. In this context, it is represented by burn probability, the risk to existing assets, and the risk to potential structures, providing a comprehensive assessment of the threat posed by wildfires. Wildfire hazard is a composite dataset of modeled wildfire behavior metrics such as flame length and rate of spread (see Appendix C for maps of wildfire behavior metrics).

Burn probability is quantified in Figure 3.7 and is the result of simulating thousands of wildfire ignitions in the county, under varied weather conditions from the local climatological record, and calculating the percentage of times any given location burned within the resulting modeled fire perimeters. The model does not incorporate suppression tactics and assumes that all fires spread, uncontrolled, until weather or fuel conditions prevent further growth. The resulting map shows that the highest burn probability can be found in the undeveloped wildland and grassland areas outside of the Fort Collins urban center.

The distance of structures to wildland fuels and associated intensity, also known as exposure, was incorporated in Figure 3.8, wildfire risk to assets. In Figure 3.8, assets include structures, infrastructure such as communication sites and power lines, and drinking watersheds. High wildfire risk occurs where assets overlap high wildfire hazard and burn probability. The resulting map illustrates the wildfire risk associated with key assets, aiding in the understanding of fuel reduction prioritization and demonstrating how that wildfire risk extends beyond just the proximity to residential structures.

Figure 3.9 displays expected wildfire risk to potential structures and answers the question: “What would the wildfire risk be if a structure were to occur there?” As population and housing demand continue to steadily grow, it is important to consider the wildfire risk associated with new development that may extend into the WUI. This map is useful when determining the wildfire risk of new developments and understanding wildfire risk on a broader landscape scale.

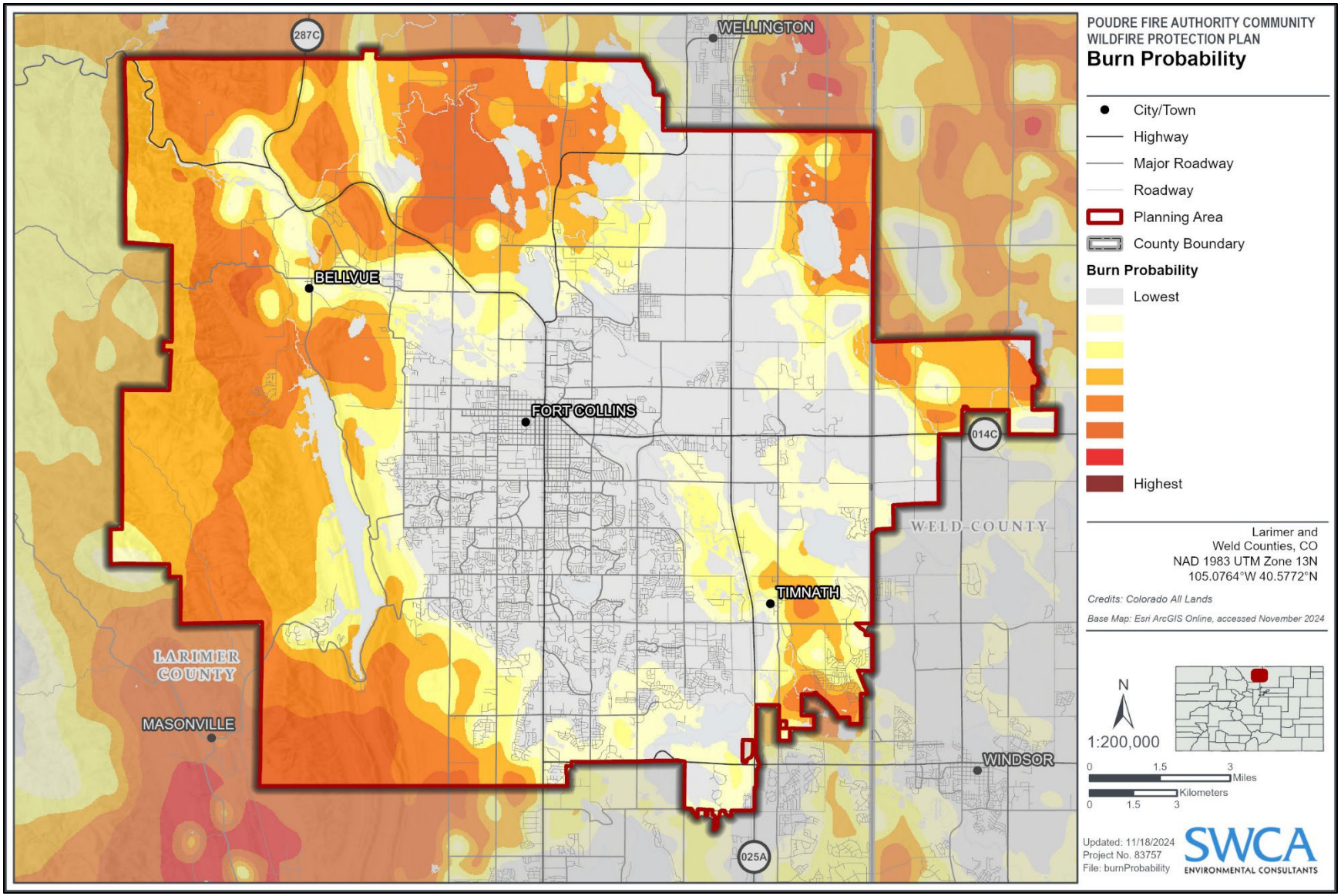

Figure 3.7. Modeled burn probability with the PFA service area. This probability output is derived by igniting thousands of fire starts across the landscape and stimulating their spread over time under different weather scenarios.

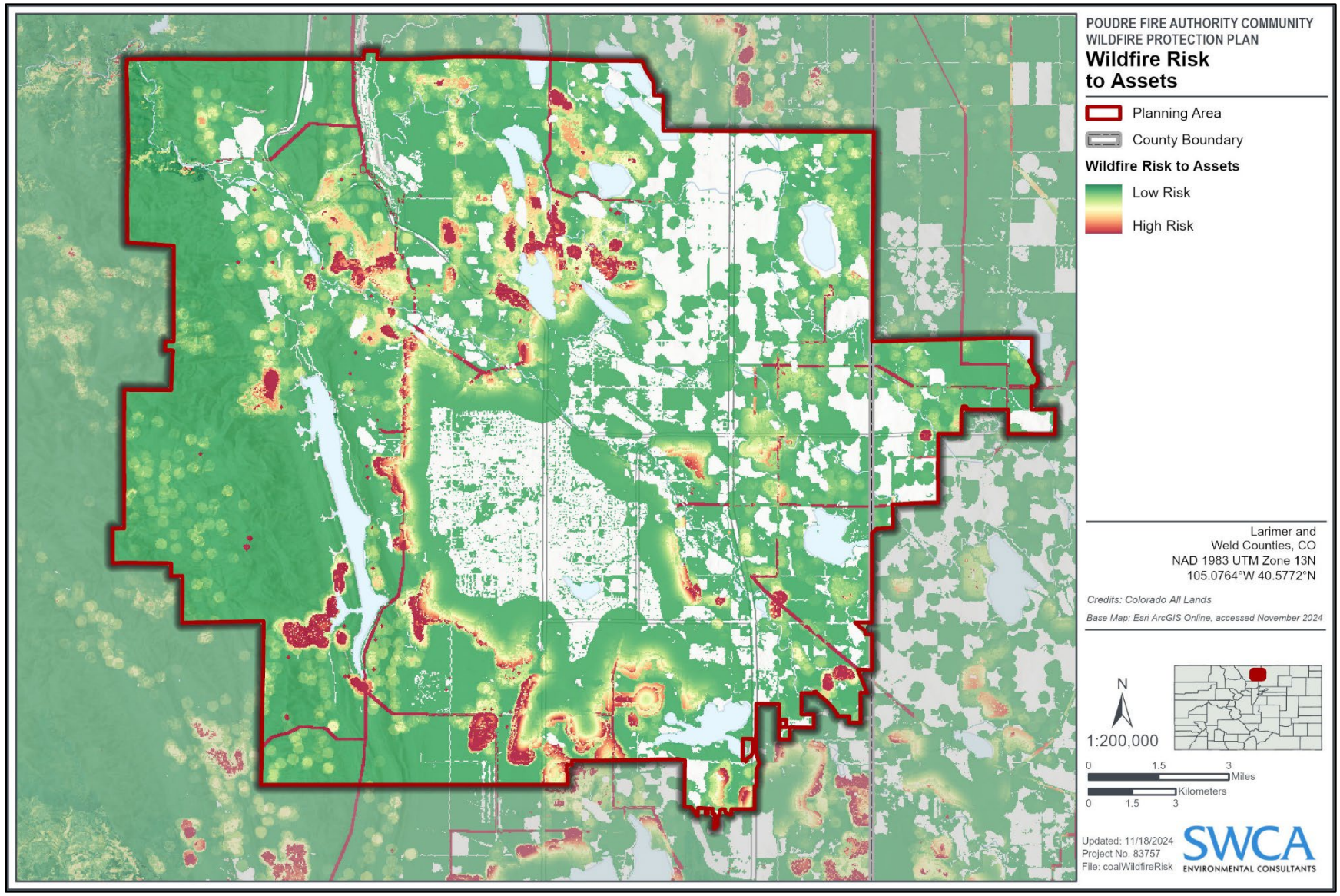

Figure 3.8. Wildfire risk to assets shows areas where high wildfire risk abuts and overlaps assets such as structures and infrastructure within the PFA service area.

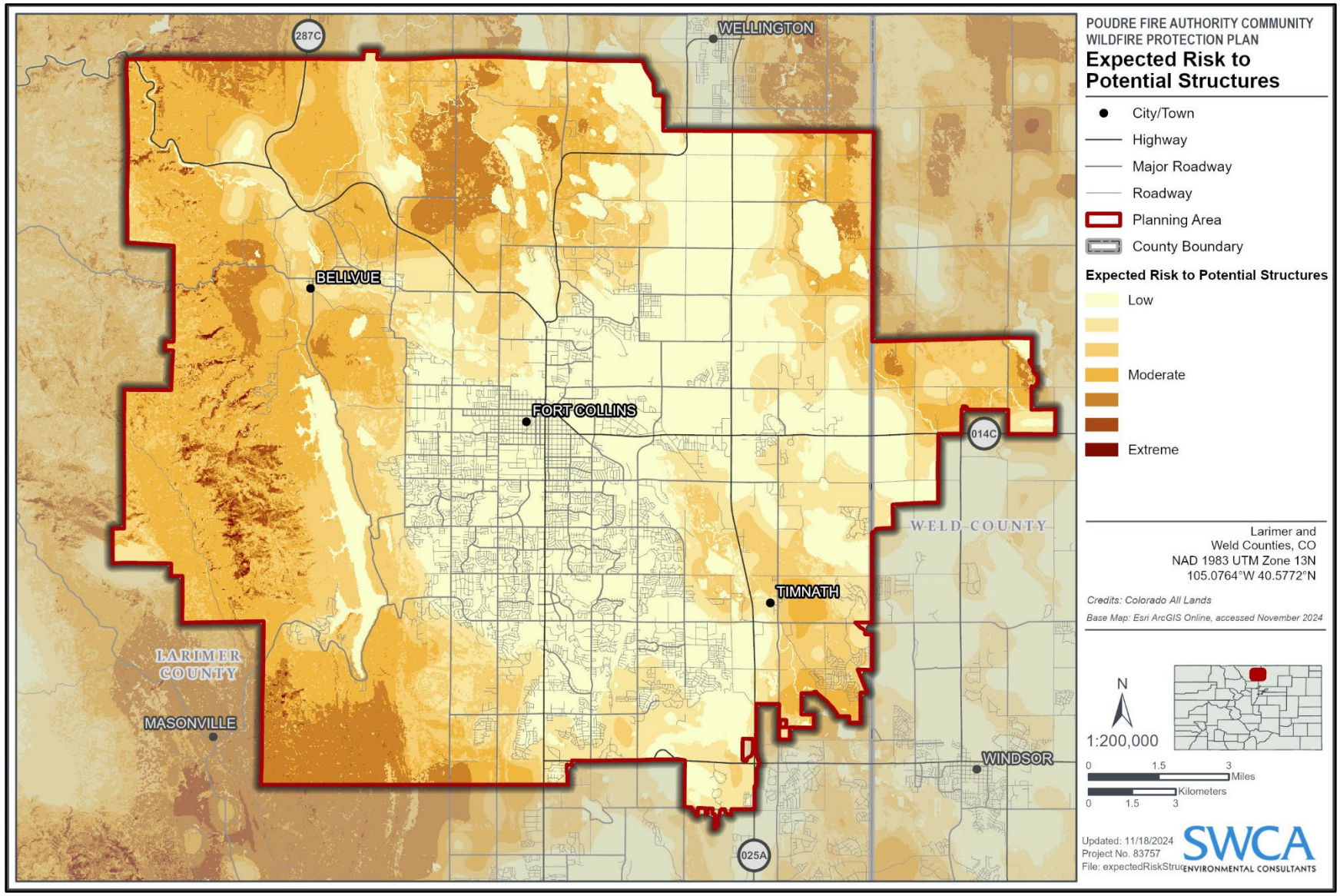

Figure 3.9. Expected risk to potential structures shows wildfire risk across the landscape and answers the question: "What would the wildfire risk be if a structure were to occur there?".

SOCIAL VULNERABILITY

It is essential to identify socially vulnerable populations accurately and comprehensively within the PFA service area when considering wildfire risk. Wildfire can disproportionately affect the underserved because of factors such as inadequate housing, social exclusion, lack of property, and inability to evacuate effectively (Fothergill and Peek 2004). Furthermore, those with fewer assets and lower financial security will have less ability to absorb losses and maintain resilience to additional hazard impacts. Such populations can be assessed using a social vulnerability index (SVI), which approximates the social vulnerability of a location based on multiple indicators. SVI uses Census Bureau data to measure the relative social vulnerability of communities on a scale from 0 to 1. Factors considered are socioeconomic status, household composition and disability, minority status and language, and housing type and transportation (Centers for Disease Control and Prevention [CDC] 2024). Figure 3.10 shows the SVI ratings within the PFA service area.

Note: SVI is based on survey responses and subject to sampling error and response biases.

Figure 3.11 depicts SVI within the PFA service area overlaid with wildfire hazard. Though it is helpful to focus efforts on socially vulnerable populations located in high wildfire risk areas, large wildfires can be transboundary in nature and may negatively impact many different demographic groups over varying time scales (Palaiologou et al. 2019). Local land managers, fire response agencies, and community resource groups should be prepared to mitigate wildfire hazards in vulnerable communities and establish programs to help those that are the most susceptible to drastic life changes due to a wildfire disaster.

Socially vulnerable populations were considered while drafting this plan through public engagement and outreach; however, this CWPP does not attempt to identify all the socially vulnerable populations in the PFA service area. According to the CDC SVI approximations, the areas of highest vulnerability are located in the central and northern portions of the city of Fort Collins, as well as the easternmost portion of the service area.

Additional information on how wildfire may affect socially vulnerable populations can be found at Wildfire Risk to Communities here: https://wildfirerisk.org/.

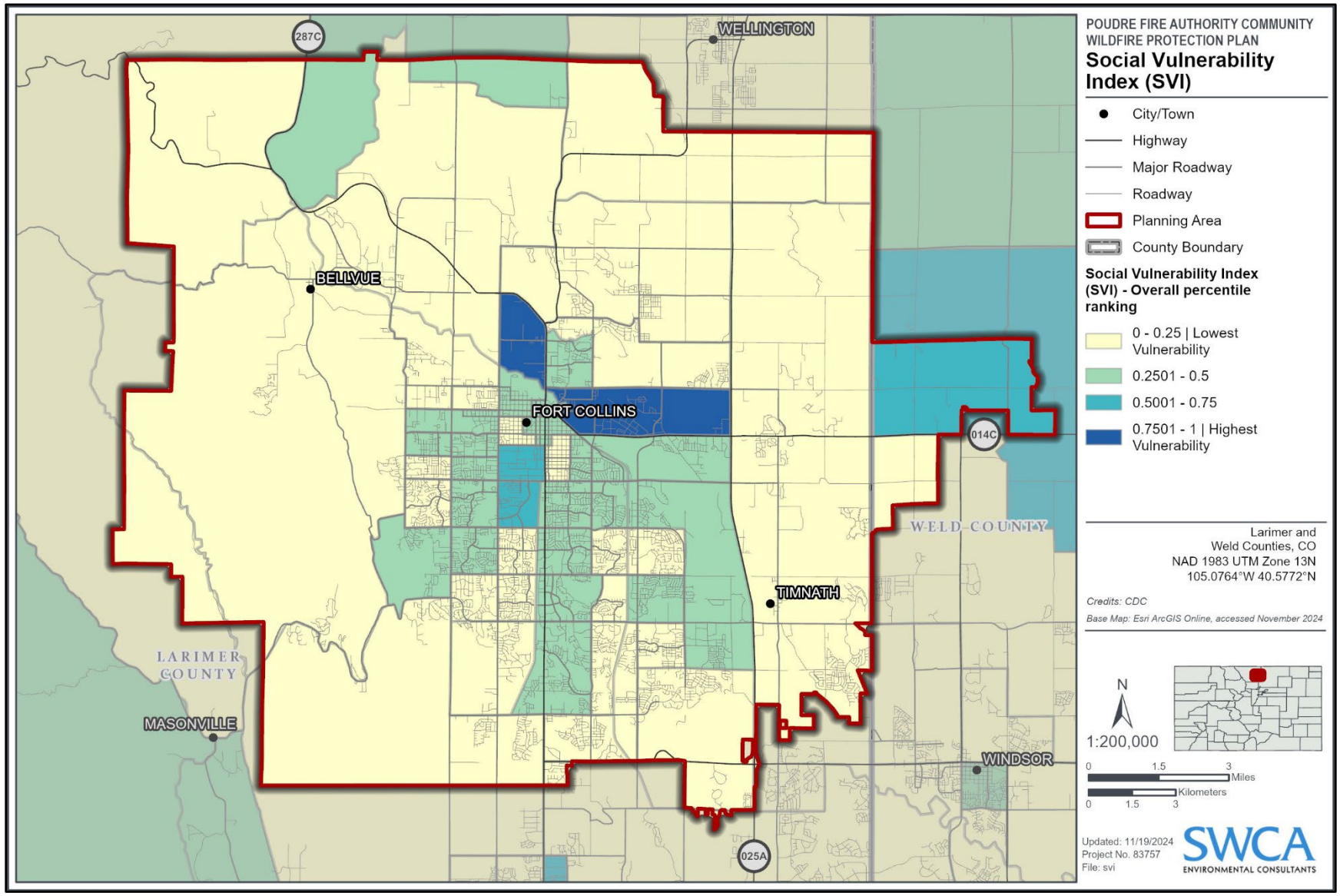

Figure 3.10. Overall SVI percentile ranking for the PFA service area (source: CDC 2024).

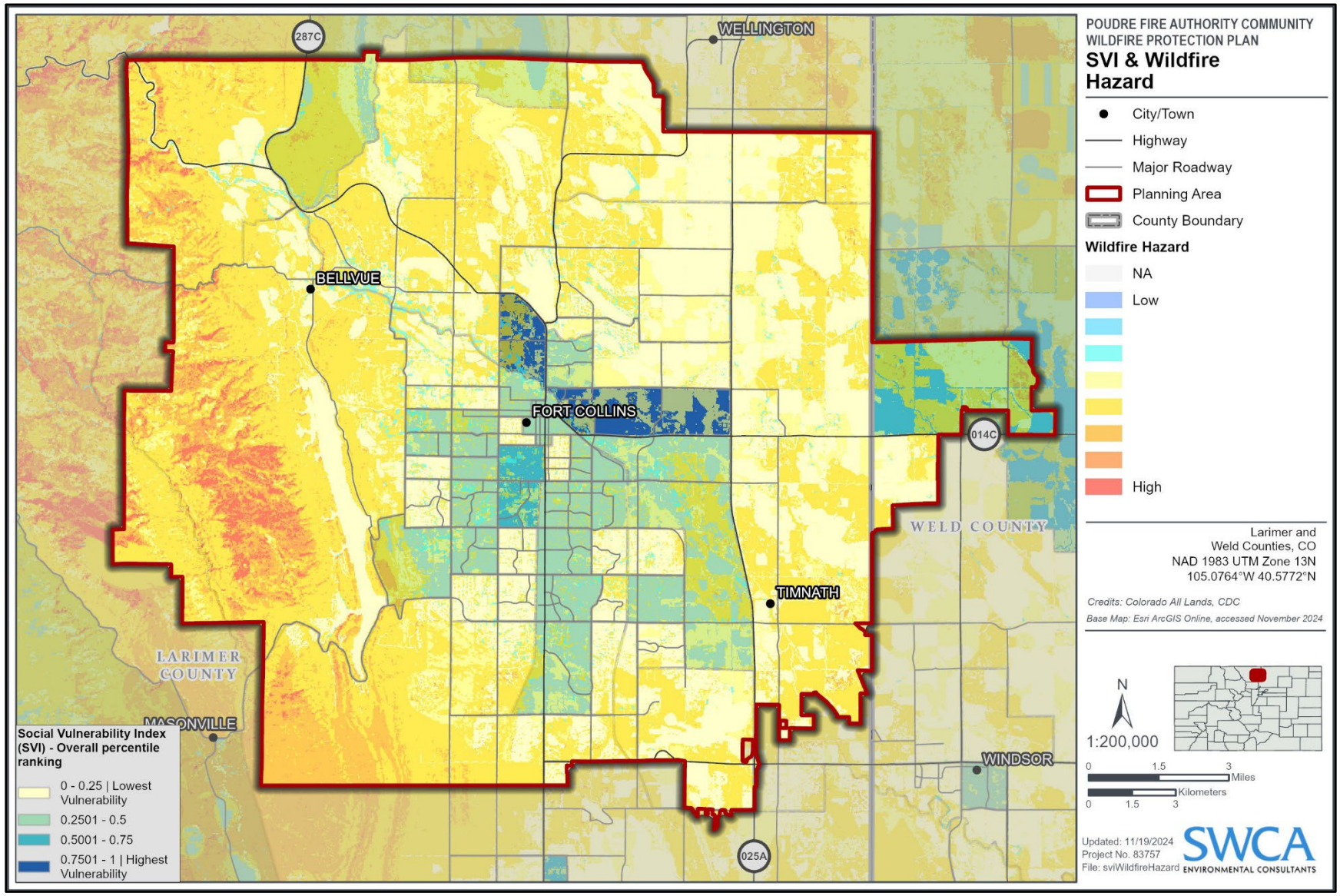

Figure 3.11. A map showing vulnerable populations in the PFA service area overlaid with wildfire risk.

VALUES EXPOSED TO WILDFIRE HAZARD

Earlier compilation of the critical infrastructure in the PFA service area, coupled with the community assessments and Core Team input, has helped in the development of a list (see below) of values potentially exposed to wildland fire hazards.

Community values include natural, socioeconomic, and cultural resources (Figures 3.12–3.14). It is important to note that although the identification of community values can inform treatment recommendations, a number of factors must be considered in order to fully prioritize areas for treatment; these factors include treatment type, land ownership constraints, locations of ongoing projects, available resources, and other physical, social, or ecological barriers to treatment.

The scope of this CWPP does not allow determination of the absolute natural, socioeconomic, and cultural values that could be impacted by wildfire in the PFA service area. In terms of socioeconomic values, the impact due to wildfire would cross many scales and sectors of the economy and call upon resources locally, regionally, and nationally.

NATURAL VALUES

While much of the PFA's jurisdiction includes developed land for urban, suburban, and agricultural uses, the PFA service area also includes a wide range of natural resources that are vital to land managers and the community, such as rivers, reservoirs, and other aquatic resources, hiking trails, and sensitive plant and wildlife species (see Appendix H, Figure H.3). Previous CWPP assessments and planning efforts have highlighted the importance of protecting natural/ecological values to the general public, and therefore, these resources are included among the prioritized actions for wildfire mitigation.

It is important to note that natural areas and values are predictably prone to wildfires; however, the effects of these fires are nuanced. While fire is a necessary and natural process essential for the health and regeneration of these ecosystems, its impacts can be undesirable for adjacent communities. Wildfires can significantly alter views, disrupt recreational activities, and increase the risk of erosion, leading to potentially undesirable impacts.

Examples of natural values identified by the public and the Core Team include the following:

- National, State, and local parks (see Figure 3.12) (e.g., Roosevelt National Forest, Lory State Park, Larimer County Open Space, Fort Collins Natural Areas)
- Trail systems and open spaces (e.g., Mason Trail, Foothills Trail, Bobcat Ridge Natural Area)
- Agricultural land
- Scenic viewsheds
- Critical habitat for wildlife (e.g., Preble's meadow jumping mouse)
- Watersheds and water resources (e.g., Poudre River, Horsetooth Reservoir)

Figure 3.12. Example of a natural value in the PFA, trail leading to cove in Lory State Park.

SOCIOECONOMIC VALUES

Socioeconomic values include population, recreation, infrastructure, and the built environment (see Appendix H, Figure H.4). Socioeconomic values are particularly important within the PFA service area because a large portion of the WUI communities fall within more developed areas (Figure 3.13). Examples of socioeconomic values include the following:

- Residential areas (e.g., individual homesites, active homesites, residential buildings, private property access)
- Agricultural infrastructure
- Communications infrastructure (e.g., cell phone and radio towers)
- Tourism values (e.g., restaurants and recreational facilities)
- Educational institutions (e.g., Colorado State University)
- Public safety infrastructure (fire stations, police departments, and emergency response facilities)
- Public works/utility infrastructure (e.g., electrical substations, transmission lines, railroads, pipelines, and landfills)
- Transportation networks (e.g., Interstate 25, Highway 287)
- Commercial buildings (e.g., grocery and hardware stores)
- Social support structures (e.g., Boys and Girls Clubs of Larimer County, Crossroads Safehouse)
- Care homes, senior housing, day care, and other group homes (e.g., Fort Collins Aspens Memory Care, Brookdale Fort Collins)
- Water infrastructure
- Recreation sites (e.g., campgrounds, trails, parks, public property access)

Figure 3.13. Example of a socioeconomic value in the PFA service area, the South Fort Collins water treatment plant. Source: Photo provided by the South Fort Collins Sanitation District.

CULTURAL VALUES

The PFA service area includes many historical landmarks, cultural resources, and sacred spaces that hold significance to the community (see Appendix H, Figure H.5) and are an integral part of the area's identity. Cultural values (see Figure 3.14) within the PFA service area have been identified through previous CWPP assessments as well as the Core Team input and are listed below:

- Historical landmarks (e.g., Water Works, Harmony Mill, Vietnam Memorial Bridge, Cache La Poudre River National Heritage Area)
- Old homesteads (e.g., Avery House)
- Historic buildings (e.g., St. Joseph's Roman Catholic Church, Laurel Street School, Armstrong Hotel)
- Poudre Landmarks Foundation Sites

Figure 3.14. Example of a cultural value in the PFA, the Pleasant Valley Schoolhouse in Bellvue. Source: North Forty News (2017).

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CHAPTER 4 – HAZARD AND RISK REDUCTION STRATEGIES

This chapter provides project recommendations, implementation guidance, and conceptual fuel treatment recommendations. A comprehensive mitigation strategy not only includes recommendations to mitigate wildfire hazards but also actions to improve preparedness and resiliency. This well-rounded approach involves being prepared both pre- and post-fire. Past planning efforts can be found in Appendix A, and post-fire response and rehabilitation information can be found at the end of this chapter and in Appendix F.

This plan has been aligned with the Wildland Fire Leadership Council's National Cohesive Strategy and its Phase III Western Regional Action Plan by adhering to the nationwide goal:

> *"To safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and collectively, learn to live with wildland fire."* (Forests and Rangelands 2014:3).

Thus, CWPP recommendations have been structured around the three main goals of the Cohesive Strategy: resilient landscapes; fire-adapted communities; and safe, effective, risk-based wildfire response. Many of the recommendations listed can be implemented at the homeowner or community level (homeowner resources can be found in Appendix E). Projects requiring large-scale support can be prioritized based on the Quantitative Risk Assessment detailed in Appendix C and funding resources summarized in Appendix I.

Recommendation matrixes are used throughout this chapter to serve as an action plan for implementation. Recommendations adhere to the minimum requirements for CWPPs established by the CSFS (2022) and have been aligned with the strategies in the 2020 Colorado Forest Action Plan (CSFS 2020) wherever possible.

For information on possible funding sources for various project types, please refer to Table 4.5. This table provides details on funding sources can that support a variety of projects aimed at forest restoration, wildfire fuels management, and habitat improvement under Resilient Landscapes; community education and structural ignitability reduction under Fire-Adapted Communities; and enhanced wildfire response capabilities and emergency management under Safe and Effective Wildfire Response. For more details on these funding sources and access to their respective websites, please see Appendix F.

COHESIVE STRATEGY GOAL 1: RESILIENT LANDSCAPES

Goal 1 of the National Cohesive Strategy is Resilient Landscapes: Landscapes, regardless of jurisdictional boundaries are resilient to fire, insect, disease, invasive species and climate change disturbances, in accordance with management objectives (CSFS 2022).

> *"Sustaining landscape resiliency and the role of wildland fire as a critical ecological process requires a mix of actions that are consistent with management objectives. The West will use all available methods and tools for active management of the landscape to consider and conserve a diversity of ecological, social, and economic values. The West will coordinate with all partners and seek continued stakeholder engagement in developing market-based, flexible and proactive solutions that can take advantage of economies of scale. All aspects of wildland fire will be used to restore and maintain resilient landscapes. Emphasis will be placed on protecting the middle lands near communities."* (Western Regional Strategy Committee [WRSC] 2013:14).

In this CWPP, recommendations to restore and maintain landscapes focus on vegetation management, hazardous fuel reduction, and restoration.

RECOMMENDATIONS FOR REDUCING WILDFIRE HAZARD

In the PFA service area and surrounding region, a strategic and cooperative approach to fuels management is essential to reduce the threat that high-intensity wildfires pose to lives, property, and other critical assets. Key components of this strategy include mitigating extreme fire behavior, decreasing structural ignitability, creating defensible space, providing safe evacuation routes, and maintaining roadways for firefighting access. The application of diverse treatment methods often amplifies the effectiveness of fuels management around communities located within WUI zones. Given the cross boundary importance and the cost of large-scale fuels treatment, collaboration between land management agencies can serve to maximize the benefits at a lower cost.

While large-area treatment is a crucial component of comprehensive hazard reduction, concentrated fuels treatment in the WUI offers the most pronounced benefits, with studies showing that treating fuels in the WUI can lessen the risk of intense or extreme fire behavior (Martinson and Omi 2013; Safford et al. 2009). Observations of fires burning in areas where fuel treatment activity has occurred have shown that the fire either remains on or drops to the surface, thus avoiding destructive crown fire, as long as accumulated fuel litter from the activity is treated or removed (Graham et al. 2004; Pollet and Omi 2002; Prichard et al. 2010; Safford et al. 2012; Waltz et al. 2014). In general, fuels reduction should begin near structures and values at risk, focusing on defensible space, and extend outward to community boundaries with fuel breaks and open space cleanup. Beyond the community, forest health and restoration treatments are prioritized to enhance the landscape's resilience to catastrophic wildfires and other potential environmental stressors. Community-led hazardous fuels efforts (for example, the work of volunteers in Redstone Canyon) provides a model that could be employed in other WUI areas throughout the PFA service area.

See Appendix D, Fuel Treatment Types and Methods, and Appendix E, Homeowner Resources.

Recommendations included in Table 4.1 are written to be geospatially broad and can be implemented in various communities and spatial contexts depending on available funding and capacity. When applying fuel treatments, every effort should be made to align treatments with the Colorado State Forest Action Plan (CSFS 2020) with consideration of all appropriate best management practices and sound science.

In addition, treatments should be strategically located in areas to maximize effectiveness of other existing and ongoing projects. A list and detailed descriptions of fuels treatment types and methods, including defensible space practices and larger-scale projects, is housed in Appendix D.

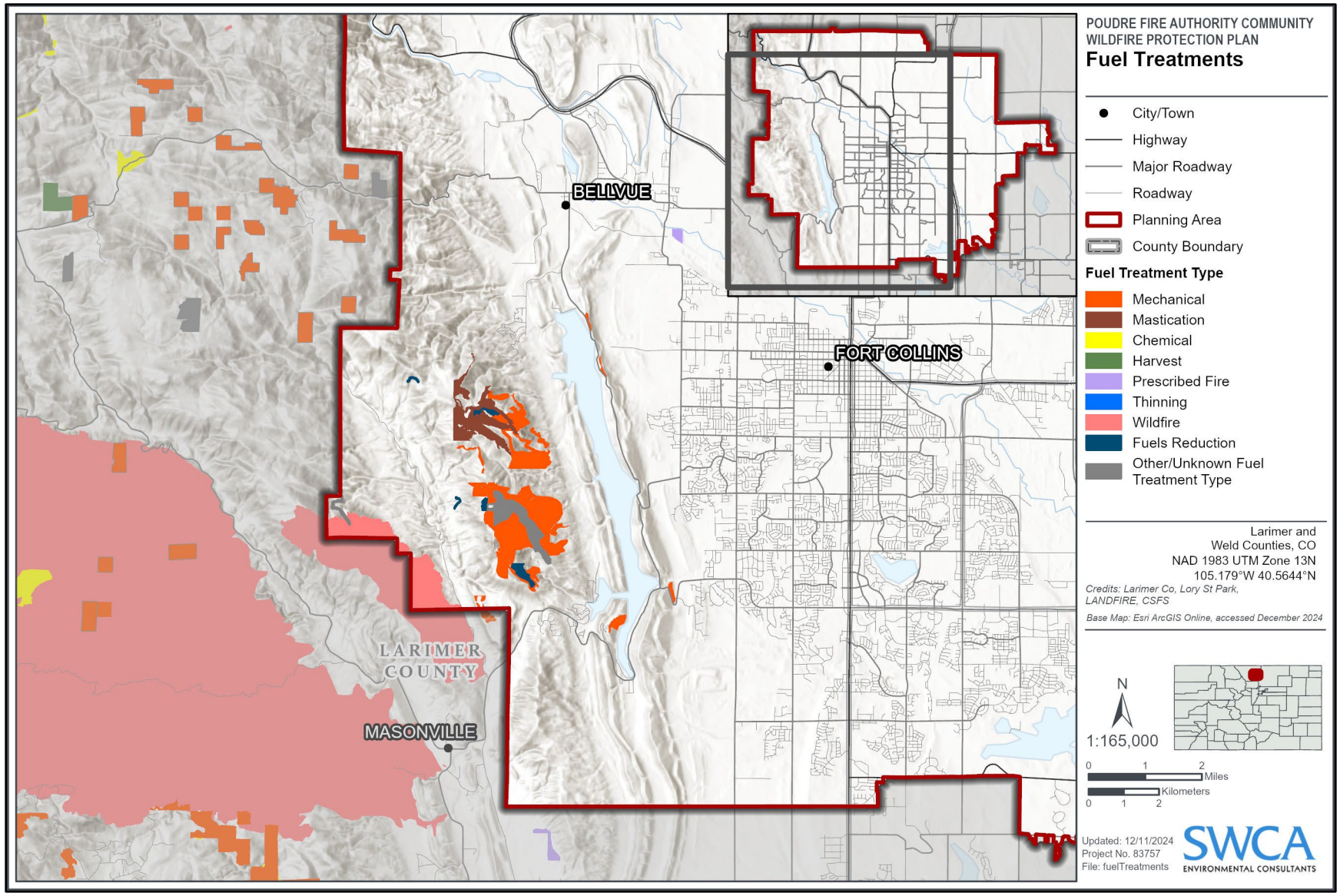

Figure 4.1. Existing fuel treatments across the PFA service area and surrounding jurisdictions.

Table 4.1. Recommendations to Create Resilient Landscapes (Fuel Treatments)

Project ID	Status	Priority (Ranking)	Timeline for Action	Project Description	Location	Priority Areas of Concern (*see Table 4.2*)	Lead Agency and Supporting Entities	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements
RL1	Proposed	1	Medium	**City of Fort Collins Vegetation Management** Implement vegetation management and restoration actions based on ***Parks and Natural Areas*** management guidance documents.	City of Fort Collins	Spring Canyon Park Russian Olives, Poudre River Corridor	Lead: City of Fort Collins	• Work with communities to develop fuel reduction prescriptions based on fuel conditions and land management objectives in the targeted area. • Conduct targeted treatments along the Poudre River corridor to enhance riparian habitats and reduce wildfire risk. • Work with neighboring communities and landowners to implement coordinated vegetation management practices along common boundaries. • Examine treatment options for Spring Canyon area.	Reduce wildfire risk, improve ecosystem health, maintain recreational opportunities, and enhance the natural beauty of City of Fort Collins Natural Areas and Parks through treatment planning.	Conduct regular assessments to evaluate the impact and effectiveness of fuel treatments. Update treatment plans and approaches as necessary to adjust to changing conditions, addressing both ecological and community safety concern Establish feedback mechanism to gather public input and address concerns.

RL2	Proposed	2	Medium	**Larimer County and Colorado State University Vegetation Management**
				Implement comprehensive vegetation management planning including various treatment options.
					Larimer County	Longview Campus, Foothills Campus	Lead: Larimer County
							Supporting: Colorado State University
								• Implement a variety of fuel treatments depending on fuel conditions and land management objectives in the targeted area.
								  ○ Manage grazing practices to control invasive species and reduce fuel loads and fuel continuity.
								  ○ Regularly mow natural areas to reduce fuel loads and maintain habitat quality.
								• Identify and document challenges and limitations encountered during implementation of vegetation management strategies to support future project planning and adaptive management efforts.
									Reduce wildfire risk and improve ecosystem health.	Conduct regular assessments to evaluate the impact and effectiveness of fuel treatments carried.
										Update treatment plans and approaches as necessary to adjust to changing conditions, addressing both ecological and community safety concerns.
										Establish feedback mechanism to gather public input and address concerns.

RL3	Ongoing	3	Medium	**Horsetooth County Parks Vegetation Management** Implement comprehensive vegetation management planning including various treatment options.	Horsetooth Mountain Park and Reservoir Lands	Milner Mountain, Redstone	Lead: Larimer County	• Implement a variety of fuel treatments depending on fuel conditions and land management objectives in the targeted area. • Specific treatments are outlined in the 2010 Horsetooth Mountain Open Space Forest Management Plan. ○ Identify and prioritize project areas for fuels reduction as outlined in the Forest Management Plan within the next 3-6 years. • Identify and document challenges and limitations encountered during the implementation of vegetation management strategies to support future project planning and adaptive management efforts.	Reduce wildfire risk, improve ecosystem health, maintain recreational opportunities, and enhance the natural beauty of Horsetooth Mountain Park and Reservoir Lands through treatment planning. Address water supply impacts due to wildfire.	Conduct regular assessments to evaluate the impact and effectiveness of fuel treatments carried. Update treatment plans and approaches as necessary to adjust to changing conditions, addressing both ecological and community safety concern. Establish feedback mechanism to gather public input and address concerns.
RL4	Ongoing	4	Medium	**Lory State Park Vegetation Management** Implement comprehensive vegetation management planning including various treatment options.	Lory State Park	Redstone, Soldier Canyon	Lead: Colorado State Parks	• Implement a variety of fuel treatments depending on fuel conditions and land management objectives in the targeted area. • Specific treatments are outlined in the 2017 Lory State Park Forest Management Plan. ○ Identify and prioritize project areas for fuels reduction as outlined in the Forest Management Plan within the next 3 to 6 years. • Identify and document challenges and limitations encountered during the implementation of vegetation management strategies to support future project planning and adaptive management efforts.	Reduce wildfire risk, improve ecosystem health, maintain recreational opportunities, and enhance the natural beauty of Lory State Park through treatment planning. Address water supply impacts due to wildfire.	Conduct regular assessments to evaluate the impact and effectiveness of fuel treatments carried. Update treatment plans and approaches as necessary to adjust to changing conditions, addressing both ecological and community safety concern. Establish feedback mechanism to gather public input and address concerns.

Note: See Appendix A to consult relevant regulations and past planning efforts, Appendix D for fuel treatment methodologies, and Appendix F for post-fire recovery and restoration.

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Priority Areas of Concern

To better prioritize resilient landscape recommendations, the Core Team, in collaboration with the PFA, has delineated district-wide priority areas of concern using a variety of mapping products. These products include assessments of wildfire risk to assets, expected risk to structures, WUI wildfire hazards, fuel loading and continuity, Potential Operational Delineation (PODs), topographical maps, and aerial imagery. In addition to these modeling tools, the Core Team leveraged local expert knowledge and public input gathered during in-person and virtual events, as well as a public survey.

Priority areas of concern provide a spatial framework for implementing resilient landscape projects. These areas of concern encompass regions with high concentrations of values such as homes and infrastructure that overlap high wildfire risk areas and/or areas where land management agencies have ongoing vegetation management treatments that could be enhanced by adjacent projects. High-priority areas are characterized by high fuel loads, extensive WUI zones, significant wildfire risk, and highly valued resources and assets. Conversely, lower-priority areas typically have a high probability of control and moderate to low risk to structures, often consisting of dispersed developments with light fuels, such as grass.

While these areas are primarily geared toward informing cooperating agencies in fuel management, residents living in these areas should prioritize fuel treatments in and beyond the home ignition zone. Additional homeowner resources surrounding defensible space and home hardening are available in Appendix D. For a detailed overview of each area of concern, refer to Figure 4.2 and Table 4.2.

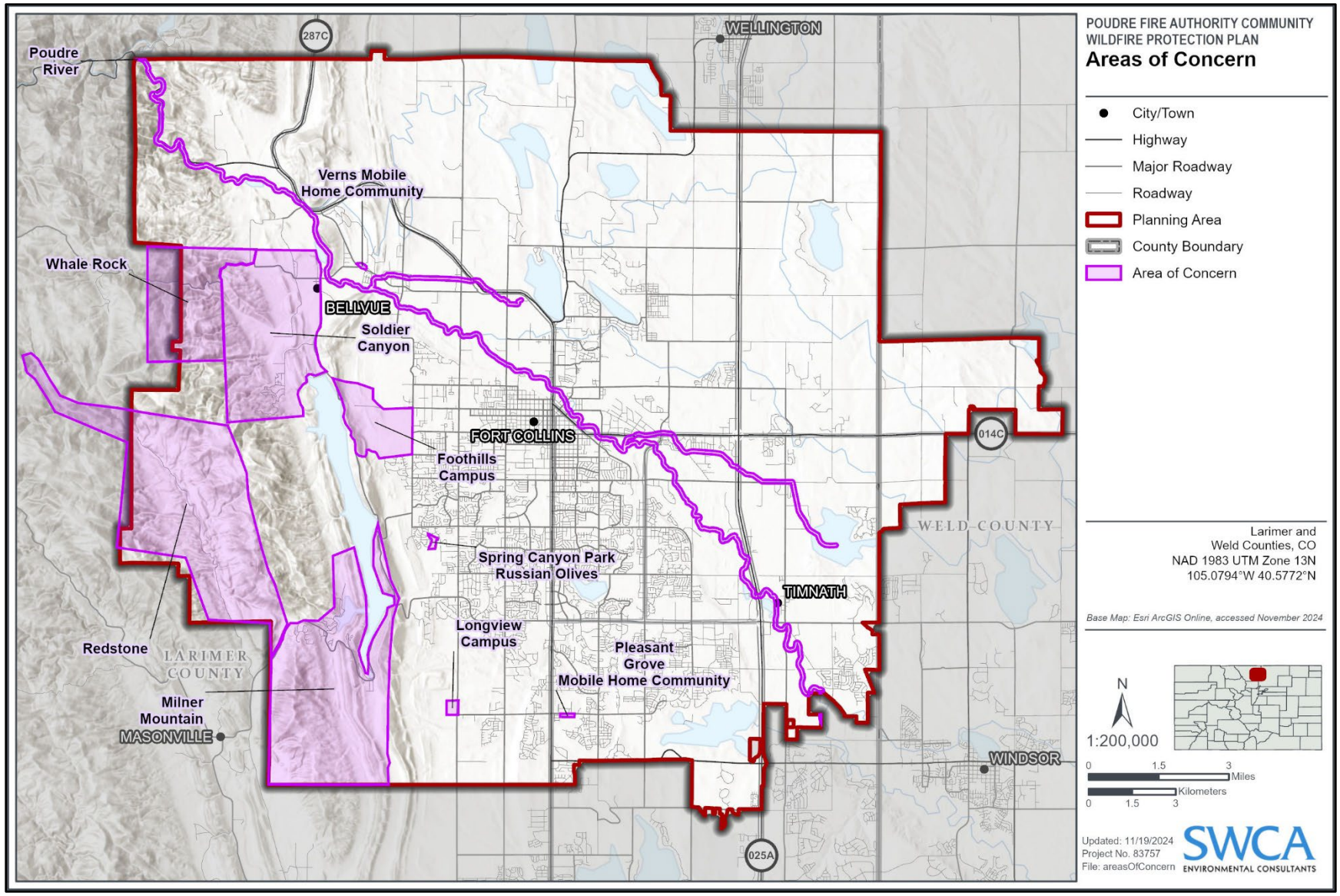

Figure 4.2. Prioritized areas of concern within the PFA service area.

Table 4.2. Areas of Concern and Recommendations

Area of Concern	Recommendations
Poudre River (400-foot buffer)	Implement vegetation management and hazardous fuels work throughout the river corridor to protect the ecological, recreational, and hydrological value of the river, as well as reduce potential for fire spread into adjacent residential areas.
Foothills Campus	Implement preparedness measures and structure hardening. Assess water treatment plants, CDC, and CSU research facilities for wildfire risk.
Spring Canyon Park Russian Olives	Develop a vegetation management plan that considers invasive species and fuels concerns and proximity to homes.
Longview Facility	Discuss wildfire preparedness and structure hardening with management.
Milner Mountain	Continue to build residential support and action for home ignition zone treatments and accompanying roadside fuel treatments and fuel breaks, as appropriate.
Redstone	Continue to work with residents on wildfire preparedness, defensible space, roadside fuel buffers, and structure hardening initiatives.
Soldier Canyon	Continue to work with residents on wildfire preparedness, defensible space, roadside fuel buffers, and structure hardening initiatives. Implement fuel breaks on public lands.
Whale Rock	Continue to work with residents on wildfire preparedness, defensible space, roadside fuel buffers, and structure hardening initiatives. Implement fuel breaks on public lands.
Pleasant Grove Mobile Home Community	Reduce exposure of hazardous fuels to socially vulnerable neighborhoods.
Vern's Mobile Home Community	Reduce exposure of hazardous fuels to socially vulnerable neighborhoods.
Natural Areas Network (not shown on map)	The natural areas network refers to the open space and vegetative fuels interfacing with values at risk to west and south of Fort Collins. Examine needs for fuels treatment and outreach initiatives throughout the natural areas network.

COHESIVE STRATEGY GOAL 2: FIRE-ADAPTED COMMUNITIES

Goal 2 of the National Cohesive Strategy is Fire-Adapted Communities: Human populations and infrastructure are as prepared as possible to receive, respond to, and recover from wildland fire. The basic premise of this goal is:

> *"Preventing or minimizing the loss of life and property due to wildfire requires a combination of thorough pre-fire planning and action, followed by prudent and immediate response during a wildfire event. Post-fire activities can also speed community recovery efforts and help limit the long-term effects and costs of wildfire. CWPPs should identify high-risk areas and actions residents can take to reduce their risk. Fuels treatments in and near communities can provide buffer zones to protect structures, important community values and evacuation routes. Collaboration, self-sufficiency, acceptance of the risks and consequences of actions (or non-action), assisting those who need assistance (such as the elderly), and encouraging cultural and behavioral changes regarding fire and fire protection are important concepts. Attention will be paid to values to be protected in the middle ground (lands between the community and the forest) including watersheds, viewsheds, utility and transportation corridors, cultural and historic values, etc."* (WRSC 2013:15).

In this CWPP, recommendations for fire-adapted communities include public education and outreach actions and actions to reduce structural ignitability.

RECOMMENDATIONS FOR PUBLIC EDUCATION AND OUTREACH

Just as environmental hazards need to be mitigated to reduce the risk of fire loss, so do human hazards. Lack of knowledge, lack of positive actions (e.g., failing to create adequate defensible space), and negative actions (e.g., keeping leaf litter and exposed propane tanks close to structures) all contribute to increased risk of loss in the WUI.

Methods to enhance public education encompass various strategies. These may involve coordinating workshops and trainings to spread awareness of home hardening strategies and Firewise building and landscaping techniques, or hosting community cleanups. It is important to highlight the availability of government funds for treatments on private land. Equally significant is the improvement of communication between property owners and local land management agencies. This becomes crucial, especially given the need for effective implementation of fuel treatments and better maintenance within the interface of public and private land. Public education should also include significant involvement from town and local officials and civic groups.

The PFA is committed to enhancing community safety through comprehensive public education and outreach programs focused on wildfire preparedness and safety. Key initiatives include the "Preparing Your Home for Wildfires" program, which offers residents actionable steps to mitigate wildfire risks, and home ignition zone assessments to help homeowners identify and reduce potential fire hazards. Additionally, PFA conducts community courses and the WUI Course to educate the public on wildfire behavior and safety measures. These efforts aim to build a resilient community well-prepared to handle and recover from wildfire incidents.

Please see Appendix B for a comprehensive list of local, statewide, and national educational resources.

Table 4.3 lists public education recommendations to be implemented in the PFA.

Table 4.3. Recommendations for Creating Fire-Adapted Communities (Public Education and Reducing Structural Ignitability)

Project ID	Status	Priority (Ranking)	Timeline for Action	Project Description	Location	Lead Agency and Supporting Entities	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements
FAC1	Ongoing	1	Long	**Public Outreach and Events** Expand public outreach and engagement efforts to raise awareness about wildfire risks and preparedness.	PFA	Lead: PFA Supporting: Larimer County, CSFS collaborating with community members	• Organize public events such as workshops, seminars, and community fairs focused on wildfire education and preparedness. • Develop and distribute educational materials through various channels, including social media, local media, and community centers. • Tailor messages to address specific community needs and concerns. • Engage with community leaders and groups to promote wildfire preparedness initiatives. • Encourage community participation in wildfire preparedness activities and programs	Increase public awareness and engagement in wildfire preparedness activities.	Collect feedback from event participants to assess the effectiveness of outreach efforts and identify areas for improvement. Provide regular updates to continue a tailored approach to changing condition
FAC2	Ongoing	2	Long	**Wildfire Partners Home Assessments** Continue to expand WUI home assessments for homes in the PFA service area through the Wildfire Partners Program.	PFA	Lead: PFA Supporting: Larimer County, CSFS collaborating with community members	• Promote program and encourage homeowners to participate in the program and schedule home assessments. • Conduct home assessments to evaluate wildfire risk and provide recommendations for mitigation, offering follow-up support. • Work with local organizations and agencies to expand the reach of the program. • Share resources and expertise to enhance the effectiveness of home assessments.	increase the number of WUI home assessments and improve wildfire preparedness among homeowners. Encourage the creation and maintenance of defensible space around homes and properties to reduce wildfire risk.	Gather feedback from participants to improve the assessment process and support services. Regularly evaluate the program's impact on community wildfire preparedness and make necessary adjustments.
FAC3	Ongoing	3	Medium	**Defensible Space Collaborative** Continue expanding communication with neighborhood groups and individual homeowners to catalyze action on private property.	PFA	Lead: PFA Supporting: Citizens supported by PFA, Larimer County, CSFS	• Provide resources and support for neighborhood-level initiatives. • Promote collaboration between neighboring properties to create continuous defensible space. • Educate residents about funding opportunities and the importance of defensible space and ingress/egress clearance. • Work with outreach groups to gather specific needs and tailor educational materials accordingly.	Encourage the creation and maintenance of defensible space around homes and properties to reduce wildfire risk.	Conduct regular home assessments to evaluate defensible space efforts and provide feedback. Establish channels for residents to provide feedback and report on their defensible space activities.
FAC4	Ongoing	4	Short	**Infrastructure Resilience Coordination** Foster collaborative planning and hazard mitigation around critical infrastructure and utility facilities	PFA	Lead Agency: City of Fort Collins Utilities Supporting: Poudre Valley REA, PRPA, FCLWD, Spring Creek Water	• Identify key stakeholders from each agency and organization. • Conduct assessments to identify vulnerabilities in infrastructure and utility facilities. • Evaluate the risk of infrastructure contributing to wildfire ignition or being affected by wildfire. • Develop a list of potential mitigation projects and prioritize based on identified vulnerabilities. • Identify opportunities for inter-agency collaboration on mitigation projects.	Enhance the resilience of critical infrastructure and utility facilities to wildfire and other hazards through collaborative planning and mitigation efforts.	Conduct periodic assessments to identify new vulnerabilities and evaluate the effectiveness of implemented mitigation measures.
FAC5	Ongoing	5	Short	**Ditch Mitigation** Identify any potential areas of concern regarding maintenance practices or lack thereof.	PFA	Lead: PFA Supporting: City of Fort Collins, Larimer County, and associated ditch companies	• Meet with City and County programs, as well as ditch companies, to discuss maintenance practices and develop a clearer understanding of potential issues and solutions. • Conduct assessments to identify areas of concern related to ditch maintenance. • Evaluate the impact of current maintenance practices on wildfire risk. • Collaborate with stakeholders to develop solutions for identified issues. • Implement best practices for ditch maintenance to reduce wildfire risk.	Ensure proper maintenance of ditches to reduce wildfire risk and improve water management.	Conduct regular inspections of ditches to ensure proper maintenance. Engage with stakeholders to gather feedback on maintenance practices and address concerns.

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Project ID	Status	Priority (Ranking)	Timeline for Action	Project Description	Location	Lead Agency and Supporting Entities	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements
FAC6	Not Started	6	Medium	**Human-Caused Ignition Study** Develop a data-driven wildfire education and prevention strategy.	PFA	Lead: PFA	• Study fire records to identify areas of concern and common ignition causes, analyzing data to understand patterns and trends in human-caused ignitions. • Develop a prevention strategy based on data analysis. • Identify key target audiences and tailor educational messages accordingly (e.g. Socially vulnerable populations, homeowners, landowners, youth, campers, unhoused) • Roll out the prevention strategy through public education campaigns, workshops, and community events. • Collaborate with local organizations to amplify the reach of the prevention efforts.	Reduce human-caused wildfire ignitions through targeted education and prevention efforts.	Continuously track and analyze data on human-caused ignitions to assess the effectiveness of the prevention strategy. Gather feedback from the community and stakeholders to improve educational materials and outreach methods.
FAC7	Started	7	Medium	**Wildfire Code and Land Use Policies** Prepare for statewide WUI code adoption and advise policymakers.	PFA	Lead: PFA, Larimer County Emergency Services	• Identify local implications and necessary adjustments to comply with the new WUI code. • Develop educational materials and training for stakeholders on the new code requirements. • Plan for the implementation of the WUI code, including timelines and resource allocation. • Collaborate with local agencies and organizations to ensure a smooth transition and adoption. • Educate and communicate with appropriate Larimer County and City of Fort Collins policymakers to identify land use planning and code enforcement issues from a fire-adapted community perspective.	Ensure readiness for the implementation of a State WUI code and ensure that future community development is wildfire aware.	Monitor compliance with the WUI code once adopted and address any issues promptly. Provide ongoing training and education for stakeholders on WUI code requirements and best practices.

Note: See Appendix A to consult relevant regulations and past planning efforts.

RECOMMENDATIONS FOR REDUCING STRUCTURAL IGNITABILITY

The effectiveness of fuels reduction treatments on public land depends on homeowner actions; if owners have failed to harden their homes and implement mitigation techniques on their own land, the risk of home ignition remains high, and firefighter lives are put at risk while carrying out structural defense. Table 4.3 provides a list of community-based recommendations to reduce structural ignitability that should be implemented throughout the PFA service area. Reduction of structural ignitability depends largely on public education that provides property owners the information they need to take responsibility for protecting their own properties.

Reducing potential structural ignition should focus on 1) creating and maintaining defensible space, and 2) home hardening. Preparing for wildland fire by creating defensible space around the home is an effective strategy for reducing structural ignitability as discussed under Cohesive Strategy Goal 1: Resilient Landscapes. Studies have shown that burning vegetation beyond 120 feet of a structure is unlikely to ignite that property through radiant heat (Butler and Cohen 1996), but fire bands that travel independently of the flaming front have been known to destroy houses that have not been impacted by direct flame impingement. In essence, reducing structural ignitability and creating defensible space are key for minimizing potential loss and damage. Home hardening for wildfire involves implementing building and landscaping measures to make homes more resistant to ignition from embers, radiant heat, and direct flame contact. This includes using fire-resistant materials for roofs, walls, and decks; installing ember-resistant vents; creating defensible space by clearing vegetation around the home; and maintaining a well-watered and managed landscape. Enhancing land use planning and zoning, and enacting codes and ordinances for greater structure hardening by homeowners, is under the purview of Larimer County Planning Division. An overarching recommendation from this PFA CWPP planning effort is for the Larimer County CWPP update to focus on recommendations to enhance structure hardening through various policy and regulatory measures. These actions would support fire response operations carried out by PFA.

Detailed information regarding defensible space practices as well as a list of actions for reducing structural ignitability can be found in Appendix D.

COHESIVE STRATEGY GOAL 3: SAFE, EFFECTIVE, RISK-BASED, WILDFIRE RESPONSE

Goal 3 of the National Cohesive Strategy is Safe, Effective, Risk-Based, Wildfire Response: All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions:

> *"A balanced wildfire response requires integrated pre-fire planning with effective, efficient, and coordinated emergency response. Pre-fire planning helps tailor responses to wildfires across jurisdictions and landscape units that have different uses and management objectives. Improved prediction and understanding of weather, burning conditions, and various contingencies during wildfire events can improve firefighting effectiveness, thereby reducing losses and minimizing risks to firefighter and public health and safety. Wildfire response capability will consider the responsibilities identified in the Federal Response Framework. Local fire districts and municipalities with statutory*

responsibility for wildland fire response are not fully represented throughout the existing wildland fire governance structure, particularly at the NWCG, NMAC, and GACC levels." (WRSC 2013:15).

This section provides recommended actions that jurisdictions could undertake to improve wildfire response.

RECOMMENDATIONS FOR IMPROVING FIRE RESPONSE CAPABILITIES

During wildfires, resources are often stretched thin due to limited personnel, making community preparedness through education a crucial support for local fire departments. Educating residents about emergency notifications and evacuation protocols allows emergency responders to focus more effectively on protecting life and property. Enhancing local wildfire response capabilities can be achieved by increasing personnel, acquiring additional equipment, and maintaining essential ingress and egress routes. Furthermore, active collaboration between wildfire response agencies can significantly boost overall response capabilities.

Table 4.4 provides recommendations for improving firefighting capabilities.

Table 4.4. Recommendations for Safe and Effective Wildfire Response

Project ID	Status	Priority (Ranking)	Timeline for Action	Project Description	Location	Lead Agency and Supporting Entities	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements
WR1	Started	1	Short	**Evacuation Planning** Ensure effective evacuation processes for residents in the event of a wildfire.	PFA	Lead: PFA Supporting: Larimer County Sheriff's Office, Fort Collins Police Services, Larimer County Emergency Telephone Authority	• Conduct regular training sessions for emergency responders on evacuation procedures. • Continue drills and exercises to test notification systems, polygon use, and implementation strategies. • Use advanced notification systems to inform residents about evacuation orders promptly. • Educate relevant agencies and the public on existing evaluation polygons and update as needed. • Develop clear implementation plans for evacuation, including routes, shelters, and transportation options. • Coordinate with local agencies and organizations to ensure seamless execution of evacuation plans.	Enhance the efficiency and effectiveness of evacuation processes through continuous training, exercises, and improvements in notification and implementation strategies.	Continuously update evacuation plans based on feedback, new data, and best practices. Ensure that notification systems are tested regularly and are capable of reaching all residents.
WR2	Ongoing	2	Long	**Personnel Training** Enhance decision-making skills and knowledge of emergency responders and command staff in wildfire response personnel in both strategic and tactical tasks.	PFA	Lead: PFA	• Identify training needs based on current skills, knowledge gaps, and emerging challenges. • Continue regular training sessions on wildfire behavior, suppression techniques, safety protocols, and equipment use. • Include both classroom instruction and hands-on field exercises. • Continue certification programs to validate the competencies of responders. • Provide opportunities for continuing education to keep responders updated on best practices and new technologies. • Continue support of out-of-district deployments to build knowledge, skills, and abilities.	Provide comprehensive training programs that improve the capabilities of emergency responders in wildfire management and response.	Track performance metrics to evaluate the impact of training on responder effectiveness, capabilities and outcomes.
WR3	Ongoing	3	Long	**Continued Support of Seasonal/Volunteers** Provide ongoing support for seasonal staff and volunteers involved in wildfire response. Evaluate the need to expand the seasonal program in both wildland skill level and coverage.	PFA	Lead: PFA	• Develop a recruitment plan to attract seasonal staff and volunteers. • Provide comprehensive training programs for seasonal staff and volunteers on wildfire response techniques, safety protocols, and equipment use. • Offer opportunities for skill development and advancement. • Implement retention strategies to encourage continued participation and commitment	Ensure that seasonal staff and volunteers are well-supported, trained, and integrated into wildfire response efforts.	Establish support systems to address the needs and concerns of seasonal staff and volunteers. Track retention rates and identify factors that influence continued participation
WR4	Ongoing	4	Long	**Equipment and Apparatus Upgrades** Ensure that emergency responders have access to the necessary equipment and apparatus for effective wildfire response.	PFA	Lead: PFA	• Conduct a comprehensive assessment and procure new equipment and apparatus as needed to fill identified gaps. • Implement a maintenance schedule to ensure all equipment and apparatus are in good working condition. • Provide training for responders on the proper use and maintenance of equipment and apparatus.	Maintain a well-equipped and ready fleet of equipment and apparatus for wildfire suppression and response.	Collect feedback from responders on equipment performance and make necessary adjustments. Maintain detailed logs of maintenance activities and equipment status
WR5	Not Started	5	Medium	**Home Assessment Updates** Update assessments from the Wildland Outreach and Planning Initiative	PFA	Lead: PFA	• Evaluate the cost-effectiveness and accuracy of remote sensing compared to traditional field assessments. • If feasible, implement remote sensing technologies to collect data on home conditions and wildfire risk factors. • Use satellite imagery, drones, and other remote sensing tools to gather relevant information. • Integrate remote sensing data with existing assessment records to update and validate home assessments.	Maintain accurate and up-to-date home assessments in the Wildland-Urban Interface (WUI) using affordable and sustainable methods.	Ensure data accuracy and consistency through quality control measures. Periodically review and update home assessments to reflect changes in conditions and risk factors.
WR6	Not Started	6	Medium	**Rural Water Supply Investigation** Investigate and enhance rural water supply infrastructure.	PFA	Lead: PFA	• Conduct investigative visits to rural areas where water supply is limited. • Collaborate with communities and water districts to develop plans for upgrading, expanding, and maintaining water supply infrastructure. • Identify and plan for the use of alternative water supply sources in rural areas with high wildfire risk.	Protect values exposed to wildfire hazards and ensure firefighter safety in areas where water supply may be limited.	Conduct periodic inspections of water supply infrastructure in rural areas to ensure functionality and readiness.

Note: See Appendix A to consult relevant regulations and past planning efforts.

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Table 4.5. Funding Sources

Funding Source	Organization	Summary	Applicable Cohesive Strategy Category		
			Resilient Landscapes	Fire-Adapted Communities	Wildfire Response
Action, Implementation, and Mitigation (AIM) Grant	Coalitions and Collaboratives/USFS	Supports wildfire risk reduction projects and planning in communities with moderate to high wildfire risk.	RL	FAC	WR
Building Resilient Infrastructure and Communities (BRIC) Grant Program	FEMA	Supports hazard mitigation projects to reduce risks from disasters and natural hazards.	RL		WR
Colorado Healthy Rivers Fund (CHRF)	Colorado Watershed Assembly	Supports collaborative efforts to protect and restore watershed health and function.	RL		
Colorado State Forest Service Grants and Funding Assistance	CSFS	Offers various grant programs and assistance to community groups, nonprofits, and others for projects promoting healthy forests and wildfire mitigation. Information is provided at the following website: https://csfs.colostate.edu/grants/	RL	FAC	WR
Colorado Strategic Wildfire Action Program (COSWAP)	Colorado Department of Natural Resources	Bolsters wildland firefighter capabilities through workforce development and expanded mitigation and response capacity.			WR
Colorado Water Plan (CWP) Grant Program	Colorado Water Conservation Board	Supports implementation of goals and objectives of the CWP, including water storage, conservation, and watershed health.	RL		
Colorado Watershed Restoration Program (CWRP)	Colorado Water Conservation Board	Funds projects to mitigate post-fire watershed impacts, including planning, engineering designs, and implementation.	RL		
Colorado Wildfire Resilient Home Grant (CWRHG)	DFPC	Funds retrofitting of homes to reduce structural ignitability and improve wildfire resilience.		FAC	
Community Wildfire Defense Grant (CWDG)	USFS	Helps communities plan and implement wildfire protection strategies.	RL	FAC	WR
Conservation Innovation Grants	Natural Resources Conservation Service (NRCS)	Stimulates the development and adoption of innovative conservation approaches and technologies.	RL		

Funding Source	Organization	Summary	Applicable Cohesive Strategy Category		
			Resilient Landscapes	Fire-Adapted Communities	Wildfire Response
Colorado Division of Fire Protection and Control Funding Programs	DFPC	Manages funding programs for firefighter safety, disease prevention, and volunteer fire assistance.			WR
Emergency Conservation Program (ECP)	USDA Farm Service Agency	Assists farmers and ranchers in repairing damage to farmlands caused by natural disasters.	RL		
Emergency Forest Restoration Program (EFRP)	USDA Farm Service Agency	Helps private forest owners restore forest health damaged by natural disasters.	RL		
Emergency Management Performance Grant (EMPG)	FEMA	Enhances state and local emergency management capabilities.			WR
Emergency Watershed Protection (EWP) Program	NRCS	Offers technical and financial assistance to relieve imminent threats to life and property caused by natural disasters.	RL		
Environmental Quality Incentives Program (EQIP)	NRCS	Helps producers install measures to protect natural resources while ensuring sustainable production.	RL		
Environmental Systems Research Institute Grants	ESRI	Provides free software, hardware, and training for conservation, education, and sustainable development.	RL	FAC	
Federal Excess Property Auctions	USFS	Auctions federally owned equipment to public owners for fire management and other uses.			WR
Fire Management Assistance Grant (FMAG)	FEMA	Aids with the mitigation, management, and control of fires on forests or grasslands.			WR
Fire Prevention and Safety (FP&S) Grants	FEMA	Supports projects that enhance the safety of the public and firefighters.		FAC	WR
Flood Mitigation Assistance (FMA) Grant	FEMA	Funds projects to reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program.	RL		

Funding Source	Organization	Summary	Applicable Cohesive Strategy Category		
			Resilient Landscapes	Fire-Adapted Communities	Wildfire Response
Forest Legacy Program (FLP)	USFS	Conserves environmentally and economically significant forested areas through conservation easements or land purchases.	RL		
Funding for Fire Departments and First Responders	Department of Homeland Security, U.S. Fire Administration	Includes grants and financial assistance for fire departments and first responders.			WR
Great Outdoors Colorado Planning and Capacity Grants	Great Outdoors Colorado	Funds planning, capacity building, research, and opportunity pathway development in outdoor recreation, access, stewardship, and conservation.	RL	FAC	
Habitat Restoration and Enhancement Funding	National Fish and Wildlife Foundation	Funds projects to protect fish, wildlife, and plant species and restore habitats.	RL		
Hazard Mitigation Grant Program (HMGP)	FEMA	Provides funding to rebuild and mitigate future losses due to potential disasters.			WR
Hazard Mitigation Grant Program – Post Fire	FEMA	Assists communities in implementing hazard mitigation measures following a wildfire.	RL		WR
Inflation Reduction Act Forest Landowner Support (IRA – FLS)	USDA	Supports underserved forest landowners in climate mitigation and resilience, including practice development, technical support, outreach, and innovative tools.	RL	FAC	WR
Inflation Reduction Act Landowner Assistance Programs (IRA – LAP)	USDA	Provides financial support to underserved and small-acreage forest landowners for climate solutions.	RL		
Infrastructure Investments and Jobs Act	Multiple	Allocates funding for infrastructure projects, including wildfire defense grants for communities at risk.	RL	FAC	WR

Funding Source	Organization	Summary	Applicable Cohesive Strategy Category		
			Resilient Landscapes	Fire-Adapted Communities	Wildfire Response
Innovative Finance for National Forests	USDA	Increases forest resilience through non-USFS funds, supporting wildfire resilience, sustainable recreation, and watershed health.	RL		WR
Joint Chiefs' Landscape Restoration Partnerships	USDA	Collaboratively implements forest health and resilience efforts at the landscape scale.	RL		
National Association of State Foresters (NASF) Appropriations	National Association of State Foresters	Supports federal and state forestry programs, including forest stewardship, fire assistance, and urban forestry programs.	RL	FAC	WR
National Fire Plan (NFP)	DOI and USDA	Provides funds to help residents reduce wildfire risk to their private property.	RL	FAC	
National Fire Plan-Wildland Urban Interface Community Fire Assistance (NFP-WUI)	USDA	Funds fuels management, risk planning, training, and community education, prioritizing high-risk areas and projects with cost share.	RL	FAC	WR
National Forest Foundation Collaborative Capacity Program for Forests and Communities	National Forest Foundation	Supports collaborative teams to improve forests and grasslands managed by the USFS, focusing on long-term stewardship.	RL		
National Forest Foundation Matching Awards Program	National Forest Foundation	Supports community engagement and local stewardship efforts, focusing on National Forest stewardship or restoration activities.	RL		
Non-motorized Trails Grants	Colorado Parks & Wildlife	Funds trail-related projects for outdoor recreation, including construction, maintenance, planning, and support.	RL		
Northern Colorado Fireshed Fund (NCFC Fund)	Northern Colorado Fireshed Collaborative/ National Forest Foundation	Supports landscape-scale improvements to fuel reduction, prescribed burning, and strategic wildland fire management.	RL		WR

Funding Source	Organization	Summary	Applicable Cohesive Strategy Category		
			Resilient Landscapes	Fire-Adapted Communities	Wildfire Response
Project Bill Grants	Colorado Water Conservation Board	General investment fund for watershed projects, including river and floodplain restoration and management.	RL		
Regional Catastrophic Preparedness Grant (RCPG)	FEMA	Increases collaboration and capacity for catastrophic incident response and preparation.			WR
Specific EPA Grant Programs	EPA	Various grants for environmental education, justice, and multipurpose projects.	RL	FAC	
Staffing for Adequate Fire and Emergency Response (SAFER)	FEMA	Helps fire departments increase the number of frontline firefighters.			WR
U.S. Endowment for Forestry and Communities Grants	U.S. Endowment for Forestry and Communities	Supports systemic, transformative, and sustainable change for the health and vitality of working forests and forest-reliant communities.	RL	FAC	
Urban and Community Forestry (UCF) Program	USFS	Supports climate-resilient tree species and disaster risk mitigation activities in urban areas.	RL	FAC	
Urban Land Institute Community Action Grants	Urban Land Institute	Supports responsible land use to enhance the environment, funding Firewise communities activities.		FAC	WR
Landscape Scale Restoration	USFS	Supports collaborative, science-based restoration on priority forest lands, focusing on wildfire fuels management, habitat improvement, and water quality.	RL		
Western Forestry Leadership Coalition	Western Forestry Leadership Coalition	Provides information and resources for forestry leadership and wildfire management.	RL	FAC	WR

Funding Source	Organization	Summary	Applicable Cohesive Strategy Category		
			Resilient Landscapes	Fire-Adapted Communities	Wildfire Response
Wildland Urban Interface Grant (WUI Grant) Program	USFS	Targets hazardous fuels reduction, community preparedness, and CWPP development, emphasizing cross-boundary projects.	RL	FAC	WR
Wood Innovations Funding Opportunity Program	USDA	Supports projects expanding traditional wood use to reduce hazardous fuels and enhance forest health.	RL		

CHAPTER 5 – MONITORING AND EVALUATION

All stakeholders and signatories to this CWPP desire worthwhile outcomes. It is also known that risk reduction work on the ground, for the most part, is often not attainable in a few months—or even years. The amount of money and effort invested in implementing a plan such as this requires that there be a means to describe, quantitatively and/or qualitatively, if the goals and objectives in this plan are being accomplished according to expectations.

Monitoring and reporting contribute to the long-term evaluation of ecosystem change, and the knowledge concerning how natural resource management decisions affect both the environment and the people who live in it. It is important that monitoring protocols are developed with specific regions and project types in mind to maintain the accuracy and effectiveness of monitoring data.

MONITORING STRATEGIES

It is recommended that project monitoring be a collaborative effort. There are many resources for designing and implementing community-based, multiparty monitoring that could support and further inform a basic monitoring program for the CWPP (Egan 2013). Multiparty monitoring involves a diverse group consisting of community members, community-based groups, regional and national interest groups, and public agencies. Using this multiparty approach increases community understanding of the effects of restoration efforts and trust among restoration partners.

Table 5.1 identifies monitoring strategies for various aspects of all categories of CWPP recommendations and the effects of their implementation, both quantifiable and non-quantifiable, for assessing the progress of the CWPP and increasing the sustainability of projects. It must be emphasized that these strategies are 1) not exhaustive and 2) dependent on available funds and personnel to implement them. When possible, other relevant plans should be used as guidance for monitoring, especially when projects overlap planning objectives.

Local and regional partner agencies and organizations should be teamed with and relied on to support monitoring efforts. Due to the nature of a Fire Authority–scale CWPP, there will be other CWPPs at the county, city, community, and homeowners association (HOA) level. It is recommended that the

implementation leaders of other CWPPs coordinate annually with the CWPP implementation leader for PFA to ensure alignment and efficiency when enacting risk reduction projects.

Table 5.1. Recommended Monitoring Strategies

Strategy	Task/Tool	Remarks
Photographic record (documents pre- and post-fuels reduction work, evacuation routes, workshops, classes, field trips, changes in open space, treatment type, etc.)	*Establish field GPS location; photo points of cardinal directions; keep photos protected in archival location.*	Moderate cost, repeatable over time; used for programs and tracking objectives
Number of acres treated (by fuel type, treatment method), location metrics, date	GPS/GIS/fire behavior prediction system –	Evaluating costs, potential fire behavior
Number and acres of home ignition zones/defensible space treated to reduce fuels Number and cost of home treatments to reduce ignitability Could be expanded to entire communities or housing developments	GPS	Fuels reduction Structure protection
Number of residents/citizens participating in any CWPP projects and events	Meetings, media interviews, articles	Evaluate culture change objective Annual lessons learned review encouraged among stakeholders
Number of homeowner contacts (brochures, flyers, posters, etc.)	Visits, phone	Evaluate objective Annual lessons learned review encouraged among stakeholders
Education and outreach: number, kinds of involvement	Workshops, classes, field trips, signage	Evaluate objectives Annual lessons learned review encouraged among stakeholders
Fire Response: changes in agency response capacity	*Collaboration, grants to fund fire department needs such as new personnel and equipment*	Evaluate mutual aid Annual review
Codes and policy changes affecting CWPP	Qualitative	CWPP changes
Wildfire acres burned, human injuries/fatalities, infrastructure loss, environmental damage, suppression, and rehabilitation costs	Wildfire records	Compare with 5- or 10-year average
Number of home assessments completed and completing a comprehensive summary of risk to homes	Web-based mapping, field surveys	Evaluate existing home risk assessment data
Number of curbside risk assessments completed and completing a comprehensive summary of risk	Web-based mapping, field surveys	Align risk assessment data with Wildfire Partners
Number of medical incidents attached to wildfire suppression incidents	After action reviews, meetings, record of medical incident reports	Determine causes and possible mitigation actions

Strategy	Task/Tool	Remarks
Number of structures lost per wildfire incident accompanied by weather and fire behavior data	National Weather Service, field surveys, public input	Establish trends and correlations before, during, and after wildfire disasters.

FUELS TREATMENT MONITORING

Monitoring fuel treatment projects is necessary for assessing the efficacy of proposed actions and evaluating how projects support environmental sustainability and wildfire resiliency. While PFA may not be implementing fuel treatments as an agency, partner agencies will likely be treating fuels within or adjacent to the PFA boundary. Establishing monitoring protocols can help project managers better understand how well the proposed treatment methods and prioritized actions fulfill planned goals and objectives. Recording and sharing monitoring results is crucial for establishing benchmarks and determining long-term fuel treatment strategies.

Key considerations for monitoring fuel treatment efficacy include:

- **Alignment with Goals:** Monitoring can confirm whether treated areas reflect CWPP priorities.
- **Ecological Considerations:** Treatments may impact soil stability, protected species, wildlife habitat, and invasive species. Cost-effective monitoring can address these factors and support long-term management.
- **Vegetation Regrowth:** Fuel treatments require regular maintenance; monitoring informs the timing and scale of future interventions.
- **Burn Area and Treatment Monitoring:** For mechanical and burn treatments, monitoring includes assessing fire behavior, ecological effects, and soil impacts to gauge treatment success.
- **Adaptive Management:** Monitoring data informs future management adaptations, addressing ecological, economic, and educational needs.

Monitoring activities should be tailored to the specific site and scope of each project. Suggested monitoring levels, increasing in detail and intensity, are as follows:

Minimum—Level 1: Pre- and Post-project Photographs

Appropriate for many individual property owners who conduct fuels reduction projects on their properties.

Moderate—Level 2: Multiple Permanent Photo Points

Permanent photo locations are established using rebar or wood posts, GPS-recorded locations, and photographs taken on a regular basis. Ideally, this process would continue over several years. This approach might be appropriate for more enthusiastic property owners or for agencies conducting small-scale, general treatments.

High—Level 3: Basic Vegetation Plots

A series of plots can allow monitors to evaluate vegetation characteristics such as species composition, percentage of cover, and frequency. Monitors then can record site characteristics such as slope, aspect, and elevation. Parameters would be assessed pre- and post-treatment.
The monitoring agency should establish plot protocols based on the types of vegetation present and

the level of detail needed to analyze the management objectives. This method is appropriate for foresters or other personnel monitoring fuel treatments on forested land.

Intense—Level 4: Basic Vegetation Plus Dead and Downed Fuels Inventory

The protocol for this level would include the vegetation plots described above but would add more details regarding fuel loading. Crown height or canopy closure might be included for live fuels. Dead and downed fuels could be assessed using other methods, such as Brown's transects (Brown 1974), an appropriate photo series (Ottmar et al. 2000), or fire monitoring (Fire Effects Monitoring and Inventory System [FIREMON]) plots. This method is ideal for foresters or university researchers tracking vegetation changes in forested lands.

Partner agencies are encouraged to select monitoring methods appropriate to the treatment scope, site, and management objectives. Appendix F provides further resources on post-fire recovery and restoration strategies.

IMPLEMENTATION

The 2025 PFA CWPP Update makes recommendations for prioritized wildfire mitigation projects (see Tables 4.1–4.5). Implementation projects need to be tailored to the specific project and will be unique to the location depending on available resources and regulations. As aforementioned, on-the-ground implementation of some recommendations in the PFA service area will require development of an action plan and assessment strategy for completing each project and many actions may be implemented by partner agencies and not PFA directly. This step will identify the roles and responsibilities of the people and agencies involved, as well as funding needs and timetables for completing the highest-priority projects (SAF 2004). Information pertaining to funding is provided in Appendix I.

CWPP EVALUATION

CWPPs are intended to provide information, guidance, and recommendations to reduce the risk of wildfire damaging a community and the environment. However, as communities change through development and vegetation communities evolve, so does the risk of wildfire. The recommendations and methods to reduce risk must be dynamic to keep pace with changes in the WUI and the fire environment; therefore, consistent evaluations of the CWPP are imperative. Additionally, recently published research and case studies regarding wildfire risk should be considered when evaluating the CWPP.

SWCA ENVIRONMENTAL CONSULTANTS | STEPS TO EVALUATE A CWPP

1 IDENTIFY OBJECTIVES:

What are the goals identified in the plan?
How are they reached? Is the plan performing as intended?

- Structural ignitability
- Fuel treatments (landscape and home ignition zone)
- Public education and outreach
- Multi-agency collaboration
- Emergency notifications/response

2 ASSESS THE CHANGING ENVIRONMENT:

How have population characteristics and the wildfire environment changed?

Population change
- Increase or decrease
- Visitor levels
- Demographics

Population settlement patterns
- Distribution
- Expansion into the WUI

Vegetation
- Fuel quantity and type
- Drought and disease impacts

3 REVIEW ACTION ITEMS:

Are actions consistent with the plan's objectives?

- Check for status, i.e., completed/started/not started
- Identify completed work and accomplishments
- Identify lessons learned, challenges, and best practices
- Identify next steps congruent with other hazard mitigation planning efforts

4 ASSESS RESULTS:

What are the outcomes of the action items?

Multi-agency collaboration
- Who was involved in the development of the CWPP?
- Have partners involved in the development process remained involved in the implementation?
- How has the planning process promoted implementation of the CWPP?
- Have CWPP partnerships and collaboration had a beneficial impact to the community?

Risk-hazard assessment
- How is the risk-hazard assessment utilized to make decisions about fuel treatment priorities?
- Have there been new wildfire-related regulations?
- Are at-risk communities involved in mitigating wildfire risk?

Hazardous fuels
- How many acres have been treated?
- How many projects are cross-boundary?
- How many residents have participated in creating defensible space?

Structural ignitability
- Have there been updates to fire codes and ordinances?
- How many structures have been lost to wildfire?
- Has the CWPP increased public implementation of structural ignitability and hazard reduction strategies?

Public education and outreach
- Has public awareness of wildfire and mitigation strategies increased?
- Have residents, visitors, and second homeowners been involved in wildfire mitigation activities?
- Has there been public involvement?
- Have vulnerable populations been involved?

Emergency response
- Has the CWPP been integrated into relevant plans (e.g., hazard mitigation or emergency operations)?
- Is the CWPP congruent with other hazard mitigation planning efforts?
- Has availability and capacity of local fire departments changed since the CWPP was developed?
- Have egress routes been publicized and mitigated?

TIMELINE FOR UPDATING THE CWPP

The HFRA allows for maximum flexibility in the CWPP planning process, permitting the Core Team to determine the time frame for updating the CWPP. However, it is suggested that a formal revision be made every 5 years. Furthermore, due to the dynamic nature of wildfire litigation and the natural landscape, several triggers may warrant a CWPP update before the 5-year mark. Among these triggers are extensive wildfire or other disaster events, changes to the local planning outlook (e.g., significant updates to the hazard mitigation plan), and the local adoption of new wildfire-related codes and ordinances.

This CWPP is a living document designed to adapt to the ever-changing fire environment, which includes shifts in community development, wildfire fuels and other hazards and the progress of Action Item projects, impacted by variable funding cycles and evolving capabilities. Core Team members are encouraged to meet annually to review action items, discuss successes, strategize funding for project implementation, and determine if any plan revisions are necessary.

ABBREVIATIONS AND ACRONYMS

BLM	Bureau of Land Management
CAR	community at risk
CDC	Centers for Disease Control and Prevention
CDHSEM	Colorado Division of Homeland Security and Emergency Management
CDNR	Colorado Department of Natural Resources
COAL	Colorado All-Lands
Cohesive Strategy	National Cohesive Wildland Fire Management Strategy
CPW	Colorado Parks & Wildlife
CRS	Congressional Research Service
CSFS	Colorado State Forest Service
CSU	Colorado State University
CUSP	Coalition for the Upper South Platte
CWPP	community wildfire protection plan
DFPC	Colorado Division of Fire Prevention and Control
DOI	U.S. Department of the Interior
EMPG	Emergency Management Performance Grant
ERC	Energy Release Component
FIREMON	Fire Effects Monitoring and Inventory System
FLP	Forest Legacy Program
FSA	Farm Service Agency
FSP	Forest Stewardship Program
GACC	Geographic Area Coordination Centers
GUI	grassland-urban interface
HFRA	Healthy Forests Restoration Act of 2003
HVRA	highly valued resource or asset
IFC	International Fire Code
IRA	Inflation Reduction Act
LSR	Landscape Scale Restoration
NEPA	National Environmental Policy Act
NIFC	National Interagency Fire Center
NPS	National Park Service
NWCG	National Wildfire Coordinating Group
OEM	Office of Emergency Management
POD	Potential Operational Delineation

ROW	right-of-way
SDI	suppression difficulty index
SVI	social vulnerability index
SWIFT	state wildland inmate fire team
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WOPI	WUI Outreach and Planning Initiative
WRCC	Western Regional Climate Center
WRSC	Western Regional Strategy Committee
WUI	wildland-urban interface

GLOSSARY

Aspect: Cardinal direction toward which a slope faces in relation to the sun (NWCG 2024b).

Active Crown Fire: A crown fire in which the entire fuel complex is involved in flame, but the crowning phase remains dependent on heat released from surface fuel for continued spread. An active crown fire presents a solid wall of flame from the surface through the canopy fuel layers. Flames appear to emanate from the canopy as a whole rather than from individual trees within the canopy. Active crown fire is one of several types of crown fire and is contrasted with **passive crown fires**, which are less vigorous types of crown fire that do not emit continuous, solid flames from the canopy (SWCA).

Available Canopy Fuel: The mass of canopy fuel per unit area consumed in a crown fire. There is no post-frontal combustion in canopy fuels, so only fine canopy fuels are consumed. It is assumed that only the foliage and a small fraction of the branchwood is available (Wooten 2021).

Available Fuel: The total mass of ground, surface, and canopy fuel per unit area available for a fire, including fuels consumed in post-frontal combustion of duff, organic soils, and large woody fuels (Wooten 2021).

Backfiring: Intentionally setting fire to fuels inside a control line to contain a fire (Wooten 2021).

Biomass: Organic material. Also refers to the weight of organic material (e. g. biomass roots, branches, needles, and leaves) within a given ecosystem (Wooten 2021).

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 (SWCA).

Canopy: The more or less continuous cover of branches and foliage formed collectively by adjacent trees and other woody species in a forest stand. Where significant height differences occur between trees within a stand, formation of a multiple canopy (multi-layered) condition can result (SWCA).

Chain: Unit of measure in land survey, equal to 66 feet (20 m) (80 chains equal 1 mile). Commonly used to report fire perimeters and other fireline distances. Popular in fire management because of its convenience in calculating acreage (example: 10 square chains equal one acre) (New Mexico Future Farmers of America 2010).

Climate Change: A change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods (CA GOPR 2020).

Community Assessment: An analysis designed to identify factors that increase the potential and/or severity of undesirable fire outcomes in WUI communities (SWCA).

Communities at Risk: Defined by the HFRA as “Wildland-Urban Interface Communities within the vicinity of federal lands that are at high risk from wildfire.”

Community Emergency Response Team (CERT): The CERT program educates volunteers about disaster preparedness for the hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. CERT offers a consistent, nationwide approach to volunteer training and organization that professional responders can rely on during disaster situations, allowing them to focus on more complex tasks (Ready 2021).

Community Wildfire Protection Plan (CWPP): A planning document that seeks to reduce the threat to life and property from wildfire by identifying and mitigating wildfire hazards to communities and infrastructure located in the WUI. Developed from the HFRA, a CWPP addresses issues such as wildfire response, hazard mitigation, community preparedness, or structure protection (SWCA).

Conditional Surface Fire: A potential type of fire in which conditions for sustained conditional surface fire active crown fire spread are met but conditions for crown fire initiation are not. If the fire begins as a surface fire, then it is expected to remain so. If it begins as an active crown fire in an adjacent stand, then it may continue to spread as an active crown fire (Wooten 2021).

Contain: A tactical point at which a fire's spread is stopped by and within specific containment features, constructed or natural; also, the result of stopping a fire's spread so that no further spread is expected under foreseeable conditions. For reporting purposes, the time and date of containment. This term no longer has a strategic meaning in federal wildland fire policy (Wooten 2021).

Control: To construct fireline or use natural features to surround a fire and any control spot fires therefrom and reduce its burning potential to a point that it no longer threatens further spread or resource damage under foreseeable conditions. For reporting purposes, the time and date of control. This term no longer has a strategic meaning in federal wildland fire policy (Wooten 2021).

Cover type: The type of vegetation (or lack of it) growing on an area, based on cover type minimum and maximum percent cover of the dominant species, species group or non-living land cover (such as water, rock, etc.). The cover type defines both a qualitative aspect (the dominant cover type) as well as a quantitative aspect (the abundance of the predominant features of that cover type) (Wooten 2021).

Creeping Fire: A low-intensity fire with a negligible rate of spread (Wooten 2021).

Crown Fire: A fire that advances at great speed from crown to crown in tree canopies, often well in advance of the fire on the ground (SWCA).

Defensible Space: An area around a structure where fuels and vegetation are modified, cleared, or reduced to slow the spread of wildfire toward or from a structure. The design and distance of the defensible space is based on fuels, topography, and the design/materials used in the construction of the structure (SWCA).

Duff: The layer of decomposing organic materials lying below the litter layer of freshly fallen twigs, needles, and leaves and immediately above the mineral soil (SWCA).

Ecosystem: An interacting natural system including all the component organisms together with the abiotic environment and processes affecting them (SWCA).

Environmental Conditions: That part of the fire environment that undergoes short-term changes: weather, which is most commonly manifest as windspeed, and dead fuel moisture content (Wooten 2021).

Escape Route: A preplanned and understood route firefighters take to move to a safety zone or other low-risk area. When escape routes deviate from a defined physical path, they should be clearly marked (flagged) (SWCA).

Evacuation: The temporary movement of people and their possessions from locations threatened by wildfire (SWCA).

Fire-Adapted Community: A fire-adapted community collaborates to identify its wildfire risk and works collectively on actionable steps to reduce its risk of loss. This work protects property and increases the safety of firefighters and residents (USFA 2021b).

Fire Behavior: The manner in which fuel ignites, flame develops, and fire spreads and exhibits other related phenomena as determined by the interaction of fuels, weather, and topography (Fire Research and Management Exchange System 2021).

Fire Break: Areas where vegetation and organic matter are removed down to mineral soil (SWCA).

Fire Environment: The characteristics of a site that influence fire behavior. In fire modeling the fire environment is described by surface and canopy fuel characteristics, windspeed and direction, relative humidity, and slope steepness (Wooten 2021).

Fire Frequency: A broad measure of the rate of fire occurrence in a particular area. For historical analyses, fire frequency is often expressed using the fire return interval calculation. For modern-era analyses, where data on timing and size of fires are recorded, fire frequency is often best expressed using fire rotation (SWCA).

Fire Hazard: Fire hazard is the potential fire behavior or fire intensity in an area, given the type(s) of fuel present—including both the natural and built environment—and their combustibility (CA GOPR 2020).

Fire History: The chronological record of the occurrence of fire in an ecosystem or at a specific site. The fire history of an area may inform planners and residents about the level of wildfire hazard in that area (SWCA).

Fire Intensity: A general term relating to the heat energy released in a fire (SWCA).

Fireline Intensity: Amount of heat release per unit time per unit length of fire front. Numerically, the product of the heat of combustion, quantity of fuel consumed per unit area in the fire front, and the rate of spread of a fire, expressed in kilowatts per minute (SWCA). This expression is commonly used to describe the power of wildland fires, but it does not necessarily follow that the severity, defined as the vegetation mortality, will be correspondingly high (Wooten 2021).

Fire Prevention: Activities such as public education, community outreach, planning, building code enforcement, engineering (construction standards), and reduction of fuel hazards that are intended to reduce the incidence of unwanted human-caused wildfires and the risks they pose to life, property, or resources (CA GOPR 2020).

Fire Regime: A measure of the general pattern of fire frequency and severity typical to a particular area or type of landscape: The regime can include other metrics of the fire, including seasonality and typical fire size, as well as a measure of the pattern of variability in characteristics (SWCA).

Fire Regime Condition Class: Condition classes are a function of the degree of fire regime condition class departure from historical fire regimes resulting in alterations of key ecosystem components such as composition structural stage, stand age, and canopy closure (Wooten 2021).

Fire Return Interval: Number of years (interval) between two successive fires in a designated area (SWCA).

Fire Severity: A qualitative measure of the immediate effects of fire on the fire severity ecosystem. It relates to the extent of mortality and survival of plant and animal life both aboveground and belowground and to loss of organic matter. It is determined by heat released aboveground and belowground. Fire severity is dependent on intensity and residence dependent of the burn. For trees,

severity is often measured as percentage of basal area removed. An intense fire may not necessarily be severe (Wooten 2021).

Fire Risk: "Risk" takes into account the intensity and likelihood of a fire event to occur as well as the chance, whether high or low, that a hazard such as a wildfire will cause harm. Fire risk can be determined by identifying the susceptibility of a value or asset to the potential direct or indirect impacts of wildfire hazard events (CA GOPR 2020).

Flammability: The relative ease with which fuels ignite and burn regardless of the quantity of the fuels (SWCA).

Flame Length: The length of flames in the propagating fire front measured along the slant of the flame from the midpoint of its base to its tip. It is mathematically related to fireline intensity and tree crown scorch height (Wooten 2021).

Forest Fire: Uncontrolled burning of a woodland area (National Geographic 2021).

Fuel Break: A natural or human-made change in fuel characteristics that affects fire behavior so that fires burning into them can be more readily controlled (NWCG 2021c).

Fuel Complex: The combination of ground, surface, and canopy fuel strata (Wooten 2021).

Fuel Condition: Relative flammability of fuel as determined by fuel type and environmental conditions (SWCA).

Fuel Continuity: A qualitative description of the distribution of fuel both horizontally and vertically. Continuous fuels readily support fire spread. The larger the fuel discontinuity, the greater the fire intensity required for fire spread (Wooten 2021).

Fuel Loading: The volume of fuel in a given area generally expressed in tons per acre (SWCA). Dead woody fuel loadings are commonly described for small material in diameter classes of 0 to 0.25, 0.25 to 1, and 1 to 3 inches and for large material greater than 3 inches (Wooten 2021).

Fuel Management/Fuel Reduction: Manipulation or removal of fuels to reduce the likelihood of ignition and to reduce potential damage in case of a wildfire. Fuel reduction methods include prescribed fire, mechanical treatments (mowing, chopping), herbicides, biomass removal (thinning or harvesting or trees, harvesting of pine straw), and grazing. Fuel management techniques may sometimes be combined for greater effect (SWCA).

Fuel Model: A set of surface fuel bed characteristics (load and surface-area-to-fuel model volume ratio by size class, heat content, and depth) organized for input to a fire model (Wooten 2021).

Fuel Modification: The manipulation or removal of fuels (i.e., combustible biomass such as wood, leaves, grass, or other vegetation) to reduce the likelihood of igniting and to reduce fire intensity. Fuel modification activities may include lopping, chipping, crushing, piling and burning, including prescribed burning. These activities may be performed using mechanical treatments or by hand crews. Herbicides and prescribed herbivory (grazing) may also be used in some cases. Fuel modification may also sometimes be referred to as "vegetation treatment" (CA GOPR 2020).

Fuel Moisture Content: This is expressed as a percent or fraction of oven dry fuel moisture content weight of fuel. It is the most important fuel property controlling flammability. In living plants, it is physiologically bound. Its daily fluctuations vary considerably by species but are usually above 80 to 100 percent. As plants mature, moisture content decreases. When herbaceous plants cure, their moisture

content responds as dead fuel moisture content, which fluctuates according to changes in temperature, humidity, and precipitation (Wooten 2021).

Fuel Treatment: The manipulation or removal of fuels to minimize the probability of ignition and/or to reduce potential damage and resistance to fire suppression activities (NWCG 2024b). Synonymous with fuel modification.

Grassland-Urban Interface (GUI): A term used to describe areas where grass and shrub wildland fuels directly interact or interface with urbanized or developed regions. This interface is similar in concept to the WUI, where natural vegetation and urban or developed areas come into close proximity. In the GUI, the specific emphasis should be placed on identifying the potential for wildfire risk and addressing the need for wildfire mitigation and management where potentially highly flammable vegetation meets human development (SWCA).

Grazing: There are two types of grazing: traditional grazing and targeted grazing. Traditional grazing refers to cattle that are managed in extensive pastures to produce meat. Targeted grazing involves having livestock graze at a specific density for a given period of time for the purpose of managing vegetation. Even though both kinds of grazing manage fuel loading in range- and forested lands, targeted grazing is different in that its sole purpose is to manage fuels. Targeted grazing is done by a variety of livestock species such as sheep, goats, or cows (University of California, Agriculture and Natural Resources [UCANR] 2019).

Ground Fire: Fire that burns organic matter in the soil, or humus; usually does not appear at the surface (National Geographic 2021).

Ground Fuels: Fuels that lie beneath surface fuels, such as organic soils, duff, decomposing litter, buried logs, roots, and the below-surface portion of stumps (Wooten 2021).

Hazard: A “hazard” can be defined generally as an event that could cause harm or damage to human health, safety, or property (CA GOPR 2020).

Hazardous Areas: Those wildland areas where the combination of vegetation, topography, weather, and the threat of fire to life and property create difficult and dangerous problems (SWCA).

Hazardous Fuels: A fuel complex defined by type, arrangement, volume, condition, and location that poses a threat of ignition and resistance to fire suppression (NWCG 2024b).

Hazardous Fuels Reduction: Any strategy that reduces the amount of flammable material in a fire-prone ecosystem. Two common strategies are mechanical thinning and prescribed burning (Wooten 2021).

Hazard Reduction: Any treatment that reduces the threat of ignition and spread of fire (SWCA).

Ignition: The action of setting something on fire or starting to burn (SWCA).

Incident: An occurrence or event, either natural or person-caused, which requires an emergency response to prevent loss of life or damage to property or natural resources (Wooten 2021).

Influence Zone: An area that, with respect to wildland and urban fire, has a set of conditions that facilitate the opportunity for fire to burn from wildland fuels to the home and or structure ignition zone (NWCG 2024b).

Initial Attack: The actions taken by the first resources to arrive at a wildfire to protect lives and property, and prevent further extension of the fire (SWCA).

Invasive Species: An introduced, nonnative organism (disease, parasite, plant, or animal) that begins to spread or expand its range from the site of its original introduction and that has the potential to cause harm to the environment, the economy, or to human health (U.S. Geological Survey 2021).

Ladder Fuels: Fuels that provide vertical continuity allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease (SWCA).

Litter: Recently fallen plant material that is only partially decomposed and is still discernible (SWCA).

Manual Treatments: Felling and piling of fuels done by hand. The volume of material generated from a manual fuel treatment is typically too small to warrant a biomass sale therefore collected material is disposed of by burning or chipping. The work can be performed by either a single individual or a large, organized crew with powered equipment (UCANR 2021a).

Mechanized Treatments: Mechanical treatments pulverize large continuous patches of fuel to reduce the volume and continuity of material. Mechanical treatments can be applied as either mastication or chipping treatments. Both treatments shred woody material, but mastication leaves residue on-site while chipping collects the particles for transportation off site. Similar to hand treatments, mechanical treatments can target specific areas and vegetation while excluding areas of concern. In addition, mechanical treatment is easily scalable to large areas (>30 acres) with little added cost. (UCANR 2021b).

Mitigation: Action that moderates the severity of a fire hazard or risk (SWCA).

Mutual Aid: Assistance in firefighting or investigation by fire agencies, irrespective of jurisdictional boundaries (NWCG 2024b).

Native Revegetation: The process of replanting and rebuilding the soil of disturbed land (e.g., burned) with native plant species (USDA 2005).

Native Species: A species that evolved naturally in the habitat, ecosystem, or region as determined by climate, soil, and biotic factors (USDA 2005).

National Cohesive Strategy: The National Cohesive Wildland Fire Management Strategy is a strategic push to work collaboratively among all stakeholders and across all landscapes, using best science, to make meaningful progress toward three goals:

- Resilient Landscapes
- Fire-Adapted Communities
- Safe and Effective Wildfire Response

Vision: To safely and effectively extinguish fire when needed; use fire where allowable; manage our natural resources; and as a nation, to live with wildland fire (Forests and Rangelands 2021).

Overstory: That portion of the trees in a forest which forms the upper or uppermost layer (SWCA).

Passive Crown Fire: A type of crown fire in which the crowns of individual trees or small groups of trees burn, but solid flaming in the canopy cannot be maintained except for short periods. Passive crown fire encompasses a wide range of crown fire behavior, from occasional torching of isolated trees to nearly active crown fire. Passive crown fire is also called torching or candling. A fire in the crowns of the trees in which trees or groups of trees torch, ignited by the passing front of the fire. The torching trees reinforce the spread rate, but these fires are not basically different from surface (SWCA).

Prescribed Burning: Any fire ignited by management actions under specific, predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. Usually, a written, approved prescribed fire plan must exist, and National Environmental Policy Act (NEPA) requirements must be met, prior to ignition.

Rate of Spread: The relative activity of a fire in extending its horizontal dimensions. It is expressed as rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually, it is expressed in chains or acres per hour for a specific period in the fire's history (NWCG 2024b).

Resilience: Resilience is the capacity of any entity – an individual, a community, an organization, or a natural system – to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience (CA GOPR 2020).

Response: Movement of an individual firefighting resource from its assigned standby location to another location or to an incident in reaction to dispatch orders or to a reported alarm (SWCA).

Safety Element: One of the seven mandatory elements of a local general plan (a county plan that forms the foundation for future development), the safety element must identify hazards and hazard abatement provisions to guide local decisions related to zoning, subdivisions, and entitlement permits. The element should contain general hazard and risk reduction strategies and policies supporting hazard mitigation measures (CA GOPR 2020).

Severe: In the context of wildfire and landscape impacts, "severe" refers to fires that cause significant damage to the surrounding ecosystem and potential structures. High-severity fires result in extensive loss of vegetation both above and below ground, substantial soil damage, and increased vulnerability to extreme hydrologic events. These fires can create large areas of overstory tree mortality and have lasting impacts to landscape processes, vegetation structure, and composition. The increased frequency and intensity of such fires are often driven by climate change factors such as rising temperatures, drought conditions, and changes in precipitation patterns (Wasserman and Mueller 2023).

Slash: Debris left after logging, pruning, thinning, or brush cutting. Slash includes logs, chips, bark, branches, stumps, and broken trees or brush that may be fuel for a wildfire (SWCA).

Slope Percent: The ratio between the amount of vertical rise of a slope and horizontal distance as expressed in a percent. One hundred feet of rise to 100 feet of horizontal distance equals 100 percent (NWCG 2024b).

Suppression: The most aggressive fire protection strategy, it leads to the total extinguishment of a fire (SWCA).

Surface Fire: fire that typically burns only surface litter and undergrowth (National Geographic 2021).

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 (SWCA).

Structural Ignitability: The ability of structures (such as homes or fences) to catch fire (SWCA).

Topography: The arrangement of the natural and artificial physical features of an area (SWCA).

Total Fuel Load: The mass of fuel per unit area that could possibly be consumed in a hypothetical fire of the highest intensity in the driest fuels (Wooten 2021).

Tree Crown: The primary and secondary branches growing out from the main stem, together with twigs and foliage (SWCA).

Understory: Low-growing vegetation (herbaceous, brush or reproduction) growing under a stand of trees. Also, that portion of trees in a forest stand below the overstory (SWCA).

Understory Fire: A fire burning in the understory, more intense than a surface fire with flame lengths of 1 to 3 m (Wooten 2021).

Values and Assets at Risk: The elements of a community or natural area considered valuable by an individual or community that could be negatively impacted by a wildfire or wildfire operations. These values can vary by community and can include public and private assets (natural and manmade) – such as homes, specific structures, water supply, power grids, natural and cultural resources, community infrastructure-- as well as other economic, environmental, and social values (CA GOPR 2020).

Vulnerable Community: Vulnerable communities experience heightened risk and increased sensitivity to natural hazard and climate change impacts and have less capacity and fewer resources to cope with, adapt to, or recover from the impacts of natural hazards and increasingly severe hazard events because of climate change. These disproportionate effects are caused by physical (built and environmental), social, political, and/ or economic factor(s), which are exacerbated by climate impacts. These factors include, but are not limited to, race, class, sexual orientation and identification, national origin, and income inequality (CA GOPR 2020).

Wildfire: A “wildfire” can be generally defined as any unplanned fire in a “wildland” area or in the WUI (CA GOPR 2020).

Wildfire Exposure: During fire suppression activities, an exposure is any area/property that is threatened by the initial fire, but in National Fire Incident Reporting System (NFIRS) a reportable exposure is any fire that is caused by another fire, i.e., a fire resulting from another fire outside that building, structure, or vehicle, or a fire that extends to an outside property from a building, structure, or vehicle (USFA 2020).

Wildfire Influence Zone: A wildland area with susceptible vegetation up to 1.5 miles from the interface or intermix WUI (CA GOPR 2020).

Wildland: Those unincorporated areas covered wholly or in part by trees, brush, grass, or other flammable vegetation (CA GOPR 2020).

Wildland Fire: Fire that occurs in the wildland as the result of an unplanned ignition (CA GOPR 2020).

Wildland Fuels (aka fuels): Fuel is the material that is burning. It can be any kind of combustible material, especially petroleum-based products, and wildland fuels. For wildland fire, it is usually live, or dead plant material, but can also include artificial materials such as houses, sheds, fences, pipelines, and trash piles. In terms of vegetation, there are 6 wildland fuel types (Fuel Type: An identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions.) The six wildland fuel types are (NWCG 2024b):

- Grass
- Shrub
- Grass-Shrub
- Timber Litter

- Timber-Understory
- Slash-Blowdown

Wildland-Urban Interface (WUI): The WUI is the zone of transition between unoccupied land and human development. It is the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels (USFA 2021a). In the absence of a CWPP, Section 101 (16) of the Healthy Forests Restoration Act defines the WUI as " (I) an area extending ½ mile from the boundary of an at-risk community; (II) an area within 1 ½ miles of the boundary of an at-risk community, including any land that (1) has a sustained steep slope that creates the potential for wildfire behavior endangering the at-risk community; (2) has a geographic feature that aids in creating an effective fire break, such as a road or ridge top; or (3) is in condition class 3, as documented by the Secretary in the project-specific environmental analysis; (III) an area that is adjacent to an evacuation route for an at-risk community that the Secretary determines, in cooperation with the at-risk community, requires hazardous fuels reduction to provide safer evacuation from the at-risk community." A CWPP offers the opportunity to establish a localized definition and boundary for the WUI (USFA 2020).

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APPENDIX A:

Planning and Policy Background

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PLANNING PROCESS

The SAF, in collaboration with the National Association of Counties and the National Association of State Foresters, developed a guide entitled *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities* (SAF 2004) to provide communities with a clear process in developing a CWPP. While this guide is now dated, the eight steps for developing a CWPP are still relevant and have been followed in preparing the PFA CWPP:

Step One: Convene Decision-makers. Form a Core Team made up of representatives from the appropriate local governments, local fire authorities, and state agencies responsible for forest management.

Step Two: Involve Federal Agencies. Identify and engage local federal representatives and contact and involve other land management agencies as appropriate.

Step Three: Engage Interested Parties. Contact and encourage active involvement in plan development from a broad range of interested organizations and stakeholders.

Step Four: Establish a Community Base Map. Work with partners to establish a base map(s) defining the community's WUI and showing inhabited areas at risk, wildland areas that contain critical human infrastructure, and wildland areas at risk for large-scale fire disturbance.

Step Five: Develop a Community Risk-Hazard Assessment. Work with partners to develop a community Risk-Hazard Assessment that considers fuel hazards; risk of wildfire occurrence; homes, businesses, and essential infrastructure at risk; other values at risk (VARs); and local preparedness capability. Rate the level of risk for each factor and incorporate this information into the base map as appropriate.

Step Six: Establish Community Priorities and Recommendations. Use the base map and Community Risk-Hazard Assessment to facilitate a collaborative community discussion that leads to the identification of local priorities for treating fuels, reducing structural ignitability and other issues of interest, such as improving fire response capability. Clearly indicate whether priority projects are directly related to the protection of communities and essential infrastructure or to reducing wildfire risks to other community values.

Step Seven: Develop an Action Plan and Assessment Strategy. Consider developing a detailed implementation strategy to accompany the CWPP as well as a monitoring plan that will ensure its long-term success.

Step Eight: Finalize Community Wildfire Protection Plan. Finalize the CWPP and communicate the results to community and key partners.

FIRE MANAGEMENT POLICY

The responsibility for fire prevention and protection lies with property owners and state, county, and municipal governments. Property owners must comply with existing state statutes and local regulations. These responsibilities should be carried out in partnership with the federal government and the private sector. The current federal fire policy states that protection priorities are 1) life, 2) property, and 3) natural resources. These priorities often limit flexibility in the decision-making process, especially when a wildland fire occurs within the WUI.

LEGISLATIVE DIRECTION

Fire District Local Direction

Poudre Fire Authority

The Fire Code employed within the PFA is dependent on the jurisdiction within its 230-square-mile service area. For instance, the City of Fort Collins, Town of Timnath, and Poudre Valley Fire Protection District have adopted the 2021 International Fire Code (IFC). Weld County, however, currently used the 2012 edition of the IFC. PFA personnel actively participate in code review processes, providing input that leads to amendments and additions aimed at enhancing community safety. The Fire Codes apply to all new construction and encompass provisions for various safety measures aimed at safeguarding community values from the impacts of fire. Enforcement and administration of these provisions occur at the respective jurisdictional levels.

To learn more about the legislative action toward wildfire mitigation in each county serviced by PFA, please visit the following webpages:

- City of Fort Collins 2021 International Fire Code Adoption
- Town of Timnath 2021 International Fire Code Adoption
- Poudre Valley Fire Protection District 2021 International Fire Code Adoption
- Weld County 2012 International Fire Code Adoption

State Direction

Colorado Forest Action Plan

In 2020, the CSFS developed Colorado's Forest Action Plan (CSFS 2020). The purpose of the plan was to provide a framework for addressing the "current conditions and trends in Colorado's forests, as well as the current threats and challenges the state's forests face across political, jurisdictional and ecological boundaries" (CSFS 2020). Priorities of the Forest Action Plan include the following: "conserve and manage working forest landscapes," "protect forests from threats," and "enhance public benefits from trees and forests." This plan is centered around six themes, but the four themes most important to this CWPP are:

1. **Forest Conditions** focuses on the current conditions of Colorado's forests, present and future pressures, and the challenges forests are facing from climate change (e.g., longer fire seasons and more uncharacteristic wildfires).
2. **Living with Wildfire** focuses on the natural role wildfire plays in Colorado's forests and rangelands. It emphasizes that fire exclusion and suppression efforts of the past are no longer appropriate and, when combined with the impacts of climate change, have put communities at heightened risk from wildfire. It also states that communities must practice wildfire risk reduction strategies as WUIs expand across the state.
3. **Watershed Protection** focuses on the risks that uncharacteristic droughts and wildfires pose to Colorado's watersheds. This theme emphasizes the link between forest health and watershed health.

4. **Forest Products** focuses on the importance of the logging industry in Colorado and describes the economic impact that declines in forest health (e.g., wildfire, overgrowth, and disease and insect associated mortality) have had on the industry.

This plan estimates that 10% of Colorado's 24 million acres of forest are in "urgent need of treatment to address forest health, wildfire risk and watershed protection threats, at a cost of approximately $4.2 billion." This plan provides detailed direction for Colorado to meet its forest treatment goals.

Colorado Legislation

Colorado Governor Jared Polis signed 15 wildfire prevention and recovery bills in 2023 and 2024 as part of the state's ongoing efforts to combat wildfires in Colorado. The legislation includes the establishment of an emergency insurance plan, tax incentives for specific reconstruction or repair materials, standardized fire-resistant building codes, homeowner financial assistance for structure hardening, wildfire investigations, evacuation modeling, and the purchase of a $26 million firefighting helicopter, among others. These 15 wildfire prevention and recovery bills are described below.

Fire Response

SB23-161: Senate Bill 23-161 allocates $26 million for the purchase of a Firehawk helicopter, doubling its existing fleet. The converted Black Hawk military helicopters are equipped with infrared sensors for night operations and can rapidly dispense 1,000 gallons of water. The addition of the Firehawk will help reduce the need for Colorado to compete with other states for temporary aircraft contracts, as the state's independent fleet will be readily available.

SB24-169: Senate Bill 24-169 reclassifies employees of the DFPC as "state troopers" if their duties include structural or wildfire management, wildfire response, live-fire training, or wildfire leadership.

Insurance and Rebuilding Codes

HB23-1288: House Bill 23-1288 aims to establish a public insurance plan as a final option for homeowners who are unable to secure coverage due to wildfires or other natural risks. The bill seeks to provide a safety net for homeowners facing difficulties in obtaining insurance due to such risks.

HB23-1174: House Bill 23-1174 mandates insurance carriers to provide homeowners with extended notice prior to canceling or allowing their insurance policy to expire. Furthermore, the measure establishes clear guidelines concerning reconstruction costs. This bill aims to enhance consumer protection by ensuring homeowners have adequate time to make alternative arrangements and understand the financial implications of policy cancelations or expirations, while also addressing specific concerns related to reconstruction expenses.

HB23-1240: House Bill 23-1240 establishes a sales and use tax exemption specifically for construction and building materials used in the reconstruction or repair of structures that were affected by a declared wildfire disaster in the years 2020, 2021, or 2022. The law aims to alleviate the financial burden on individuals or communities affected by wildfires by providing tax relief on necessary materials for rebuilding or repairing damaged structures.

HB23-1254: House Bill 23-1254 requires landlords to address and remediate residential units that have been impacted by environmental public health events. It also includes provisions that protect tenants from retaliation by landlords in response to complaints regarding the condition of their units. The bill seeks to ensure the well-being and safety of tenants by holding landlords accountable for maintaining habitable living spaces and fostering a supportive environment for tenants to voice concerns without fear of reprisal.

Fire Prevention

SB23-166: Senate Bill 23-166 establishes a board responsible for setting building codes aimed at reducing fire risk and fortifying structures within Colorado's WUI. The initial task for the board is to define the specific areas within the state that fall under this interface, with the objective of constructing homes in a manner that is mindful of the persistent threat of wildfires.

HB23-1273: House Bill 23-1273 establishes a grant program designed to provide financial assistance to homeowners who undertake upgrades and improvements to their properties, making them more resilient against the risks posed by wildfires. The program initially receives $100,000 in funding. However, additional federal funds are expected to become accessible in the near future, further augmenting the program's resources.

HB24-1006: House Bill 24-1006 establishes a grant program that provides funds to non-governmental organizations that provide technical assistance to rural communities related to wildfire education and preparation. The bill tasks the CSFS with establishing and administering the program beginning in March 2025. Nongovernmental organizations may apply for funds to assist rural communities with outreach and education, technical assistance related to outreach and wildfire mitigation, and grant writing assistance to help communities apply for federal and state funding to complete wildfire mitigation related tasks.

HB24-1024: House Bill 24-1024 allocates $40,000 to be used by the CSFS to continue public outreach campaigns in WUI areas. Along with the fiscal allocation, CSFS is tasked with completing wildfire awareness month outreach campaigns and conducting other outreach events related to wildfire risk mitigation in WUI communities.

Fire Investigations and Workforce Capacity

SB23-013: Senate Bill 23-013 mandates the director of the DFPC to provide reports on wildfire investigations and allocates over $2.7 million for funding these investigations. The bill emphasizes the importance of investigations and analysis of wildfires, ensuring dedicated resources to support thorough investigations in the state.

SB23-005: Senate Bill 23-005 aims to strengthen the timber, wildfire mitigation, and forest health industries through various initiatives. The bill includes the development of educational materials, the establishment of an internship reimbursement program for employers, and efforts to recruit more college-level educators in these fields. By investing in education and incentivizing workforce development, the bill aims to support and bolster these critical industries in addressing wildfire risks and promoting forest health.

Emergency Preparedness

HB23-1075: House Bill 23-1075 directs the state Emergency Management Office to assess the utilization of technology to expedite evacuation modeling. The study mandated by the bill will explore the feasibility of making it a requirement for building developers to conduct the modeling themselves. By examining the potential use of technology and exploring developer involvement, the legislation aims to enhance evacuation planning and response strategies, ultimately ensuring the safety and well-being of individuals during emergencies.

HB23-1237: House Bill 23-1237 focuses on expanding the inclusion of additional languages in emergency alerts. The bill calls for a study to determine which agencies and governmental entities should be responsible for providing multi-lingual alerts. By addressing the need for diverse language accessibility

in emergency communications, the legislation aims to enhance the effectiveness of alerts and ensure the safety of a broader range of individuals during critical situations. Colorado Minimum CWPP Standards

SB09-001: The 2022 CSFS Minimum Standards for Developing CWPPs provide basic guidelines that have been updated per Colorado Senate Bill 09-001. The purpose of the described standards is to provide a foundation for supporting healthy, resilient, and fire-adapted communities. The plan has been developed into three overarching goals, which are broken down into sub-goals as well as related action items (CSFS 2022a). These goals include but are not limited to:

1. Promote Community Fire Adaptation: Through a deeper understanding of living with wildfire, facilitate social community adjustments, wildfire risk reduction through community enhancement, and an increase of pace and scale of wildfire risk reduction efforts.
2. Reduce the Risk of Uncharacteristic Wildfire: Reduction of wildfire severity through forest alteration, maintenance and enhancement of species and structural diversity, and revegetation of sites through species transitions before and after disturbances.
3. Promote the Role of Fire in Ecological Processes: Fundamental sustainability through ecological functions, improving the understanding of the role of fire in Colorado's ecosystems, and increasing the use of managed and prescribed wildfire.

The standards specify that the planning process should be as inclusive as possible to address the needs of socially vulnerable populations and ensure all residents' concerns are represented in the plan. CSFS also requires mapping of the WUI, completion of a Quantitative Risk Assessment, and identification of priority projects to provide the community with actionable recommendations on risk reduction and resilience. The CSFS recommends updating CWPPs at 5-year intervals to ensure project objectives, demographics, and Quantitative Risk Assessments are relevant (CSFS 2022).

Colorado Strategic Wildfire Action Program

In 2021, Colorado Senate Bill 21-258 was signed by Governor Polis. This bill designates $17.5 million to immediately address the wildfire crisis in Colorado through mitigation and community resilience work. This objective will be realized by increasing funding to the Forest Restoration and Wildfire Risk Mitigation Grant Program and other fire-related funding mechanisms, providing funds to hire additional mitigation and firefighting personnel, and establishing a hazard mitigation and capacity development fund. This bill marks a statewide recognition of the extreme hazards wildfires create and an investment in creating more fire resilient landscapes (Colorado Department of Natural Resources [CDNR] 2022). The scope of the bill is focused heavily on the counties lying on the eastern base of the Front Range, opening a multitude of opportunities for communities within PFA service area to, in partnership with the CSFS and CDNR, establish funding pipelines for locations with significant tourism/recreation and watersheds providing trans-basin diversions.

HB22-1111 (Insurance Coverage for Loss Declared Fire Disaster)

In 2022, Colorado passed HB-1111, which increases the amount of lost property insurers must cover upfront and extends the timeframe that victims of wildfire have to rebuild their homes. This bill was signed by Governor Polis in 2022 and outlines standards and restrictions for home insurers when covering instances of total loss from wildfire events. This bill includes, but is not limited to, the following requirements:

- There will be a minimum of 24 months to collect Additional Living expense Coverage with two extensions of 6 months

- Homeowners may not be denied insurance payment if they decide to rebuild in a different location than their previous home or if building code updates will make rebuilding costs higher than the home value.
- If a policy requires repair or rebuild in order for the owner to collect payments, the owner shall be allowed 36 months to submit invoices.
- The right to use all available rebuild benefits to buy a replacement home.
- The right to collect 65% of contents benefits without having to inventory a lifetime of possession.
- The right to know how an insurer calculated depreciation.

Additional measures of this bill ensure homeowners can recoup money from furniture and other items lost in a fire and establishes a mandatory time that insurers must cover living expenses. This Bill only applies to future declared fire disasters (Colorado General Assembly 2022a).

Federal Direction

Federal wildfire planning has historically been guided by the U.S. Department of the Interior (DOI), who stated in its 2017 Wildland Fire Management Department Manual that all public lands with burnable vegetation must have a fire management plan (DOI 2017). Subsequent efforts, including the National Fire Plan in 2000 and the Healthy Forests Restoration Act (HFRA) in 2003 (revised in 2009), which further incentivized the development and highlighted the importance of CWPPs, emphasized collaboration, and expedited hazardous fuels reduction projects (Public Law 108–148, 2003; H.R. 4233 - Healthy Forest Restoration Amendments Act of 2009). CWPPs are an effort to enhance collaborative wildfire management approaches between federal agencies and communities, prioritize treatment areas, and secure grant funding priority to communities with an established CWPP.

In 2023, the Wildfire Leadership Council sought to update and enhance the strategic direction of the 2014 National Cohesive Wildland Fire Management Strategy framework. This was done through the 2023 National Cohesive Wildland Fire Management Strategy Addendum Update (Wildland Fire Leadership Council 2023). The updated strategy highlights critical emphasis areas that were not identified in the previous framework.

Included among these emphasis areas are:

1. Climate change
2. Workforce capacity, health, and well-being
3. Community resilience (preparation, response, and recovery)
4. Diversity, equity, inclusion, and environmental justice

Thorough analysis of these emphasis areas is provided for within the Addendum Update report, along new management options to address them.

PAST PLANNING EFFORTS

Local

City of Fort Collins

Fort Collins Natural Areas Department Fire Management Plan 2012: The City of Fort Collins Natural Areas Department published a 2012 Fire Management Plan. The plan guides the use of fire on City of Fort Collins Natural Areas Department lands, specifically when prioritizing and planning prescribed fires (City of Fort Collins 2012). Additionally, the plan delineates fire management zones and units which break up Natural Areas properties into more manageable groups based on geographic location, political boundaries, and land characteristics. The plan also outlines previous prescribed fire projects from 2002 to 2012 and includes appendices that contain proposed WUI mow lines adjacent to Natural Areas properties (City of Fort Collins 2012).

Natural Areas Master Plan (draft for public review 2014): The 2014 Master Plan outlines achievements of the past decade and sets priorities for the next based on community input and emerging needs. It aligns with the City's mission for exceptional service and emphasizes conserving lands with natural, agricultural, and scenic values while providing education and recreation opportunities (City of Fort Collins 2014). The Fort Collins community's support has been pivotal in realizing the original vision of the 1992 Natural Areas Policy Plan. The natural areas offer various ecosystem services, support diverse wildlife, and contribute to the city's economic and cultural vibrancy. Sustainability, with a focus on the triple bottom line (human, economic, and environmental considerations), is a core philosophy driving the city's efforts (City of Fort Collins 2014).

Fort Collins City Plan 2019: The 2019 Fort Collins City Plan serves as a comprehensive and forward-looking guide for the city's development over the next 10 to 20 years. The plan acknowledges the significant changes faced by the community in recent years, addressing challenges such as increased population, transit ridership, housing costs, and demographic shifts (City of Fort Collins 2019). The plan is a result of extensive community engagement, emphasizing inclusivity and diverse representation. It covers crucial aspects such as land use, economic health, housing, transportation, and climate action. Climate change is recognized as a significant area of planning concern, as it is projected to increase the risk of droughts, wildfire, and poor air quality (City of Fort Collins 2019).

Parks and Recreation Master Plan 2021: The Fort Collins Parks and Recreation Master Plan, titled ReCreate, serves as a comprehensive roadmap to optimize the city's parks and recreational resources. The Plan emphasizes the holistic value of parks, considering them part of a broader system of public spaces that contribute to the city's outcome areas (City of Fort Collins 2021). Equity is a primary consideration, with the plan addressing access, program pricing, and community involvement to ensure everyone benefits. The plan focuses on the benefits of parks and recreation in areas such as economic health, environmental health, and community cohesion. It outlines specific goals, actions, and methods to enhance access, recreation, trails, resources, funding, partnerships, operations, economic health, communication, design, and safety (City of Fort Collins 2021). The document highlights the importance of clear maintenance standards, sustainable practices, and design excellence to create engaging and safe public spaces.

Larimer County

Open Lands Master Plan 2015: The Larimer County Open Lands Master Plan outlines the conservation efforts and achievements in Larimer County, Colorado. The program, initiated in the mid-1990s, has

successfully preserved over 33,000 acres of high-quality land through fee simple purchase and conservation easements (Larimer County 2015). Key priorities include the protection of natural areas, agricultural lands, and regional priorities like the Cache la Poudre River and Bellvue valley. The plan emphasizes collaboration with willing landowners, responsible stewardship, and the development of land-use alternatives that align with both landowner and county goals (Larimer County 2015). The Open Lands Program has actively engaged the community through public outreach, ensuring that conservation efforts align with public values and needs. The master plan also addresses the importance of ongoing resource management, habitat restoration, and closing gaps between conserved areas (Larimer County 2015).

2017 Reservoir Parks Master Plan: The 2017 Larimer County Reservoir Parks Master Plan outlines the management strategies, issues, and opportunities for reservoir parks within Larimer County. A collaborative Planning Team, involving representatives from Reclamation, Larimer County, and a project consultant, played a key role in gathering public input and shaping the plan (Larimer County 2017). The Technical Advisory Committee, comprising federal, state, and local agencies, provided additional input. Public engagement occurred across multiple phases, involving various stakeholder groups and utilizing online platforms for updates (Larimer County 2017). The plan emphasizes the mission of Larimer County's Department of Natural Resources to ensure a reservoir parks system supporting the county's vision, anticipating the future, and providing diverse recreational experiences.

Noxious Weed Management Plan 2018: The Larimer County Noxious Weed Management Plan is a comprehensive document outlining the strategies and requirements for managing invasive exotic plant species that threaten the environment, agriculture, economy, and human health in Larimer County, Colorado (Larimer County 2018a). The plan is in compliance with the Colorado Noxious Weed Act and classifies weeds into List A, List B, and List C species, each with specific management goals. It emphasizes the importance of public and private landowners working together to control and eradicate noxious weeds. The plan includes a detailed process for noxious weed compliance, prioritizes enforcement actions based on the severity of the infestation, and encourages integrated weed management practices for effective and efficient control (Larimer County 2018a).

Comprehensive Plan 2019: The Larimer County Comprehensive Plan serves as a guiding policy document for long-term decision-making in Larimer County, focusing on the unique character of its unincorporated areas. It addresses regional opportunities and challenges, providing policy guidance for land development, public services, environmental protection, and economic sustainability (Larimer County 2019). The plan, organized according to the Colorado Resiliency Framework, replaces the 1997 Larimer County Master Plan. It emphasizes intentional and thoughtful planning, comparing the county's role to that of running a business. The document outlines the significant growth in population and jobs over the past two decades and anticipates future growth, with municipalities expected to absorb the majority of the forecasted population increase (Larimer County 2019).

Comprehensive Emergency Management Plan: The Larimer County Comprehensive Emergency Management plan provides the basis for emergency prevention and preparedness, mitigation, response, and recovery. The plan is organized into four parts: a preparedness plan, the 2021 Multi-Jurisdictional Hazard Mitigation Plan, an emergency operations plan, and a disaster recovery plan (Larimer County n.d.). The preparedness plan outlines emergency management standards, public education programs in place within the county, and considerations that should be taken when planning for wildfire (Larimer County 2021a). The Multi-Jurisdictional Hazard Mitigation Plan, which serves as part two of the Cohesive Emergency Management Plan, is outlined in more detail below. Part three is an emergency operations plan that ensures alignment with national and state emergency response and outline a framework for response and disasters that overwhelm normal resources (Larimer County 2018b). The final part of the Comprehensive Emergency Management Plan is a recovery plan that promotes effective recovery efforts

by identifying scalable actions and linking them to organizations that play a vital role in recovery (Larimer County 2018c).

Multi-Jurisdictional Hazard Mitigation Plan 2021: The 2021 update of the Larimer County Hazard Mitigation Plan (HMP) involves collaboration among various municipalities and special districts in Colorado. The plan aims to reduce long-term risks to people and property from natural and human-caused hazards, emphasizing cost-effective mitigation strategies (Larimer County 2021b). It builds on previous plans and aligns with FEMA requirements for updating every five years. The document covers sections such as introduction, community profile, planning process, risk assessment, capability assessment, mitigation strategy, and plan implementation. The risk assessment identifies and ranks hazards, including biological hazards, civil disturbance, dam inundation, drought, earthquake, flood, hazardous materials incident, landslide/rockslide, and others (Larimer County 2021b).
The comprehensive approach involves public participation, stakeholder involvement, and collaboration with state and federal agencies, ensuring a resilient and updated strategy for the next five years.

2021 Hazard Mitigation Plan Town of Berthoud annex: The 2021 HMP for the Town of Berthoud focuses on reducing risks from natural and human-caused hazards. The town, known as the "Garden Spot of Colorado," aspires to balance future growth with preserving its rural character (Larimer County 2021c). The document outlines the planning process, emphasizing continuity from the 2016 Larimer County HMP. Berthoud's vision includes a vibrant commercial and residential core, mixed-use areas, and connectivity through trails. The annex presents a jurisdiction-specific hazard identification and risk assessment summary, detailing the frequency, spatial extent, and severity of various hazards (Larimer County 2021). The significance of each hazard is evaluated, guiding the town's mitigation actions.
The vulnerability assessment examines the town's risk profile, and the community asset inventory provides insights into improved properties and critical facilities (Larimer County 2021c). Overall, the plan aims to enhance resilience, protect assets, and maintain eligibility for federal disaster assistance programs.

Climate Impacts in Larimer County: The 2023 Climate Impacts in Larimer County report outlines the county's efforts to create a proactive Climate Smart and Future Ready Plan. It highlights the diverse climate within Colorado and Larimer County, emphasizing the increasing temperatures and unpredictability in precipitation since 1990 (Lotus Engineering and Sustainability 2023). The primary risks identified include wildfires, flash floods, and winter storms, with additional concerns about hailstorms and tornadoes. The economic impacts span agriculture, infrastructure, recreation, and suppression, with potential damages ranging from millions to hundreds of millions of dollars. The report also underscores the uneven distribution of climate impacts, with historically marginalized communities facing greater environmental burdens and vulnerability (Lotus Engineering and Sustainability 2023). The proposed plan aims to address these challenges and foster resilience in the face of climate change.

2023 Water Master Plan: The Larimer County Water Master Plan draft envisions responsible water stewardship and resilient communities through safeguarding water systems, aligning land use, and fostering ecosystems (Larimer County 2023). Goals include minimizing hazards, enhancing collaboration, promoting water literacy, addressing supply and demand dynamics, and improving efficiency. Objectives involve seeking grants, stakeholder collaboration, integrating hazard mitigation, strengthening communication, promoting education, aligning zoning, preserving agricultural water, incentivizing sustainable land use, and implementing conservation programs (Larimer County 2023).

Poudre Fire Authority

Poudre Fire Authority 2011 CWPP: The 2011 PFA CWPP, developed with Larimer County, CSFS, and USFS, aims to protect lives and property in the WUI (PFA 2011). The 2011 plan analyzes WUI areas and

community hazards, and engages residents in mitigation planning. The plan provides recommendations for mitigation, preparedness, response, and recovery, emphasizing collaboration, fuels management, and community engagement to reduce wildfire risks in compliance with legislative authorities (PFA 2011).

Poudre Fire Authority Strategic Plan 2022–2025: The PFA's strategic plan is a comprehensive roadmap that outlines the organization's vision, goals, and objectives. It focuses on ensuring effective fire and emergency services, community safety, and organizational resilience (PFA 2022b). The plan includes strategies to enhance operational coordination, improve emergency communications, develop supply chain management, and strengthen community outreach programs. It emphasizes collaboration with various stakeholders, including government agencies, healthcare organizations, and community groups (PFA 2022b). Specific goals address areas such as hazard mitigation, mass care and response capabilities, and water sustainability. The strategic plan also outlines a method for implementation, evaluation, and maintenance to ensure continuous improvement and adaptability to changing circumstances (PFA 2022b).

Weld County

Weld County Multi-jurisdictional Hazard Mitigation Plan: The Weld County 2021 Hazard Mitigation Plan aims to reduce vulnerability to hazards by incorporating input from stakeholders and the Hazard Mitigation Planning Committee. It sets goals, objectives, and actions focusing on community resilience and economic well-being, prioritizing mitigation strategies using FEMA's methodology. Categories include structure and infrastructure projects, local regulations, natural systems protection, and education and awareness programs. Goals include protecting people, property, and natural resources, enhancing service delivery, engaging communities, and supporting ongoing mitigation planning. The plan integrates with other emergency management efforts and undergoes annual review for effectiveness. Challenges like funding and leadership support are addressed for successful implementation. (Weld County 2021).

Weld County Comprehensive Plan: The Weld County Comprehensive Plan, part of Chapter 22 of the County Code, directs land use in unincorporated areas. Originating in 1973 and regularly updated, it prioritizes community health, safety, and economic prosperity. The recent update streamlines guidelines, keeping core principles intact. It manages zoning for compatible land use, fosters collaboration with municipalities, and follows legislative processes. Covering agriculture, development, transportation, economics, environment, and natural resources, it includes a zoning map for guidance. Urban-scale development is encouraged near municipalities, with commercial and industrial zones designated based on infrastructure proximity. Zone changes approvals hinge on meeting county criteria, ensuring careful consideration of local factors (Weld County 2020).

State

2018–2023 Colorado Hazard Mitigation Plan: The 2018–2023 Colorado Hazard Mitigation Plan was developed by the Colorado Department of Public Safety in 2023. The Plan is designed to maintain a framework for implementing hazard mitigation actions and minimizing the impacts of hazards across the State. The Plan breaks down planning into categories regarding identifying hazards, implementation and response capabilities, planning at local levels, and maintaining plans. Wildfire is identified as a high annual hazard with large associated economic losses. Recommended mitigation actions include developing and maintaining CWPPs (Colorado Department of Public Safety 2018).

2019 State Emergency Operations Plan: The State Emergency Operations Plan was implemented in 2019 by the Colorado Division of Homeland Security and Emergency Management (CDHSEM). The purpose of the Plan is to establish guidelines on how Colorado provides response and recovery actions for emergencies and disasters. The Plan provides a single framework for response, with specific

details of response varying based on the type and severity of incident. For wildfire, the plan emphasizes the importance of preparedness, coordinated interagency response, and clear assignment of responsibilities (CDHSEM 2019).

2020 Colorado State Forest Action Plan: The Colorado State Forest Action Plan was developed by the CSFS in 2020. The Plan provides a framework for identifying forest stewardship priorities within the state by accounting for forest constraints, threats, trends, and jurisdictional boundaries. The Plan breaks forest management into six categories: conditions, living with wildfire, watershed protection, wildlife, urban and community forestry, and forest products. Strategies for cooperatively addressing these categories while achieving healthy forest goals are also discussed. Key wildfire priorities outlined in the Plan include promoting community wildfire adaptation, reducing risks of severe wildfires, and promoting the ecological role of wildfires (CSFS 2020).

2023 Wildfire Preparedness Plan: The 2023 Wildfire Preparedness Plan was prepared by the DFPC and provides an overview of the Division's wildfire response capabilities. Specific numbers and types of ground, aviation, and other support resources are outlined, along with additional needs and considerations (DFPC 2023).

Federal

The National Cohesive Wildland Fire Management Strategy: The Strategy outlines a holistic approach to the future of wildfire management, with the goal of managing forests to coexist with wildland fire but containing incidents when necessary. The Strategy maintains that this goal will be achieved by restoring and maintaining landscapes, developing fire-adapted communities, and maintaining sufficient wildfire response capabilities (Forests and Rangelands 2021).

A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: A 10-year Implementation Strategy: This plan was most recently updated in 2006 and focuses on using a collaborative framework for restoring fire-adapted ecosystems, reducing hazardous fuels, mitigating risks to communities, providing economic benefits, and improving fire prevention and suppression strategies. The plan also emphasizes information sharing and monitoring of accomplishments and forest conditions, a long-term commitment to maintaining the essential resources for implementation, a landscape-level vision for restoration of fire-adapted ecosystems, the importance of using fire as a management tool, and continued improvements to collaboration efforts (Forests and Rangelands 2006).

National Fire Plan: The National Fire Plan (Managing the Impact of Wildfires on Communities and the Environment) was implemented by the DOI and the USFS in 2000. The plan was established to develop a collaborative approach among various governmental agencies to actively respond to severe wildland fires and ensure sufficient firefighting capacity for the future. Focuses of the plan are on firefighting preparedness and accountability, forest restoration, hazardous fuels reduction, community assistance, and research (Forests and Rangelands 2000).

Arapahoe and Roosevelt National Forests and Pawnee National Grassland Land and Resource Management Plan: The Plan was revised in 1997, updated in 2019, and is the guiding land management document for the Arapahoe National Forest. The Plan recognizes the natural role and importance of wildfire in mountain ecosystems and outlines that significant efforts should be made to reduce wildfire hazards. These efforts include fuel management such as targeted timber harvest, wildfire-habitat improvement, and invasive species control to reduce risk to lives and property while improving forest health. Public education around wildfire protection is also emphasized in the Plan (USFS 2019a).

PUBLIC LAND MANAGEMENT

LAND MANAGEMENT STRATEGIES

Local and State Land

Local land in the PFA service area is managed under the guidance and objectives of land, resource, and fire management planning documents for the county and municipalities within the PFA's service area. This includes Larimer and Weld County, the City of Fort Collins, and lands managed by Colorado Parks & Wildlife. Resource and land management plans, (e.g. Natural Areas Master Plan, Open Lands Master Plan, Water Master Plan) provide assessments of current conditions, projections of future land use and community changes, and recommendations for protecting PFA service area values and character while adapting to growth and natural environment changes. A key theme is the conservation of resilient open space and natural areas and the potential effects of climate change on ecosystems and natural hazard risk. These plans also emphasize the need for cross boundary collaboration to foster landscape scale forest health and fire resilience on public and private land.

Emergency preparedness and general planning documents, (e.g. Fire Management Implementation Plan, Hazard Mitigation Plan, Strategic Plan) provide recommendations for improving emergency preparedness and response, outline ideal growth and capacity building, and identify major challenges or hazards to community development and sustainability. Some themes of the preparedness and implementation plans are the need for collaboration and cooperative agreements between response jurisdictions, increasing emergency response capacity, and strengthening community outreach and education programs.

Public land in the PFA service area is also managed with regard to state guidance. In 2020, the CSFS published a Forest Action Plan with the overarching goal of maintaining forest ecosystems and improving the health of local watersheds. The foundation of the plan is built on six central themes: forest conditions, living with wildfire, watershed protection, forest wildlife, urban and community forestry, and forest products (CSFS 2020). The Colorado Department of Public Safety also develops an annual wildfire preparedness plan aims to forecast yearly wildfires and determine the amount and availability of aerial firefighting resources, state wildfire engines, wildfire hand crews, and modify the dispatching process/mobilization plan as needed. It also provides a breakdown of the hierarchy of local, County, and State jurisdictions when dealing with fires as well as any additional needs or important information based on the yearly conditions (DFPC 2022b).

The state of Colorado has joined forces with major federal agencies, namely the BLM, U.S. Fish and Wildlife Service (USFWS), USDA, Bureau of Indian Affairs, and National Park Service (NPS), to form the Colorado Cooperative Wildland Fire Management and Stafford Act Response Agreement. The agreement focuses on interagency cooperation, the use of interagency fire resources, operations, and preparedness (DFPC 2021).

Federal Land

Arapaho and Roosevelt National Forests (USFS)

The Arapaho and Roosevelt National Forests cover a vast area of 1.5 million acres in north-central Colorado and are located in the western portion of the PFA management area (see USFS land in Figure 2.2). Managed by the USFS, these forests showcase the diverse ecosystems found along the Continental Divide, including glacial peaks, snowfields, alpine tundra, and a rich variety of vegetation. These forests

are popular destinations for outdoor recreation due to their natural beauty and proximity to metropolitan areas. With ten federally designated wilderness areas and close proximity to Rocky Mountain National Park, the Arapaho and Roosevelt National Forests offer abundant opportunities for exploration and adventure (USFS 2022b). The Arapahoe-Roosevelt National Forests Fire Management plan prioritizes wildfire management to reduce hazards and preserve forest health and prevent the spread of high-severity wildfire, employing strategies such as fuel reduction, prescribed burns, and invasive species control. Additionally, the plan emphasizes community protection, collaboration among various land managers, and public education regarding wildfire prevention (USFS 2019a, 2022b).

STEWARDSHIP AGREEMENTS

For all wildfire hazards that are, or may become, declared as emergencies or major disasters under the Stafford Act, the state of Colorado (specifically the CSFS and the DFPC) has entered into a cooperative wildland fire management agreement with multiple federal agencies (e.g., BLM, USFS, NPS, USFWS, and the Bureau of Indian Affairs). The purpose of this agreement is to improve wildfire response and management efficiency by facilitating the coordination and exchange of equipment, personnel, supplies, services, and funds among the parties in the agreement. The details of this agreement are described in the "Colorado Cooperative Wild Land Fire Management and Stafford Act Response Agreement" (available at: https://gacc.nifc.gov/rmcc/administrative/docs/COAgreement.pdf).

Additionally, in 2018 the USFS released its national Shared Stewardship strategy that contains the following main goals: determine management needs on a state level, do the right work in the right places at the right scale, and use all available tools for active management. The strategy is based on the USFS seeking out state, tribal, and local input to best determine land management needs. The Shared Stewardship agreement was formalized in Colorado in 2019, establishing a Shared Stewardship framework between CSFS, CDNR, DFPC, and other state agencies (CDNR 2022).

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APPENDIX B:

Community Background and Resources

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LOCATION AND GEOGRAPHY

The PFA service area covers 230 square miles mostly in Larimer County and a small portion of Weld County (Figures B.1 and B.2). PFA provides fire prevention, protection, and emergency response services to the Poudre Valley Fire Protection District, Fort Collins, Timnath, Bellvue, LaPorte, and unincorporated portions of Larimer and Weld Counties. The City of Fort Collins is the main urban center under the responsibility of PFA, and the remaining service area is primarily rural, grassland, and foothills landscapes.

The vast majority of land in the PFA service area is privately owned with small portions owned by the City of Fort Collins, and state and federal government. A small northwestern portion of the PFA service area is managed by the USFS as part of Arapaho and Roosevelt National Forests; Colorado Parks & Wildlife manages areas along the Poudre River, Lory State Park, and northeast of Fort Collins; and the City of Fort Collins manages multiple parks and natural areas such as Gateway Natural Area. A summary of land ownership in the PFA service area is provided in Table B.1. Land ownership data were provided by Larimer and Weld Counties, and the City of Fort Collins.

Table B.1. Breakdown of Land Ownership in the PFA Service Area

Land Ownership	Acres	% of Focus Area
Private Land	119,224.40	80.85
City of Fort Collins Natural Areas	11,457.12	7.77
County Land	8,645.62	5.86
State Land	7,138.83	4.84
Colorado Parks & Wildlife	430.46	0.29
Bureau of Land Management	224.43	0.15
Colorado State University	181.19	0.12
U.S. Forest Service	154.56	0.10
City of Loveland	1.60	0.001
Total	**147,458.21**	**100**

Figure B.1. Typical landscape in western PFA service area (Lory State Park).

Figure B.2. Typical landscape in eastern PFA service area (southeast Fort Collins).

ROADS AND TRANSPORTATION

The PFA service area includes multiple primary transportation corridors including Interstate 25, Highway 287, and County Roads 14 and 29. Interstate 25 runs north-south along the eastern edge of the service area and is a primary travel route in Colorado connecting Denver to Wyoming and accessing many Front Range cities along its path. Highway 287 also runs north-south and is relatively central, bisecting the service area and running through the City of Fort Collins. County Road 14 travels east-west and connects I-25 and Highway 287, allowing easier access from the City of Fort Collins to the major interstate, County Road 29, also labeled as Poudre Canyon Road, is a minor corridor but provides the most efficient access in and out of Poudre Canyon.

RECREATION

Outdoor recreation is a cornerstone of communities within the PFA service area. With ample access to Arapaho and Roosevelt National Forests, multiple state parks (Figure B.3), and open space and natural areas owned by the city and county, camping, hiking, biking, and other outdoor activities can be easily accessed throughout the PFA service area. Additionally, the Cache la Poudre River, Horsetooth Reservoir, and other water bodies provide access to fishing, boating, and other water sports (City of Fort Collins 2021). The service area is also proximal to Rocky Mountain National Park, a popular area for hiking, backpacking, and other outdoor activities.

Figure B.3. Recreation infrastructure for the Stout Trail in Lory State Park.

WILDLIFE

Much of the lower-lying, urban area within the PFA service area, such as the City of Fort Collins, have intermixed natural areas along with proximity to foothill and mountain habitats and associated wildlife. Some grassland and rangeland open space and natural preserves are also maintained within the service area that are more intermixed with urban and suburban development. The City of Fort Collins has a vision of maintaining a network of open space to connect people to nature and provide functional habitat for plants and animals (City of Fort Collins 2021). This is also in line with Larimer County's Open Lands Master Plan, which has prioritized natural ecosystem preservation through land acquisition and collaboration with private landowners and agricultural producers to maintain natural habitats and foster a matrix of interconnected natural areas where native species can thrive (Larimer County 2015).

Threatened and Endangered Species

Several federally and state-recognized threatened and endangered species can be found in the portions of Larimer and Weld Counties that comprise the PFA service area. These include grey wolf (*Canis lupus*), Preble's meadow jumping mouse (*Zapus hudsonius preblei*), tricolored bat (*Perimyotis subflavus*), eastern black rail (*Laterallus jamaicensis* ssp. *jamaicensis*), Mexican spotted owl (*Strix occidentalis lucida*), piping plover (*Charadrius melodus*), whooping crane (*Grus americana*), greenback cutthroat trout (*Oncorhynchus clarkii stomias*), and monarch butterfly (*Danaus plexippus*). In addition to the above-listed mammals, birds, and fishes, there multiple flowering plants listed in the service area, including Ute ladies'-tresses (*Spiranthes diluvialis*) and western prairie fringed orchid (*Platanthera praeclara*) (USFWS 2024).

Recommendations for fuel treatments should be developed in alignment with all required compliance, and when possible, treatment approaches should be aligned with actions that provide for habitat enhancement for threatened and endangered species. Refer to guidance from local, regional, or state natural resource agencies before conducting fuel treatments, during active fire response, and during post-fire recovery efforts.

FOREST HEALTH CONSIDERATIONS

The PFA service area is home to many different species of deciduous and coniferous trees spread throughout an urban and rural environment; both native and nonnative species can be found throughout. This presents unique challenges for foresters who must contend with a multitude of native and introduced insects and diseases.

Not only are typical western insects and diseases such as mountain pine beetle (*Dendroctonus ponderosae*) and western gall rust (*Peridermium harknessii*) present in the PFA service area, but so are invasive insects and diseases affecting hardwoods such as emerald ash borer (*Agrilus planipennis*) and cottonwood canker (*Cytospora chrysosperma*). Proper planning and treatment are often more involved for urban forests due to the increased risk that weakened and damaged trees pose to people and infrastructure. It is important that woody debris is managed closely and collaboratively within the PFA service area, especially in riparian areas where a buildup of dead and down material can increase the risk of wildfire.

INSECTS

It is important to monitor the health of urban trees and take appropriate measures, such as proper maintenance and timely insecticide treatments, to manage and mitigate insect infestations. Consulting with local arborists or forestry experts can provide more specific and up-to-date information on insect pests in the region.

Primary insects that have infested or have the potential to infect the forests within and around the PFA service area include the following (CSFS 2024):

- Mountain Pine Beetle (*Dendroctonus ponderosae*) – Primarily affecting ponderosa pine and lodgepole pine
- Spruce Beetle (*Dendroctonus rufipennis*) – primarily affecting Engelmann and blue spruce
- Western Balsam Bark Beetle (*Dryocoetes confuses*) – primarily affecting subalpine fir
- Western Spruce Budworm (*Choristoneura freeman*) – primarily affecting Douglas-fir and spruce
- Emerald Ashborer (*Agrilus planipennis)* – primarily affecting ash trees

Additional information on tree mortality and beetle infestations can be found in the Tree Mortality section of this appendix.

DISEASES

Vegetation affected by fungi, parasites, and bacteria increase fire hazard within the PFA service area. These diseases degrade the productivity and health of vegetation making it more susceptible to ignition. Some of the more common plant diseases that are found in Colorado are listed below.

- Ink Spot (*Ciborinia whetzelii)* primarily affecting aspen
- Cercospora Blight of Junipers (*Cercospora sequoiae var. juniperi)* – primarily affecting rocky mountain juniper
- Broom Rust of Spruce and Fir (*Melampsorella caryophyllacearum*, *Chrysomyxa arctostaphyli*) – primarily affecting Douglas-fir, spruce, and subalpine fir
- White Pine Blister Rust (*Cronartium ribicola*) – primarily affecting limber pine
- Cottonwood canker (*Cytospora chrysosperma*) – primarily affecting cottonwood, aspen, and alder
- Dwarf Mistletoe (*Arceuthobium* spp.) – primarily affecting ponderosa pine and lodgepole pine
- Dutch elm (Oph*iostoma ulmi, Ophiostoma himal-ulmi, Ophiostoma novo-ulmi*) – primarily affecting elm trees

Treatments for affected plants on federal land would be subject to the National Environmental Policy Act (NEPA); in areas that may impact threatened and endangered species, certain mitigation measures would be required to prevent habitat degradation.

WATERSHED CONSIDERATIONS

Watersheds, defined as areas of land that drain water, sediment, and dissolved materials to a common outlet, are crucial for connecting landscapes, ecosystems, and societies (U.S. Environmental Protection Agency [EPA] 2022). Their health is vital not only for the natural environment but also for the communities and industries that depend on them. In Colorado, wildfires can significantly impact watershed health, altering native vegetation, sediment transport, stream flows, and aquatic habitats. These changes can have detrimental effects on the overall health of watersheds. Therefore, it is essential to consider the current health of watersheds and assess potential wildfire impacts when planning.

A healthy watershed can support essential hydrologic and geomorphic processes and provide critical ecosystem services such as clean water, flood protection, and recreational opportunities. While wildfires are a natural part of the ecosystem, uncharacteristically large and severe wildfires can significantly jeopardize watershed health (Wildfire Ready Watersheds 2023).

Strategies to mitigate these risks through pre- and post-wildfire actions can involve wildfire severity reduction through various fuel treatments, watershed restoration through stream bank stabilization and riparian restoration, and community resilience efforts focusing on public education, infrastructure improvements, and regulatory compliance. The successful implementation of these strategies requires collaboration among local planners, land management agencies, water providers, and landowners, with projects prioritized based on comprehensive risk assessments and supported by federal and state funding sources. Continuous monitoring and stakeholder engagement are essential to ensure the effectiveness and cost-efficiency of these efforts, ultimately contributing to the long-term health and safety of Colorado's watersheds.

ENVIRONMENTAL CHALLENGES

WIND

Wind is a critical environmental factor influencing wildfire behavior in the PFA service area. Its direction, speed, and power can drastically impact fire intensity, rate of spread, and ember transport, making it essential to consider wind dynamics in wildfire mitigation strategies. In regions with frequent high winds, such as the PFA service area, even well-prepared fire defenses can be challenged by the ability of winds to spread embers and intensify flames across fuel breaks. It is important to note that the winter months are recognized as the season when the strongest wind events can occur in northern Colorado (NOAA n.d.). This knowledge is crucial for understanding treatment seasonality and preparing for periods of greatest risk.

These charts, generated using an approximate location from the Global Wind Atlas, illustrate the frequency, speed, and power of winds from various directions, offering a comprehensive overview of local wind conditions among the 10% windiest areas for the region. Using wind rose charts in wildfire planning can assist communities in better optimizing fuel treatments and develop effective suppression and evacuation strategies based on local wind dynamics.

Figure B.4 displays a wind **frequency** rose, identifying the prevailing wind directions, which are critical for assessing potential fire spread patterns. The chart is divided into segments that correspond to the primary and secondary compass directions, with the radial length of each segment representing the frequency of winds blowing from that direction, expressed as a percentage of the total wind observations. From this

chart, we can see that the most frequent wind directions are from the northwest (270° to 0°) and the southeast (90° to 180°) with relatively little activity from the northeast (0° to 90°) and southwest (180° to 270°).

Figure B.5 shows a wind **speed** rose, showing the intensity of winds and indicating areas at greater risk of rapid fire propagation. The chart is divided into segments corresponding to different primary and secondary compass directions, with the radial length of each segment indicating the relative occurrence or magnitude of wind speeds from various directions, expressed as a percentage of total wind observations. The highest values are observed from the north to northwest (270° to 0°) and the southeast (90° to 180°), with relatively little activity from the northeast (0° to 90°) and southwest (180° to 270°).

Figure B.6 displays wind **power** rose, highlighting the potential energy of winds, which can influence fire intensity, ember transport, and the ability to ignite spot fires. The chart is divided into segments that correspond to compass directions with each segment showing the contribution of wind power from a specific direction. The radial length of each segment indicates the relative amount of wind power coming from that direction, expressed as a percentage of total wind observations. The greatest wind power observed occurs almost entirely from the northwest (270° to 0°).

Figure B.7 illustrates the mean wind speed across varying percentages of the windiest areas in the PFA service area. This graph highlights how mean wind speeds decrease as we move from the highest 10% of windiest areas to the least windy areas. The vertical axis represents mean wind speed in meters per second (m/s), while the horizontal axis indicates the percentage ranking of the windiest areas.
The highest wind speeds observed in the top 10% to 20% of areas may significantly impact fire behavior, increasing flame length and spread rates, and facilitating ember transport. Understanding where these peak wind speeds occur allows for better-informed mitigation strategies, such as focusing fuel treatments and constructing firebreaks in areas most prone to high winds. The figure underscores the importance of targeting wildfire resilience efforts within these highest wind speed zones to reduce the overall wildfire risk in the PFA service area.

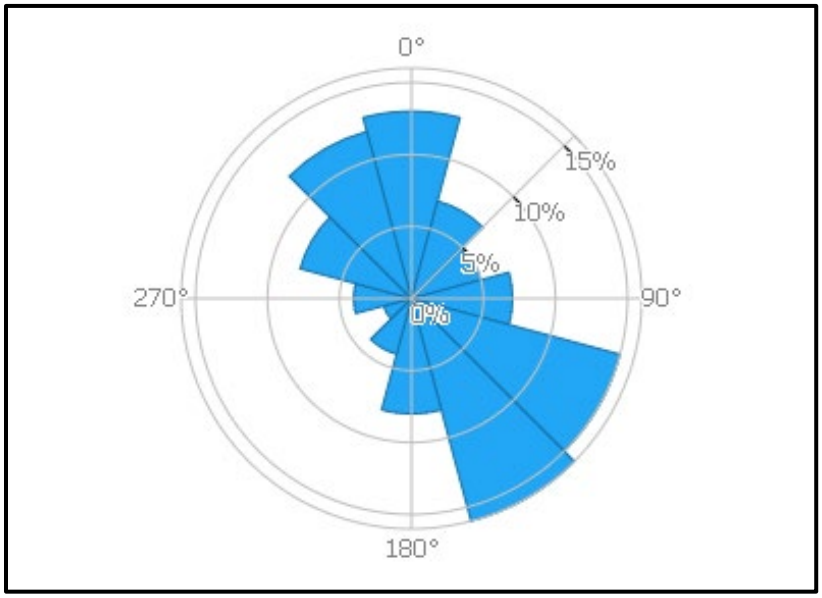

Figure B.4. Wind frequency rose for approximate PFA service area (source: Global Wind Atlas 2024).

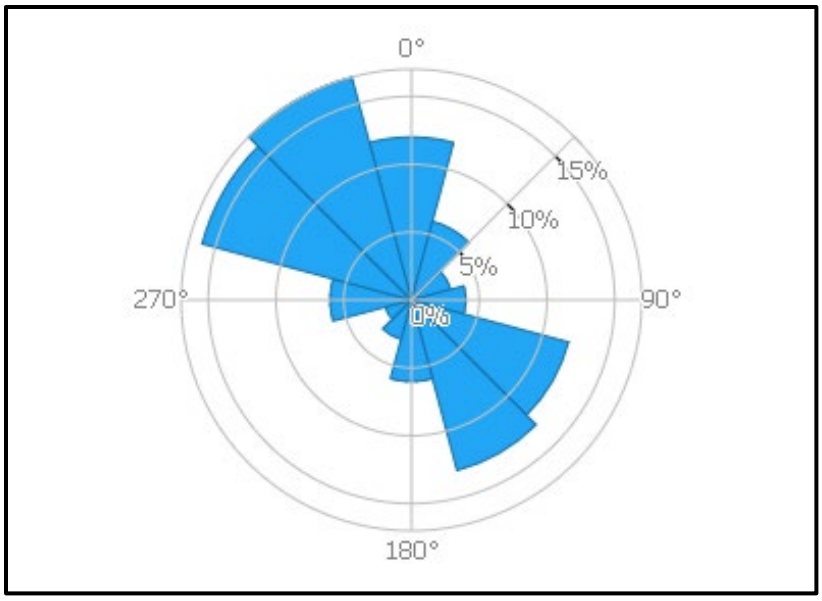

Figure B.5. Wind speed rose for approximate PFA service area (source: Global Wind Atlas 2024).

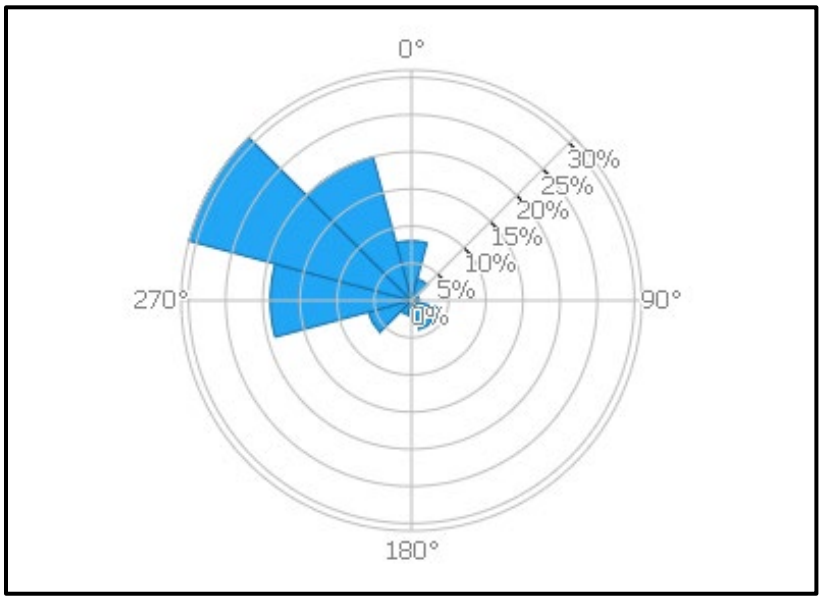

Figure B.6. Wind power rose for approximate PFA service area (source: Global Wind Atlas 2024).

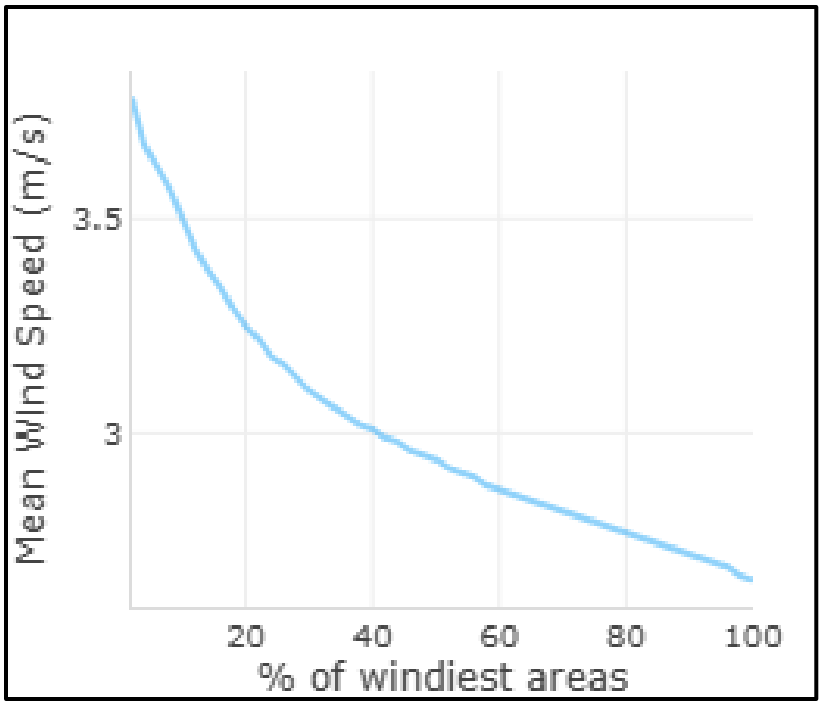

Figure B.7. Graph of the mean wind speed within the windiest areas in the approximate PFA service area (source: Global Wind Atlas 2024).

The data indicate that the PFA service area is primarily influenced by winds from the northwest and southeast, which are the most frequent and carry the highest wind speeds, increasing the risk of rapid fire spread in these directions. Additionally, the wind power is most significant from the northwest, suggesting higher potential for fire intensity and ember transport, making these areas particularly vulnerable to spot fires and challenging suppression conditions.

DROUGHT AND CLIMATE

Frequent drought, tree mortality, and climate change have all worked together to increase wildfire likelihood and community vulnerability to wildfire (CSFS 2020). These factors have interacted to increase the risk of uncharacteristically large high-severity fires (CSFS 2020). In the past few years, fires have grown to record sizes in Colorado and are burning longer, hotter, and more intensely than they have in the past (CSFS 2021). In Colorado, wildfires burned 665,454 acres of land in 2020, making it the largest and most destructive season recorded in Colorado's history (DFPC n.d.). The shifting climate, particularly rising temperatures, changing wind patterns, and increasing temporal and spatial variability of water availability, are considerably escalating wildfire risk across the state (CSFS 2020).

This impacts of highly variable winds and rising temperatures throughout the state are exemplified by the devastating Cameron Peak Fire in October 2020, which grew to be the largest wildfire in Colorado history with 10 Incident Management Teams over the course of months, burning 208,913 acres (USFS 2021). The Cameron Peak Fire ignited near Cameron Peak, approximately 40 miles from Fort Collins continuing toward Big Thompson Canyon and Estes Park (USFS 2021). The fire's magnitude was a result of persistent dry conditions and high winds causing major blowups (Colorado Encyclopedia 2021). Destroying and damaging over 700 homes and commercial structures, the fire forced thousands of evacuations (Colorado Encyclopedia 2021).

Furthermore, Colorado is expecting more extreme and prolonged drought conditions in the coming decades. Warm drought periods in Colorado have already significantly increased the risk of wildfire across the state (CSFS 2020). According to data from the NIFC, the 10 years with the highest burned acreage have all occurred since 2004, aligning with the warmest years recorded nationwide (NIFC 2022). Changing health of Colorado forests combined with increased development in the WUI and impacts from climate change suggest that large destructive fires will become more likely throughout Colorado. It is important to note that fire is a natural part of Colorado's diverse landscapes and is essential to many ecosystems across the state. Almost all of Colorado's diverse ecosystems are fire-dependent or fire-adapted; when not directly or indirectly intensified by human actions, wildfire works to balance ecosystems, and restore their natural functions (CSFS 2020).

DRY GRASSLANDS

Grasslands present unique challenges for wildfire mitigation due to the flammability of grass fuels and susceptibility to fire spread over large areas (Wragg et al. 2001). Historical fire patterns in the grasslands and prairies of central North America are characterized by frequent fires occurring every 1 to 35 years (Zouhar 2021). With climate change causing greater variability in precipitation and increasingly severe and frequent drought events, it is likely that grasslands across the United States will experience disruptions to their natural cycles, such as aquifer depletion due to soil erosion and increased wildfire occurrences (Bagne et al. 2012). Grassland fires are also more likely to take place when the dominant grass species have entered their dormant periods (mechanism used by grasses to protect from harsh or unfavorable conditions) in the late summer and fall/winter months, after which they will have lost moisture and accumulated a fuel load composed of dry biomass (Zouhar 2021).

When factors such as extreme weather and dry fuel accumulation coincide, they formulate conditions that are conducive to wildfire spread that can be extremely destructive to populations that interface with grassland communities. The recent Cameron Peak Fire is described to have been a "perfect storm", as the incident was preceded by historically high winds, low humidity, and dry conditions which helped accelerate the wildfire's spread (National Weather Service 2021).

To reduce flammability and the potential for rapid wildfire spread across grass-dominated landscapes, land managers and landowners can employ various fuel mitigation practices. Prescribed grazing in shrub-grasslands during winter months has been shown to reduce fuel loads and increase fuel moisture when applied over extended periods (5 years) (Davies 2016). Other fuel reduction strategies such as fuel breaks and mowing can also be effective for reducing fire spread by reducing or even completely eliminating the burnable fuels within an area. For fuel breaks to effectively reduce the spread of wind-propelled flames, it is recommended that fuel breaks span 100 to 300 feet on each side of a roadway, with vegetation trimmed down to 4 inches in height (Moriarty et al. 2015; personal communication Janae Coston-Malpas, CSFS Wildfire Resilience Coordinator, 2024).

TREE MORTALITY

Primarily linked to prolonged drought and bark beetle attacks, tree mortality in Colorado is largely exacerbated by climate change and subsequent shifts in beetle attack patterns (USFS 2022a). Although bark beetle attacks were once normal in northern Colorado's forests, climate change has amplified their impact and expanded their reach (Anderson 2003; Mitton and Ferrenberg 2012). Trees killed by insects pose varying levels of fire risk, with increased potential for intense wildfires (Kulakowski and Veblen 2007; USFS 2019b). It is estimated that 70% to 90% of trees in the Cameron Peak burn area were already dead

due to beetle kill (National Weather Service 2021). To mitigate this threat, fuel reduction treatments like thinning and prescribed fires within the WUI can decrease both catastrophic wildfire risk and the severity of future beetle outbreaks (Goodwin et al. 2020). The USFS monitors tree mortality and beetle infestations yearly across millions of acres in Colorado. A documented surge in beetle infestations has been observed in 2021, contributing to Colorado's record-breaking wildfires (USFS 2022a). Areas of the PFA service area within the WUI face susceptibility to tree infestations, which heighten ignition chances, endanger lives and property (see Hazardous Trees below), and result in fuels accumulation.

Hazardous Trees

Hazardous trees are often responsible for wildland fire ignitions as well as damage to property and injury to people in urban, suburban, and exurban settings. It is important to be able to identify and report hazardous trees within the WUI or adjacent to critical infrastructure in exurban areas, such as power lines. During high wind events, hazardous trees often fall on power lines, potentially causing wildfire ignitions during which windy conditions may exacerbate the intensity and rates of spread. It is advised that property owners and land management groups understand how to identify hazardous trees and the best course of action for removing them. Property owners that have identified hazardous trees on their land are encouraged to consult licensed tree care professionals. The removal of hazardous trees is highly dangerous and should not be attempted without proper experience, knowledge, and equipment.

Tree height should be used to assess the potential impact zone. Trees are known to fall unpredictably and may slide, roll, and cause other trees to fall in thicker stands. The potential impact zone should be surveyed for values at risk such as power lines, vehicles, sleeping areas, structures, and high traffic zones. Additionally, it is best to look at trees from two to three different perspectives, close, at a distance and all around. Be on the lookout for characteristics such as dead tops, split trunks, and fungal fruiting bodies. Accurately determining tree defects requires advanced knowledge and skill. If a tree is suspected of having defects, it is advised to consult a licensed arborist or similar tree care professional.

A link to the National Wildfire Coordinating Group (NWCG) Hazard Tree Identification guide can be found here: https://www.nwcg.gov/6mfs/felling-safety/hazard-tree-identification.

Additional information on forest health considerations are summarized in Chapter 2.

ECOSYSTEM SERVICES

Ecosystem services are the benefits to humans provided by natural resources. The PFA service area's diverse agricultural/rangeland, montane forest, and aquatic environments provide many ecosystem services. Residents and visitors enjoy the beauty of the natural landscape and many recreational opportunities that generate revenue for businesses within the PFA service area. The forested ecosystems play important roles in sequestering carbon, providing clean air, and recreation opportunities. Extensive and uncharacteristic wildfires directly jeopardize these important ecosystem services and have the potential to impact economic prosperity.

In addition to direct damage (e.g., structure and property damage) caused by high-severity wildfires, there are indirect impacts to the environment and ecosystem services as well. High-severity wildfires are known to deteriorate local and regional air quality, pollute waterways, displace native animal and plant species, and increase carbon dioxide emissions. The increased carbon dioxide emissions are of special concern as carbon dioxide is a greenhouse gas and plays a major role in climate change. It is important to note that low-severity fire is a component of healthy rangelands and lower montane shrublands (see the Fire Ecology subsection in Chapter 2).

Residents in more urban areas should adhere to local building regulations and fire code guidelines to prevent high-severity fire impacts in residential areas, which can spread and cause damage to ecosystems in addition to life and property. Those living in rural areas should adopt management practices that both reduce wildfire risks and maintain native ecology.

FIRE RESPONSE CAPABILITIES

Fire management in Colorado relies on a cooperative, interagency partnership among federal, state, and local entities. Wildland fire response for large fires is typically supported and coordinated by regional interagency dispatch centers in Colorado. These dispatch centers are part of the larger Rocky Mountain Area Coordination Center. The Fort Collins Interagency Dispatch Center (FTC) is one of nine Interagency Dispatch Centers in the Rocky Mountain Area. The FTC serves to manage wildland fires and mobilize wildland firefighting resources in the northern Front Range and northeastern Colorado (GACC 2024).

In the event of an emergency, always call 911. The 911 dispatcher will send the appropriate response resource to the incident. 911 calls reporting suspicious smoke or clouds are highly valued as they can help locate wildfire ignitions.

When a fire occurs within the PFA service area, the responsibility of incident commander falls upon the PFA Fire Chief, who may assume command of the fire or assign a qualified incident commander to lead wildfire operations. However, if an incident exceeds the capacity of a district or occurs in an unincorporated area outside of a district, incident command defaults to the associated County Sheriff, who will identify a local incident commander whose qualifications are adequate for managing the wildfire complexity type. The Sheriff's Office will often assume evacuation management roles during wildfire incidents. Authority of fire chiefs and the Sheriff is derived from the Colorado Revised Statues (Colorado General Assembly 2022b). If an incident occurs on land managed by the USFS, BLM, or NPS, the respective managing agency is responsible for response and establishment of an incident commander who bears the power of declaring evacuations.

PFA staffs 13 fire stations, one training center, and an administrative headquarters that spread across its 230-square-mile service area (PFA 2024). Displayed in Figure B.8 are the locations of each fire station within the district, including estimated service response times throughout the PFA service area (calculated via ESRI ArcGIS tool). In addition to structure fire and emergency medical service response, PFA also supports a wildland fire division that often cooperates with other agencies to provide their services. Figure B.9 below depicts the fire suppression difficulty level across the district, which is calculated using various factors (e.g., flame length, topography, fire line production rates, and proximity to trails and roads). Fire suppression difficulty can be used to identify potential challenges of firefighting resource deployment and should not be utilized for evaluating burn probability structural fire risk.

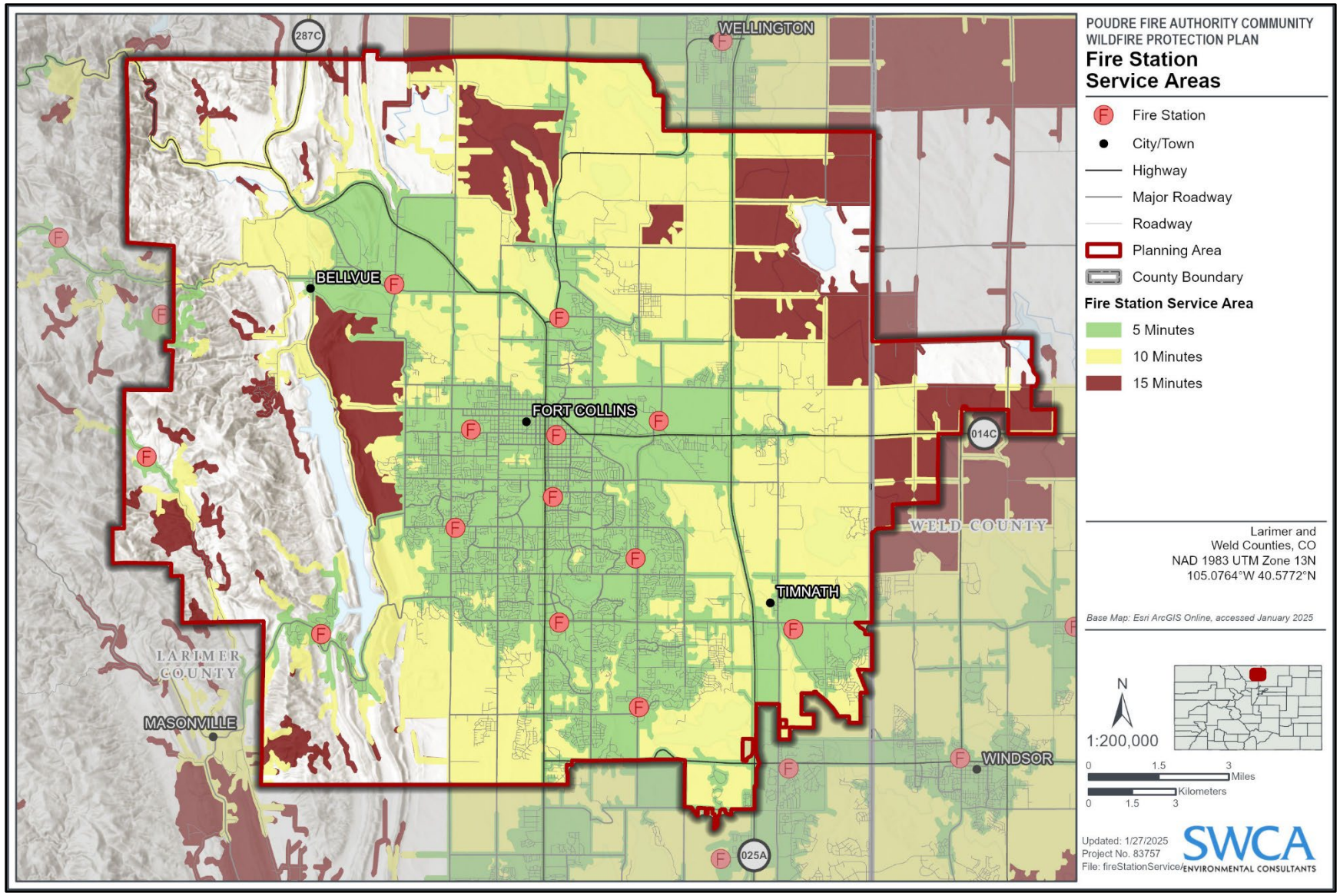

Figure B.8. Fire station locations and service areas.

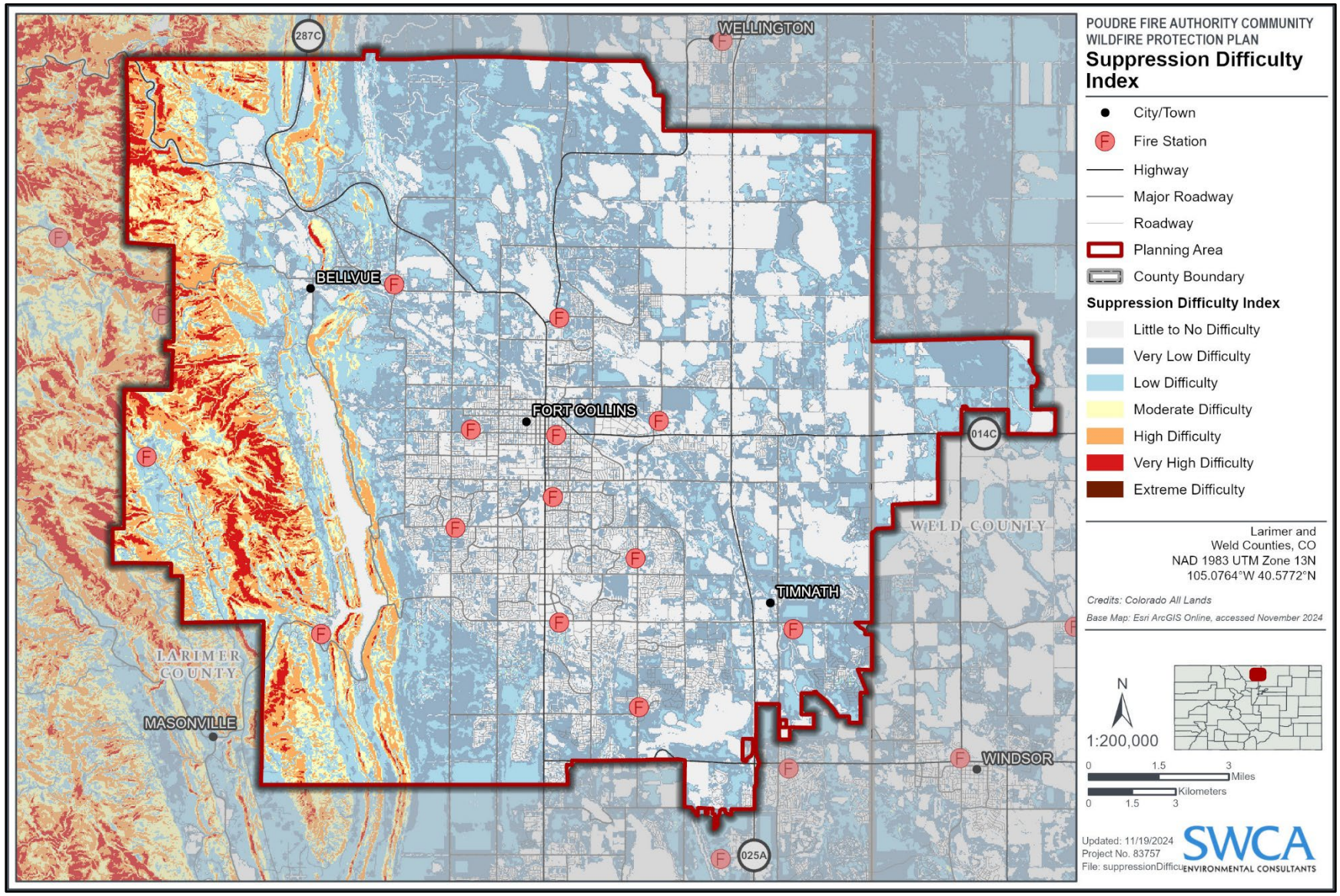

Figure B.9. Suppression difficulty index throughout the PFA service area.

STATE RESPONSE

Colorado Division of Fire Prevention and Control

The Colorado Division of Fire Prevention and Control (DFPC) is the lead state agency for fire. DFPC's Wildland Fire Management Section (WFMS) is responsible for wildland fire management on local and state lands and aids in the coordination of wildfire management across local, state, and federal agencies. DFPC states that its priority wildland fire mission is "to assist and support local agencies and counties with a range of wildfire management programs including administrative, technical, preparedness and planning, funding, response, and prescribed fire functions" (DFPC 2022b).

On non-federal lands, wildfire management follows a hierarchy of local jurisdiction, to county sheriff, and, finally, to the State of Colorado. The chief of a local fire protection district is responsible for fires that occur within the boundaries of their district. If a fire is outside of the chief's ability to manage, it is the duty of the county sheriff to assume the responsibility for coordinating fire suppression efforts and requesting assistance from the DFPC. The county sheriff is also responsible for coordinating fire suppression efforts in unincorporated areas of the county. In the event that the county sheriff and DFPC have determined that the County's capacity has been exceeded, the DFPC director will approve state assistance based on the assessment of capacity and availability of funds. If state assistance is approved, the fire becomes a state responsibility area and DFPC assumes cost and management responsibility, along with ongoing involvement from local and County partners (DFPC 2022b).

On non-federal lands, wildfire management follows a hierarchy from local jurisdiction to County Sheriff, and finally, to the State of Colorado. The chief of the PFA is responsible for fires that occur within the boundaries of their district. If a fire is outside of the chief's ability to manage, then it is the duty of the Larimer and Weld County Sheriffs to assume the responsibility of coordinating fire suppression efforts and requesting assistance from the DFPC.

In Colorado, the state can either aid with fighting fires or be responsible for fighting fires.

State assistance for fires includes the following management strategies and resources (DFPC 2022b):

- Seeks to encourage rapid initial attack actions where fire is unwanted to reduce the size, duration, costs, and impacts of wildfires.
- Can provide personnel, enabling local agencies to respond to their next incident and volunteer firefighters to return to their regular jobs.
- Provides funding and resources for local and County responsibility fires. The fire does not have to exceed the capacity of the fire department or the county for a county to receive funding.
    - This can include funding and reimbursement for aviation and hand crew resources during the initial attack phase of fires on non-federal lands. Ordered resources are based on the closest forces concept, whether they are state or federal agency resources, to reduce response times.
- Resource support can include DFPC engines, module, and overhead resources, as well as technical assistance from DFPC fire management staff.

State responsibility for wildfire covers the following conditions and scenarios (DFPC 2022b):

- The state is responsible if the county requests assistance from DFPC.

- DFPC and Sheriff have conducted an assessment and have determined that the county capacity has been exceeded.
- DFPC Director approves the State's responsibility based on assessment of capacity and availability of funds.
- If approved for state responsibility, DFPC assumes cost and management responsibility, along with ongoing involvement from local and county partners.

WATER AVAILABILITY AND SUPPLY

The primary water source for fire suppression operations in the PFA service area is municipal hydrants. Fire suppression operations in areas beyond hydrant service zones rely on emergency water supplies in cisterns and water shuttling via tenders and engines. Water resources for fire suppression throughout the service area and surrounding region are displayed in Figure B.10.

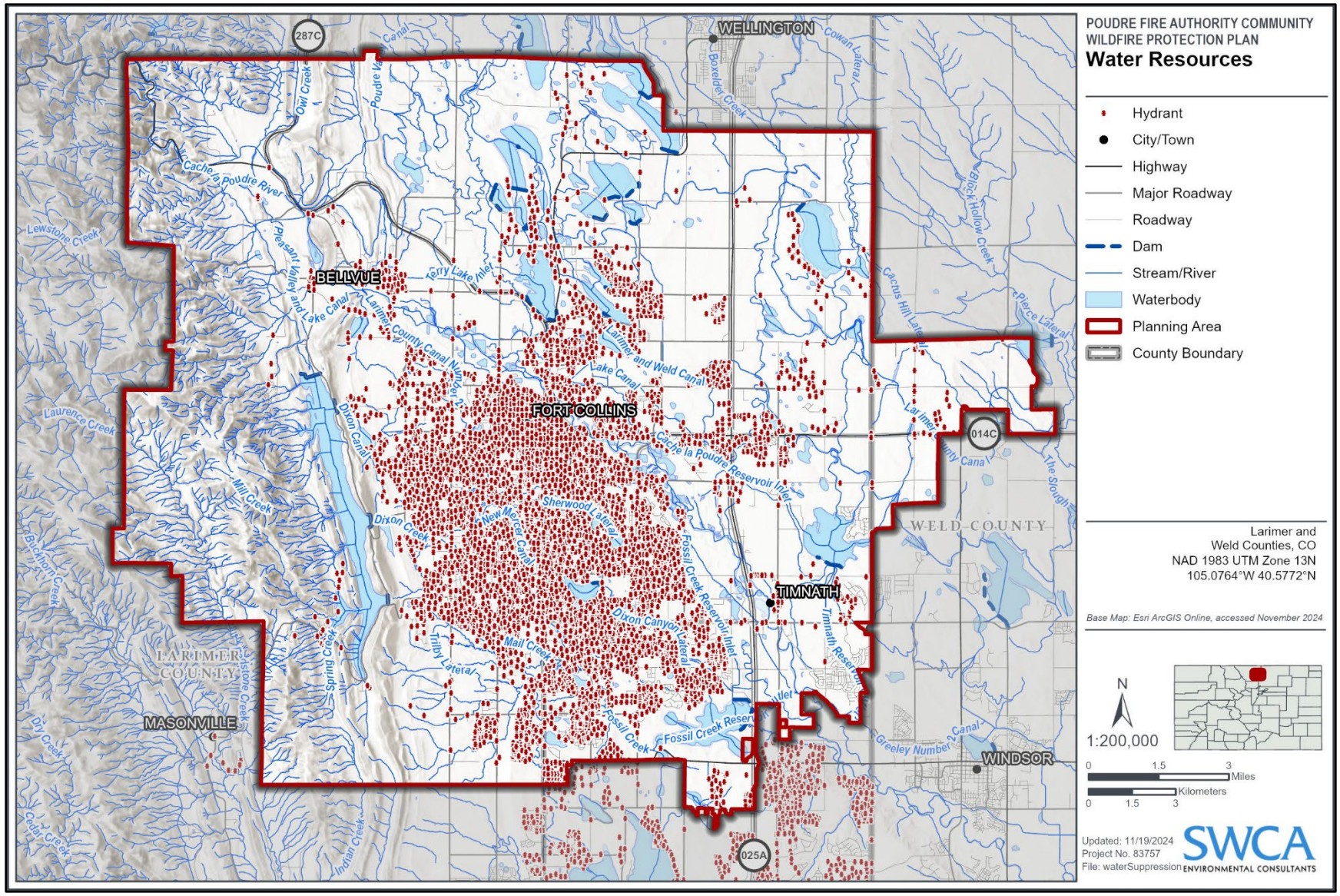

Figure B.10. Water resources throughout PFA.

MUTUAL AID

The wildland fire community is well known for its development of mutual aid agreements at the federal, state, and local levels. Such automatic aid agreements allow for the closest forces to respond to an incident as quickly as possible regardless of jurisdiction. Figure B.9 depicts the fire stations within the district boundary along with service area response times.

Such agreements may also describe how reimbursement will be conducted; state resources responding to wildfires on federal land may have their associated costs reimbursed by the responsible federal agency, and the reverse is true for federal resources suppressing a wildfire on state land.

The PFA collaborates with various agencies such as the DFPC, Fort Collins Police Services, Larimer County Emergency Services, Larimer County Search and Rescue, UCHealth, and the USFS, while also maintaining auto and mutual aid agreements with neighboring fire departments.

EVACUATION RESOURCES

Evacuation relies on both cooperative planning and the capability of residents to effectively comprehend and execute planned evacuation procedures. Larimer County and Weld County's Offices of Emergency Management have developed Hazard Mitigation Plans that highlight the need for evacuation planning for disaster events that pose a threat to human life, including wildfire.

Moreover, both Larimer and Weld counties offer Emergency Preparedness Guides, which serve as comprehensive educational tools for residents in each county, aiding them in developing personalized evacuation plans for wildfire and other emergency situations.

Hazard mitigation plans for Larimer and Weld Counties:

- Larimer County 2021 Multi-Jurisdictional Hazard Mitigation Plan
- Weld County 2021 Multi-Jurisdictional Hazard Mitigation Plan

Emergency Preparedness Guides for Larimer and Weld Counties:

- Larimer County Emergency Preparedness Guide
- Weld County Emergency Preparedness Guide

Please note that the public should follow the latest guidance from trusted sources, such as official government agencies, with regard to evacuation orders, especially as emergency response plans change rapidly. Current evacuation orders should always be adhered to and supersede all information presented in the CWPP.

Road Systems

The PFA service area predominantly consists of densely populated urban landscapes, expansive agricultural fields, and rangelands, with a western section characterized by unsurfaced roads, which are often narrow, long, and windy, presenting challenges such as blind corners and potential vegetative obstructions (see Figure B.11). These access roads are particularly hazardous and can pose ingress/egress challenges during emergency evacuation, especially where they are lined by thick, dense vegetation. Fuel treatments may be needed along some roads where vegetation is overhanging and

could prevent safe evacuation of residents or safe access by emergency responders (see Chapter 3 or Appendix C for more information regarding roads hazard analysis).

Figure B.11. Example of a narrow access road within the PFA service area.

People

The safe and efficient evacuation of people from wildfire requires emergency notification systems, preplanning of evacuation routes, and effective public education and outreach on emergency preparedness. The following sections detail these elements within the PFA service area.

Emergency notification methods:

The jurisdictions within the PFA service area use multiple notification systems to alert residents of emergencies.

The Larimer Emergency Telephone Authority (LETA 9-1-1) oversees 9-1-1 services within Larimer County, providing crucial emergency alerts and a Text to 9-1-1 program, known as NOCO Alerts. Used by all public safety agencies in Larimer County, NOCO Alerts delivers timely notifications to residents on various critical situations, including missing persons, natural disasters like floods and wildfires, and police activities necessitating evacuation or shelter, as well as severe weather events such as tornadoes, large

hail, and thunderstorms. By signing up for NOCO Alerts, individuals can receive notifications tailored to their preferred devices and locations, ensuring they stay informed and safe.

Weld County employs the CodeRed Emergency Communications System, enabling public safety agencies to swiftly disseminate pre-recorded information to targeted areas within the county during emergencies such as police activity, Amber Alerts, wildfires, and other critical incidents, urging residents to take necessary precautions to protect life and property.

See the following resources to sign up for emergency alerts for Larimer and Weld Counties.

- Larimer County Emergency Notification System
- Weld County Emergency Notification System

In addition to the alert systems used by the counties within the PFA service area, word of mouth also plays a role in emergency notification, especially in more rural areas where residents may not be subscribers to opt-in alerting systems. When safe to do so, residents should call or text friends, neighbors, and contacts to ensure that they are aware of active alerts.

It is important to note that temporary residents or tourists may not be signed up for emergency alert notifications. It is recommended the PFA work with short-term rental owners and hotels to ensure the applicable emergency notification sign up resources are provided to all who rent a property or have a short-term stay within the county.

Preplanning by the public about how to evacuate and where to go:

Locked gates, poor or missing signage, and conflicts with emergency vehicles driving into communities versus the public trying to leave can complicate evacuation. Uncertainty about where to find temporary refuge can also cause families to become separated and delay reunions, and some individuals without transportation or with limited mobility may be accidentally left behind. Always make sure to have an evacuation plan, grab list items, and go bag(s) ready; know your evacuation routes and rallying points; and ensure you are signed up to receive emergency notifications. Be sure to bring important belongings such as irreplaceable items, prescriptions, documentation, or other life-dependent items.

Help your local community members only if it is safe to do so. It is also important to note that if a wildfire is in your area, you do NOT need to wait for government evacuation orders to evacuate. If you see, smell, hear, or otherwise sense that you are in danger, take action to keep yourself safe. Please see Appendix E, Homeowner Resources, for links to resources mentioned above.

Public awareness:

Safe and effective evacuation will only occur if residents are aware of planning efforts and notification methods. Therefore, public education and outreach on these topics should be part of all efforts conducted by agencies such as fire departments in a wide variety of venues.

Community Emergency Response Team

Developed by FEMA, the Community Emergency Response Team (CERT) training is a program that educates community members about disaster preparedness for hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical.

Supplemental training modules are available to better assist professional responders in a variety of emergency situations. Advance training includes such topics as animal response, emergency communications, traffic and crowd management, and flood response. The City of Fort Collins offers CERT courses limited to residents of Fort Collins. For more information, please visit: https://www.fcgov.com/eps/cert.

For more information, visit FEMA's CERT webpage: https://www.fema.gov/emergency-managers/individuals-communities/preparedness-activities-webinars/community-emergency-response-team

Animals and Livestock

In the event of a wildfire, it is important that residents and fire responders within PFA service area have a plan for evacuation of pets and livestock. Evacuation planning often neglects to describe how animals will be evacuated and where they will be taken. The loading of horses, for example, during a fire and smoke situation, and transport of stock vehicles down narrow roads under stressful situations, can be very difficult.

The Colorado State University has additional resources for livestock and animals, you can view those resources here: https://extension.colostate.edu/disaster-web-sites/fire-resources/fire-livestock-resources/

HorseAlert is a free community-based equine emergency evacuation system provided by Colorado Horse Rescue. This system connects owners who need to evacuate their horses with registered volunteers and drivers. More information can be found at https://horsealert.org/.

However, additional public education could emphasize the need for individuals to have a plan for the evacuation of pets and horses in addition to their family, ensuring a lack of planning doesn't slow or prevent evacuation.

PUBLIC EDUCATION AND OUTREACH PROGRAMS

Public education and outreach programs are a common factor in virtually every agency and organization involved with wildfire response. The Poudre Fire Authority's mission is to "serve our community by saving lives and protecting property through collaboration, innovation, and commitment to excellence" (Poudre Fire Authority 2023). Education plays a pivotal role in the Poudre Fire Authority's approach to facilitating greater community safety and resilience to disasters and other emergencies.

LOCAL AND STATE PROGRAMS

Poudre Fire Authority

The PFA is dedicated to protecting life and property by providing proactive fire and emergency services. Their goal is to enhance community safety through comprehensive public education and outreach programs focused on wildfire preparedness and safety. Key initiatives include the "Preparing Your Home for Wildfires" program, which provides residents with actionable steps to mitigate wildfire risks around their properties. Additionally, the PFA conducts home ignition zone assessments to help homeowners identify and reduce potential fire hazards. They also offer community courses and the WUI Course to educate the public on wildfire behavior and safety measures. These programs aim to build a resilient community well-prepared to handle and recover from wildfire incidents.

For more information, please visit: https://www.poudre-fire.org/home.

Weld County Office of Emergency Management

The Weld County Office of Emergency Management (OEM) is responsible for disaster planning and coordinating response activities in the event of an emergency. Their mission is to provide the county's residents with support and information about prevention, mitigation, response, and recovery. Located on the webpage are numerous educational resources, training opportunities, and announcements, allowing the public to stay up to date with the county's emergency management goals.

For more information, please visit: https://www.weld.gov/Government/Departments/Office-of-Emergency-Management

Larimer County Office of Emergency Management

The Larimer County OEM aims to enhance community safety, preparedness, and resilience against emergencies and disasters. Their mission is to coordinate and implement comprehensive strategies encompassing planning, response, mitigation, and recovery. In emergency response, they offer guidance through the Sheriff's Office Emergency Services, wildfire evacuation authority, and shelter-in-place information. Their mitigation efforts include the 2021 Hazard Mitigation Plan, community grants, and wildfire mitigation education. Additionally, they support resilience and recovery through the Larimer Connects Program, infrastructure projects, and resources for significant events like the 2020 Cameron Peak Fire.

For more information, please visit: https://www.larimer.gov/emergency#.

Colorado Division of Homeland Security and Emergency Management

The CDHSEM offers numerous services, including those geared towards prevention, protection, mitigation, response, and recovery. They also help facilitate pre- and post-disaster funding to local governments. Their emergency management website can be accessed here: https://dhsem.colorado.gov/emergency-management-office.

Colorado Division of Fire Prevention and Control

The DFPC offers various resources for topics such as building safety, fire prevention, community risk reduction, firework safety, vehicle safety, and the fire safety evaluation system (FSES). The DFPC has its own wildland fire management communications and outreach specialist. Contact information is available here: https://dfpc.colorado.gov/home/public-information.

In addition, the DFPC hosts several campaigns throughout the year including building safety month, fire prevention week, community risk reduction week, and more. You can find more information on the DFPC campaigns and public education webpage located here: https://dfpc.colorado.gov/FLScampaigns?web=1&wdLOR=c61B38F2B-6998-4994-BC02-E114F1CDA5E3

NATIONAL PROGRAMS

Ready, Set, Go!

The Ready, Set, Go! program, managed by the International Association of Fire Chiefs, was launched in 2011 at the WUI conference. The program seeks to develop and improve the dialogue between fire departments and residents, educating residents who live in high-risk wildfire areas on how to best prepare themselves and their properties for wildfire.

The tenets of Ready, Set, Go! as included on their website (http://www.wildlandfirersg.org) are:

Ready – Take personal responsibility and prepare long before the threat of a wildland fire so your home is ready in case of a fire. Create defensible space by clearing brush away from your home. Use fire-resistant landscaping and harden your home with fire-safe construction measures. Assemble emergency supplies and belongings in a safe place. Plan escape routes and ensure all those residing within the home know the plan of action.

Set – Pack your emergency items. Stay aware of the latest news and information on the fire from local media, your local fire department, and public safety.

Go – Follow your personal wildland fire action plan. Doing so will not only support your safety but will allow firefighters to best maneuver resources to combat the fire.

National Fire Protection Association (NFPA)

The NFPA is a global non-profit organization devoted to eliminating death, injury, and economic loss due to fire. Its 300 codes and standards are designed to minimize the risk and effects of fire by establishing criteria for building, processing, design, service, and installation around the world (NFPA 2013).

The NFPA develops easy-to-use educational programs, tools, and resources for all ages and audiences, including Fire Prevention Week, an annual campaign that addresses a specific fire safety theme. The NFPA's Firewise Communities program (www.firewise.org) encourages local solutions for wildfire safety by involving homeowners, community leaders, planners, developers, firefighters, and others in the effort to protect people and property from wildfire risks.

The NFPA is a premier resource for fire data analysis, research, and analysis. The Fire Analysis and Research division conducts investigations of fire incidents and produces a wide range of annual reports and special studies pertaining to fire hazards.

National Interagency Fire Center

The NIFC provides a wide array of fire resources and services and can provide communication assistance to over 32,000 firefighters and 50 major events at any given time (NIFC 2022). The program also offers wildfire forecasts and predictions using fuel and weather data collected from their remote automated weather base with over 2,000 weather stations. Additionally, the NIFC has a training branch where national curriculums are developed, including FireWorks, an educational program designed for kids K-12. The program teaches children about wildland fire science, ecosystem fluctuations, human interaction on the environment, and other environmental science topics.

NIFC public education resources can be found here: https://disastersafety.org/wildfire/wildfire-ready/

U.S. Fire Administration's WUI Toolkit

The U.S. Fire Administration (USFA) is an entity of the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) that aids in the preparation for and response to fire. Their WUI toolkit consists of websites and other information regarding risk assessments, public outreach, and community training. Find the toolkit here: https://www.usfa.fema.gov/wui/.

Wildfire Research Center (WiRē)

Wildfire Research Center (WiRē) is a non-profit organization that works with local wildfire services to highlight community-tailored pathways to reduce risk to wildfire while simultaneously promoting pathways to fire adaptation. WiRē's mission states that fire adaptation is "about living with fire", while "creating safe and resilient communities that reduce wildfire risk on their properties before a fire, and supporting effective response when fires threaten a community." WiRē states that wildfire is an integral component of many ecosystems, and that safe fire must be allowed to ensure healthy forests.

To achieve its goals and serve communities, WiRē typically assesses factors contributing to wildfire risks; factors include building materials, vegetation near homes, background fuels, local topography, and access to emergency fire services. Additionally, they conduct social surveys to gauge residents' perceptions about wildfire, wildfire risk, risk mitigation behavior, and assess their willingness to take action in reducing wildfire risks.

For more information, please visit https://wildfireresearchcenter.org/.

Community Navigators

Coalitions & Collaboratives, Inc. (COCO) partners with the USFS and various nonprofits to deliver Community Navigator (CN) services. These services support historically underserved communities. CN connects communities to appropriate resources for building climate resilience such as access funding and partnership support. The program aims to create mutually beneficial relationships between local communities, the USFS, and other federal agencies that contribute to community and ecosystem resilience. Through their website, community leaders can request a navigator; resources are available in Spanish and English and accessibility accommodations are available.

For more information, please visit https://co-co.org/community-navigator/.

APPENDIX C:

Fire Behavior Modeling/

GIS Background and Methodology

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FIRE BEHAVIOR MODELING AND METHODOLOGY

COLORADO ALL LANDS QUANTITATIVE RISK ASSESSMENT

Fire behavior models were sourced from the COAL Quantitative Wildfire Risk Assessment developed by Pyrologix LLC in partnership with several federal and state land management agencies across Colorado. Efforts to create the quantitative wildfire risk assessment began in 2019 and concluded in 2021 (Pyrologix 2022a). The assessment uses a collaboratively calibrated fuelscape, state-of-the-art modeling methodologies, and a set of collaboratively defined HVRAs standardized across Colorado. This risk assessment improves upon previous risk assessment efforts by adjusting the burnable calibrations for various fuel types like urban and agricultural fuels in addition to removing data seam lines.
The assessment incorporates both stochastic and deterministic models to accurately model wildfire behavior and predict burn probabilities and risks to integrated hazards. Deterministic models use known inputs to calculate a repeatable answer for a single weather scenario, whereas stochastic models use statistically derived inputs for the local area to run thousands of simulations, also known as a Monte Carlo simulation, to calculate the probability of different scenarios occurring. Additionally, the quantitative risk assessment makes use of conditional outputs and probabilistic outputs to inform users of objective hazards (conditional) and calculated risk (probabilistic). More on these statistical theories as well as modeling methodology is explained below.

Conditional vs. Probabilistic Modeling Outputs

The COAL Quantitative Wildfire Risk Assessment makes use of conditional model outputs multiplied by probabilistic model outputs to produce spatial risk metrics for the operational, fire effects and integrated hazard products listed below. Conditional outputs show results for the entire landscape as if everything had the same chance of burning and show modeled wildfire behavior on existing fuels based on given weather conditions. The probabilistic outputs are a product of conditional metrics multiplied by burn probability, which is predicted by simulating thousands of fires based on historic weather and wind conditions for the area. This is done for each grid square (30 m^2) on the landscape to create a gradient (raster) of probability for metrics such as burning, operational control, and risk to structures. Conditional outputs are typically best utilized by land managers, developers, and fuel treatment planners who want to see what the fire behavior would be like, regardless of probability. Alternatively, probabilistic outputs give a more comprehensive representation of wildfire risk on the landscape and are best for prioritization and community planning efforts, as they incorporate the odds of any future fire impacts.

FIRE BEHAVIOR MODELS

The following fire behavior models were used in the COAL Quantitative Wildfire Risk Assessment. These models have been continuously updated with improved algorithms, hardware, and real-world data. Each model has been used extensively in predicting wildfire risk across the United States.

LANDFIRE

LANDFIRE is a national remote sensing project that provides land managers with a data source for all inputs needed for fire behavior models (fuels, topography and canopy characteristics). The database is

managed by the USFS and the DOI and is widely used throughout the United States for land management planning. More information can be obtained from http://www.landfire.gov.

The COAL Quantitative Wildfire Risk Assessment used many of the fuel models housed within LANDFIRE but made significant adjustments to create a better match for Colorado's fire environment (Pyrologix 2022b). Specifically, Pyrologix has recalibrated previously non-burnable fuels to account for burnable agricultural and urban lands such as parks. Additionally, the updated fuelscape removes raster tile seamlines in raster datasets that have occurred throughout the district in base LANDFIRE remaps. To produce locally accurate fire behavior results, a 2-day fuel calibration workshop was held in Lakewood, Colorado, with a group of interagency fire and fuels experts from across Colorado (Pyrologix 2022b).

FSim

FSim (Large Fire Simulator) is a wildfire simulation program developed by the USFS fire sciences laboratory in Missoula, Montana. The program uses a stochastic Monte Carlo method to simulate hundreds of thousands of fire events across large land areas using a variety of input parameters such as fire occurrence, terrain, weather, and fuel conditions (USFS 2023). This analysis method allows for the quantification of wildfire risk as it relates to fire impact probabilities and sizes. Pyrologix has used FSim for the COAL Quantitative Wildfire Risk Assessment to calculate outputs associated with wildfire likelihood and burn probability for the integrated hazard products (Pyrologix 2022b).

WildEST

Pyrologix recognized the challenges of estimating wildfire intensity with a stochastic simulator such as FSim. Stochastic models rely on a robust sample size, so, in low fire occurrence areas stochastic simulators will be less reliable due to the small sample size. Therefore, Pyrologix developed a custom utility called WildEST (Wildfire Exposure Simulation Tool). WildEST is a deterministic model that calculates intensity values from weighing spatially continuous weather input variables based on how likely they will occur on the landscape (Pyrologix 2022b).

Deterministic values are more robust than FSim's stochastic values, especially in areas with relatively low wildfire occurrences such as those in the eastern part of the PFA service area. Pyrologix has used WildEST to calculate wildfire intensity outputs (flame front characteristics) such as flame lengths and rate of spread for the COAL Quantitative Wildfire Risk Assessment (Pyrologix 2022b). The deterministic fire behavior outputs were derived from WildEST simulations using 216 weather scenarios.

FIRE BEHAVIOR MODEL INPUTS

Fuelscape

The assessment utilizes LANDFIRE's 2016 fuel model remap for producing a current conditions fuelscape for the COAL statewide assessment. Significant updates to the fuelscape were conducted after the release of LANDFIRE's 2019 remap. Additionally, Pyrologix made use of 2021 satellite imagery to calculate continuous vegetation cover and height classifications to more accurately predict wildfire behavior. Furthermore, the 2020 fire season had a significant impact on fuels and, in order to represent current conditions, Pyrologix updated the fuelscape to incorporate changes in fuels resulting from the 2020 fire season (Pyrologix 2022a). Current conditions are constantly changing, and it is imperative to constantly update the source fuel model data for maintaining reliable fire behavior and wildfire risk results.

An in-depth overview of Pyrologix's fuelscape inputs are available here: http://pyrologix.com/reports/COAL_FuelscapeReport.pdf

The following is a list of fuel characteristic inputs used in the creation of the COAL fuelscape:

- Surface Fuels
- Canopy Fuels
  - Canopy Cover
  - Canopy Height
  - Canopy Bulk Density
  - Canopy Base Height
  - Canopy Overrides
- Recent Disturbances
- Developed Ruderal Vegetation Types
- Canopy Bulk Density Adjustments for Insects and Disease
- Custom Fuel Model Assignments
  - High Elevation-Subalpine Vegetation
  - Burnable Agriculture and Urban Fuel Models

Topography

Topography is important in determining fire behavior and is a required input for FSim and WildEST models. Steepness of slope, aspect (direction the slope faces), elevation, and landscape features can all affect fuels, local weather (by channeling winds and affecting local temperatures), and rate of spread of wildfire (Figure C.1). The PFA service area contains complex topography in the western portion of the district.

More detailed information regarding topography in the PFA can be found in Chapter 2.

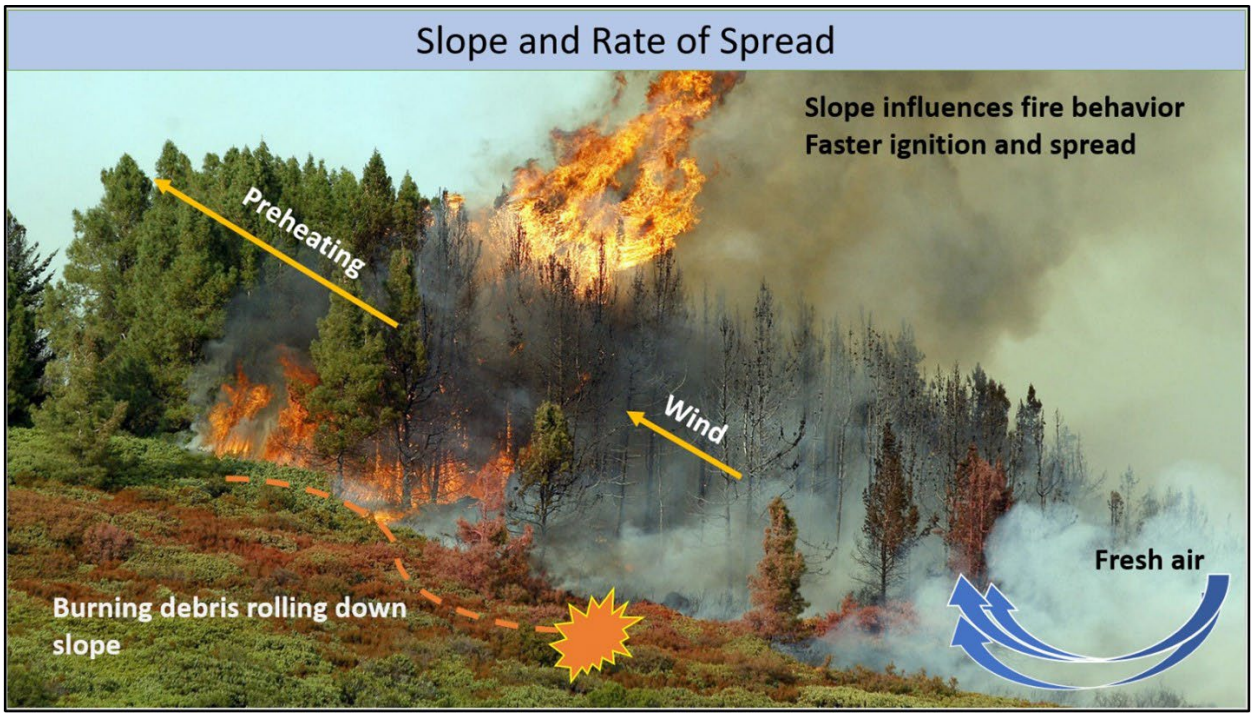

Figure C.1. Effect of topography on fire behavior.

Historical Wildfire Occurrence

Fire occurrence data spanning 26 years from 1992 through 2017 were used to develop model inputs, an ignition density grid, and model calibration targets (Pyrologix 2022b). For detailed information on historical wildfire occurrence methodology go to: http://pyrologix.com/reports/COAL_HazardReport.pdf

Ignition Density Grid

Pyrologix used the program FSim to create an ignition density grid to represent the relatively large fires that may occur across Colorado. The ignition density grid within FSim produced a spatial pattern of large fire occurrences, which were calibrated with historical wildfire occurrences across five different calibration regions within Colorado to produce a viable prediction of large fires throughout Colorado. The eastern part of the PFA service area is shown as having moderate to low likelihood for large fire occurrences, and the western part is shown as having moderate to high likelihood for large fire occurrences (Pyrologix 2022b).

Historical Weather

Of the three fire behavior components, weather is the most likely to fluctuate. Fine dead fuels can cure rapidly, making them highly flammable in as little as 1 hour following light precipitation. Low live fuel moistures of grass, shrubs, and trees can significantly contribute to fire behavior in the form of increased rates of spread, crowning and torching.

A selected list of 10 RAWS was used to produce FSim results. Selected RAWS were distributed across Colorado with relatively long and consistent records. RAWS were also selected using suggestions from local fire personnel with knowledge of RAWS with the most representative data. FireFamilyPlus version

4.1 was used to generate fire risk files for each RAWS (Pyrologix 2022b). The weather inputs used within FSim were:

- Monthly distribution of wind speed and direction
- Live and dead fuel moisture content
- Seasonal trends in the mean and standard deviation of the Energy Release Component (ERC)
    - ERC values were sourced from Dr. Matt Jolly's publicly available ERC raster for the period of 1992 to 2017.
    - ERC sample sites were distributed throughout Colorado similar to RAWS.

To simulate weather for each individual fire, FSIM chooses a scenario, based on the weather inputs from the historical 25-year climatological record These weather scenarios are selected in the same percentages that historically occurred at the start date of the fire. Some simulated fires occur under very low fire danger and don't spread at all, others occur under extreme climatological scenarios and grow quite large in the model. Additionally, Pyrologix utilized FSim to generate stochastic fire ignitions based on historical relationships between large fires and ERC. This was then used to determine burn probabilities.

Highly Valued Resources and Assets (HVRAs)

HVRAs are included in wildfire risk assessments to determine how wildfire hazards influence wildfire risk to different assets across a landscape and within communities. The COAL Quantitative Wildfire Risk Assessment uses HVRAs for determining wildfire risk, and this approach has been integrated within the Poudre Fire Authority CWPP. The HVRAs included in the COAL Quantitative Wildfire Risk Assessment were determined for the state of Colorado by an interagency group of statewide representatives and wildfire experts during a two-part fire effects workshop held in July 2021.

HVRAs were identified based on readily available national spatial datasets that were evaluated for response to wildfire. Additionally, line officers, area fire management officers, and interagency leadership placed relative importance (RI) values on each HVRA for the purpose of weighting and ranking HVRAs (Figure C.2). RI allows all of the HVRAs to be combined into a single, weighted, data product called wildfire risk to assets (Figure 3.9) where total wildfire risk for all values can be viewed on a spectrum of least to greatest.

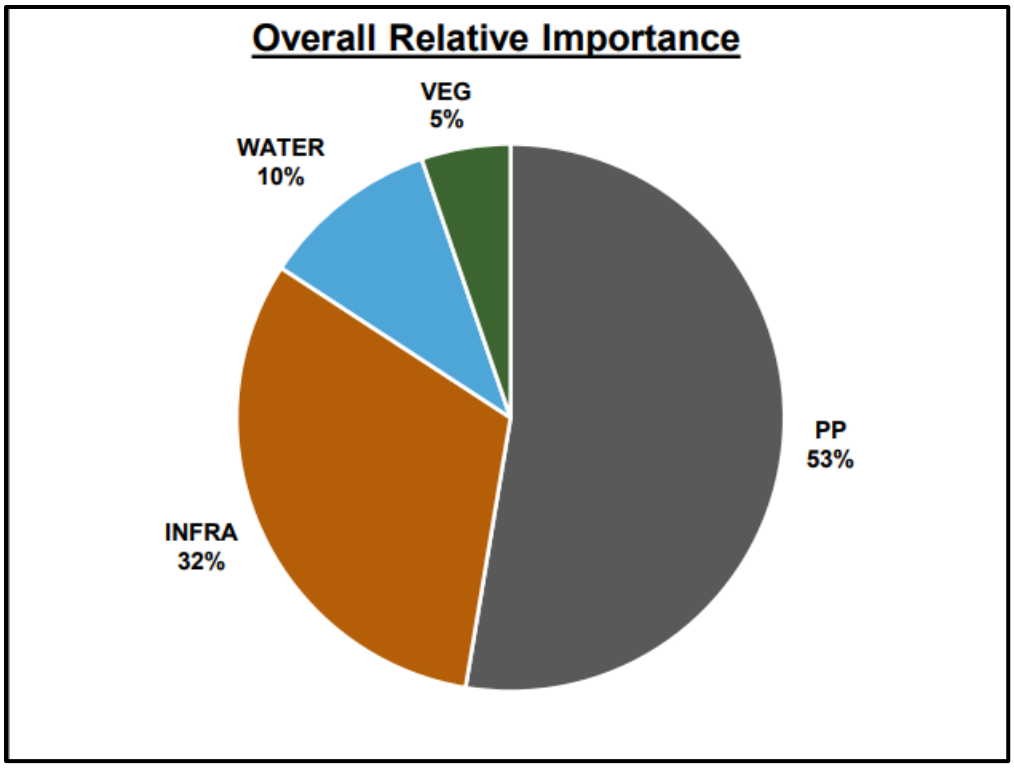

Figure C.2. Overall RI weighting (ranking) of collaboratively determined HVRAs for the state of Colorado (Reference: Pyrologix 2022b)

The resources and assets included in the risk analysis for the COAL Quantitative Wildfire Risk Assessment and incorporated into the wildfire risk to assets data product within this CWPP are people and property, infrastructure, water, and vegetation. See below for a brief explanation of each HVRA.

- **People and Property (PP)** – This data represents housing data calculated from building footprints and U.S. Census Bureau 2018 county population estimates and census block level datasets.
- **Infrastructure (INFRA)** – This data represents high- and low-voltage electric transmission lines, communication sites, and power infrastructure (power plants and substations) all sourced from the Homeland Infrastructure Foundation-Level Data (HIFLD) program.
- **Water** – This data represents surface drinking water protection areas sourced from the EPA Source Water Protection Area program. Potential watershed impacts were evaluated based on intake location and population served.
- **Vegetation (VEG)** – This data represents ecosystem function sourced from LANDFIRE's 2016 biophysical setting layer.

It is important to note that many Colorado CWPPs use the same HVRA datasets and RI weighting. This allows for accurate comparisons and sharing of solutions across jurisdictions. Net value change (NVC) analyses for each individual HVRAs are available from the COAL dataset, allowing local fuel planners to design future projects using more specific datasets as they pertain to their treatment area. For the purposes of this CWPP, the wildfire risk to assets is included to represent the wildfire risk to all HVRAs across the PFA service area combined (Figure 3.9).

FIRE BEHAVIOR MODEL OUTPUTS

Flame Length

Flame length (Figure C.3) is calculated by WildEST and is a weighted-average flame length quantified in feet for each pixel in the fuelscape. Flame length includes contributions from crown fire under severe weather scenarios. For example, high winds may cause fire to spread in the crown of trees. This crown fire flame length is then incorporated into the flame length output where topography, weather, and fuels are conducive to crown fire occurring. Flame lengths are highest (11–25 feet and beyond) in the forested western area of the PFA. Across most of the WUI and urban areas flame lengths range from 0 to 4 feet and 4 to 8 feet, signifying the presence of primarily grass and shrub fuels.

Ember Load Index

Ember load index is derived from modeled fire behavior at the head of the fire and represents the relative ember load being received at any given pixel (30 m). To calculate this, simulated embers are produced and launched based on fire behavior, topography, wind, fuel, and canopy characteristics at the source. Burn probability is incorporated before the embers are distributed downwind where the model tracks the number of hot embers reaching the source to derive the ember load index.

The COAL modeling process allows ember production from grass and brush, in addition to timber. The ember load index map (Figure 3.5) identifies areas where buildings will need to resist ignition from embers, as well as the priority for doing so based on burn probability. Ember production is highly variable and difficult to model. This product should be used as a relative potential ember production, from few to many, rather than an actual real-world count of anticipated embers. Ember loads are moderate in grasslands and open spaces and highest in the forested areas found in the southwestern region of the PFA service area.

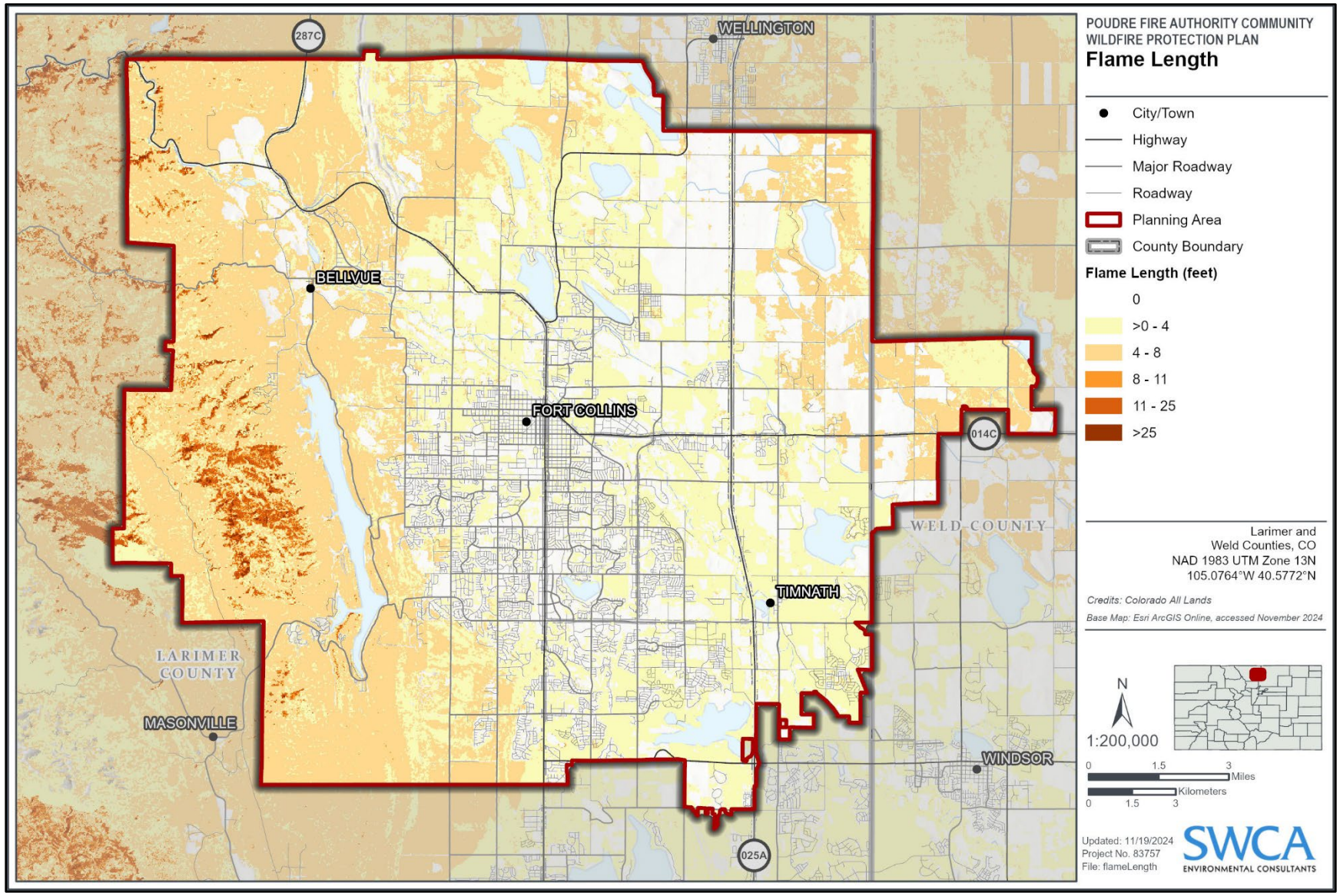

Figure C.3. Modeled flame length in the PFA service area.

INTEGRATED HAZARDS

Risk to Potential Structures

The expected risk to potential structures (RPS) dataset (Figure 3.10) gauges the combined risk of wildfires based on their likelihood, intensity, and potential impact to structures. RPS was calculated using flame length probabilities generated from WildEST. RPS helps answer the question of "how vulnerable would a house or building be if located here?" This helps compare wildfire risks in existing residential areas versus potential construction sites. RPS is determined by multiplying the conditional risk to structures (cRPS) with the probability of a burn.

Wildfire Hazard Potential

Wildfire hazard potential is calculated from a combination of burn probability and conditional flame length converted into an index (Figure 3.7). A weighted resistance to control measure is applied based on the fire line production rates associated with the Scott and Burgan 40 fuel models. Wildfire hazard potential is a good output for determining the likelihood of a fire occurring, the intensity range if it did, and a rough measure of control difficulty. Wildfire hazard potential is a useful tool for evaluating fuel treatment priorities based on burn probability.

Suppression Difficulty Index

Suppression difficulty index (SDI) does not incorporate burn probability in the source data and is based on a very high fire weather scenario (Figure C.4). SDI is a function of flame length outputs, topography, fire line production rates, and the distance of evaluated cells (30 m) from trails and roads. SDI is a good output for determining how difficult it would be for resources to get to a fire's location and successfully implement suppression actions. This output should not be used to evaluate the risk to structures and instead shows areas where fires would be difficult to suppress under very high fire weather conditions.

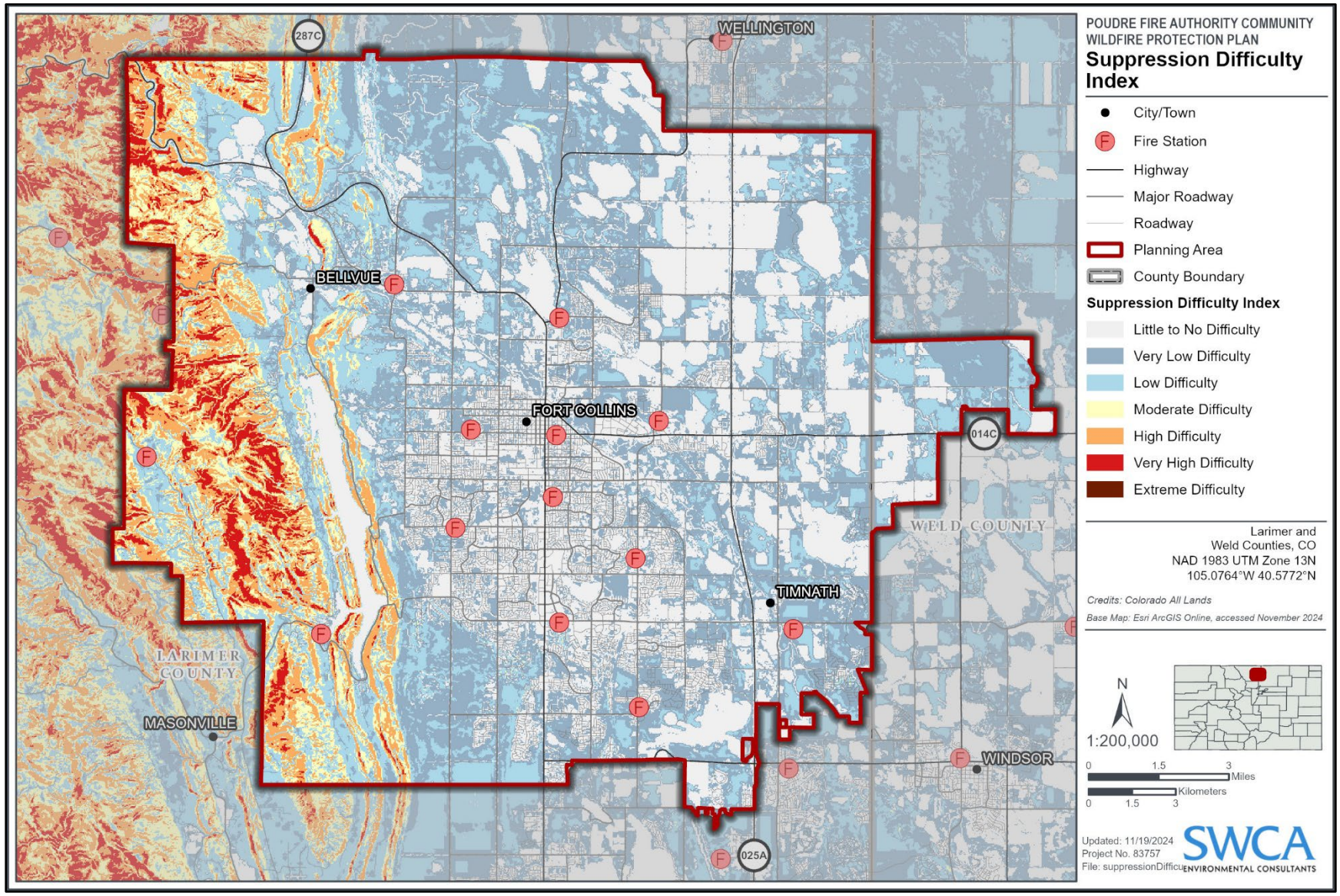

Figure C.4. Suppression difficulty ratings for the PFA service area. Wildfire is more difficult to suppress in steep and remote places far from paved roads.

APPENDIX D:

Fuel Treatment Types and Methods

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FUELS TREATMENT TYPES

DEFENSIBLE SPACE

Defensible space is perhaps the fastest, most cost-effective, and most efficacious means of reducing the risk of loss of life and property. Although fire agencies can be valuable in providing guidance and assistance, creating defensible space is the responsibility of the individual homeowner (Figure D.1).

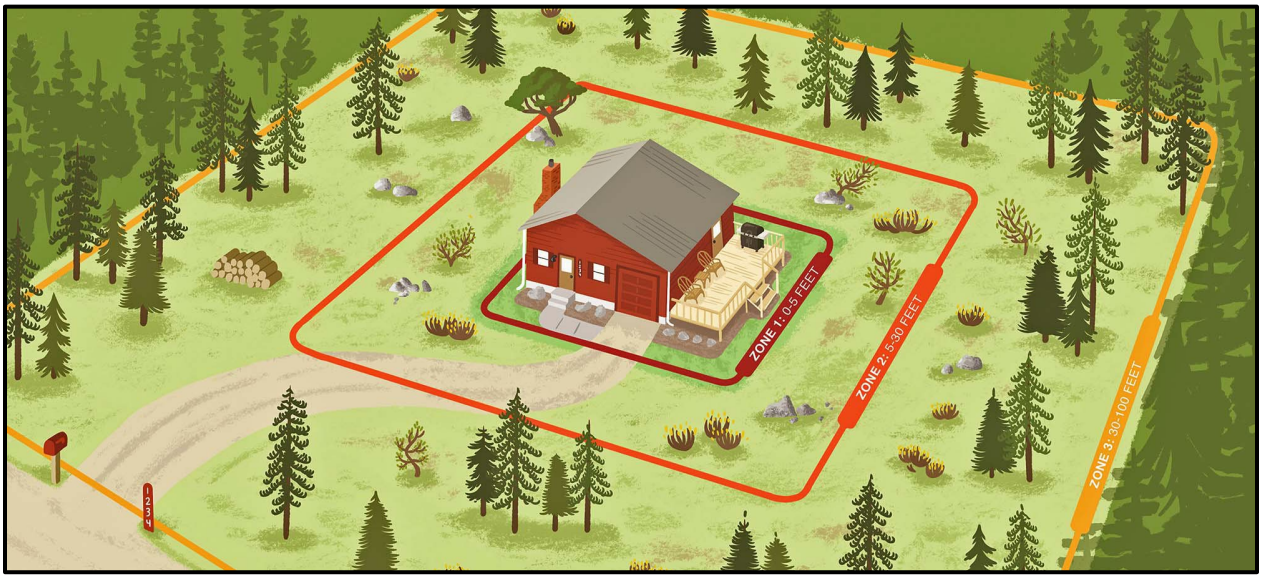

Figure D.1. Defensible space zones providing clearance between a structure and adjacent woodland or forest fuels.
Source: National Fire Protection Association [NFPA] 2022

Effective defensible space consists of creating an essentially fire-free zone adjacent to the home, a treated secondary zone that is thinned and cleaned of surface fuels, and (if the parcel is large enough) a transitional third zone that is basically a managed forest area (Figure D.1). These components work together in a proven and predictable manner. Zone 1 keeps fire from burning directly to the home; Zone 2 reduces the adjacent fire intensity and the likelihood of torching, crown fire, and ember production; and Zone 3 does the same at a broader scale, keeping the fire intensity lower by maintaining a more natural, historic condition (Figure D.1).

Three zones for defensible space actions are described. These include:

Zone 1 This zone, which consists of an area of 0 to 5 feet around the structure, is designed to prevent flames from coming in direct contact with the structure. Use nonflammable, hard surface materials in this zone, such as rock, gravel, sand, cement, bare earth or stone/concrete pavers.

Recommendations for treating Zone 1 include (NFPA 2022):

- Remove all flammable vegetation, including grass, shrubs, slash, mulch, and other woody debris.
- Do not store firewood or other combustible materials inside this zone.

- Prune tree branches hanging over the roof or decks and remove all fuels within 10 feet of the chimney.
- Regularly remove all pine needles and other debris from the roof, deck, and gutters.
- Rake and dispose of pine needles, dead leaves, mulch, and other organic debris within 5 feet of all decks and structures. Farther than 5 feet from structures, raking material will not significantly reduce the likelihood of ignition and can negatively affect other trees.
- Do not use space under decks for storage.

Zone 2 This zone, which consists of an area of 5 to 30 feet around the structure, is designed to give an approaching fire less fuel, which will help reduce its intensity as it gets nearer to your home or any structures.

Recommendations for treating Zone 2 include (NFPA 2022):

- Mow grasses to 4 inches tall or less.
- Avoid large accumulations of surface fuels such as logs, branches, slash, and mulch.
- Remove enough trees to create at least 10 feet* of space between crowns. Measure from the outermost branch of one tree to the nearest branch on the next tree.
- Small groups of two or three trees may be left in some areas of Zone 2. Spacing of 30 feet* should be maintained between remaining tree groups to ensure fire doesn't jump from one group to another.
- Remove ladder fuels under remaining trees. This is any vegetation that can bring fire from the ground up into taller fuels.
- Prune tree branches to a height of 6-10 feet from the ground or a third of the total height of the tree, whichever is less.
- Remove stressed, diseased, dead, or dying trees and shrubs. This reduces the amount of vegetation available to burn and improves forest health.
- Common ground junipers should be removed whenever possible because they are highly flammable and tend to hold a layer of flammable material beneath them.
- Isolated shrubs can be kept in Zone 2, as long as they are not growing under trees. Keep shrubs at least 10 feet* away from the edge of tree branches.
- Periodically prune and maintain shrubs to prevent excessive growth. Remove dead stems annually.
- Spacing between clumps of shrubs should be at least 2 ½ times* their mature height. Each clump should have a diameter no more than twice the mature height of the vegetation. Example: For shrubs that grow 6 feet tall, space clumps 15 feet apart or more (measured from the edge of the crowns of vegetation clumps). Each clump of these shrubs should not exceed 12 feet in diameter.

* Horizontal spacing recommendations are minimums and can be increased to reduce potential fire behavior, particularly on slopes. Consult a forestry, fire, or natural resource professional for guidance with spacing on slopes.

Zone 3 This zone, which consists of an area of 30 to 100 feet around the structure, focuses on mitigation that keeps fire on the ground, but it is also a space to make choices that can improve forest

health. Healthy forests include trees of multiple ages, sizes, and species, where adequate growing room is maintained over time. If the distance of 100 feet to the edge of Zone 3 stretches beyond your property lines, it is encouraged to work with adjoining property owners to complete an appropriate defensible space. If your house is on steep slopes or has certain topographic considerations, this zone may be larger.

Recommendations for treating Zone 3 include (NFPA 2022):

- Mowing grasses is not necessary in Zone 3.
- Watch for hazards associated with ladder fuels. The chance of a surface fire climbing into the trees is reduced in a forest where surface fuels are widely separated, and low tree branches are removed.
- Tree crown spacing of 6 to 10 feet is suggested. Consider creating openings or meadows between small clumps of trees so fire must transition to the ground to keep moving.
- Where practical, prune tree branches to a height of 6-10 feet from the ground or a third of the total height of the tree, whichever is less.
- Any approved method of slash treatment is acceptable in this zone, including removal, piling and burning, lop and scatter, or mulching. Lop-and-scatter or mulching treatments should be minimized in favor of treatments that reduce the amount of woody material in the zone. The farther this material is from the home, the better.

Please see the figures below for a visual representation of minimum vertical (Figure D.3) and horizontal spacing (Figure D.2), as well as spacing on slopes (Figure D.4).

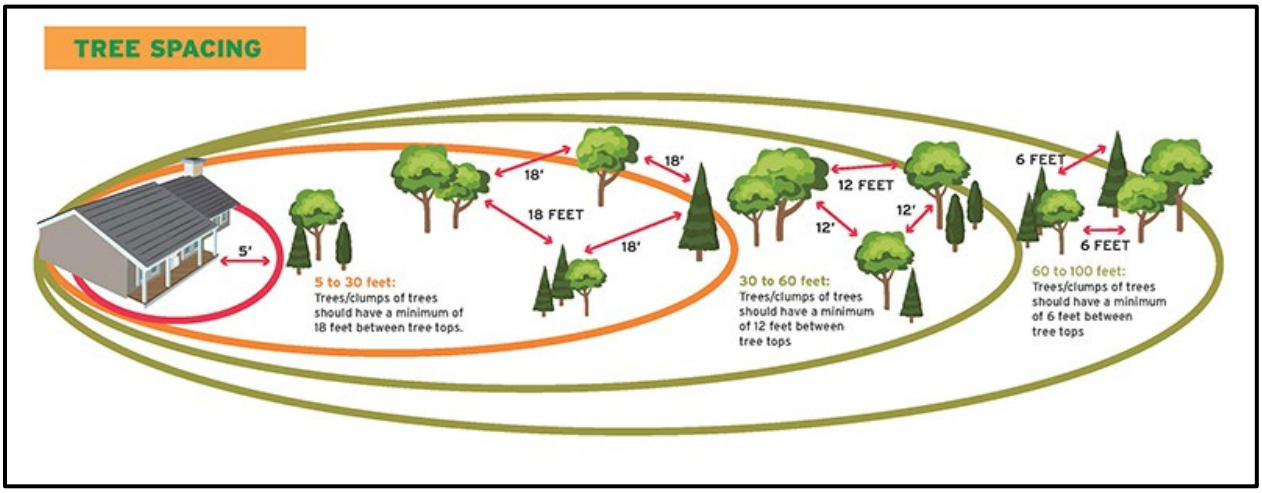

Figure D.2. Recommended tree spacing.
Source: NFPA 2022

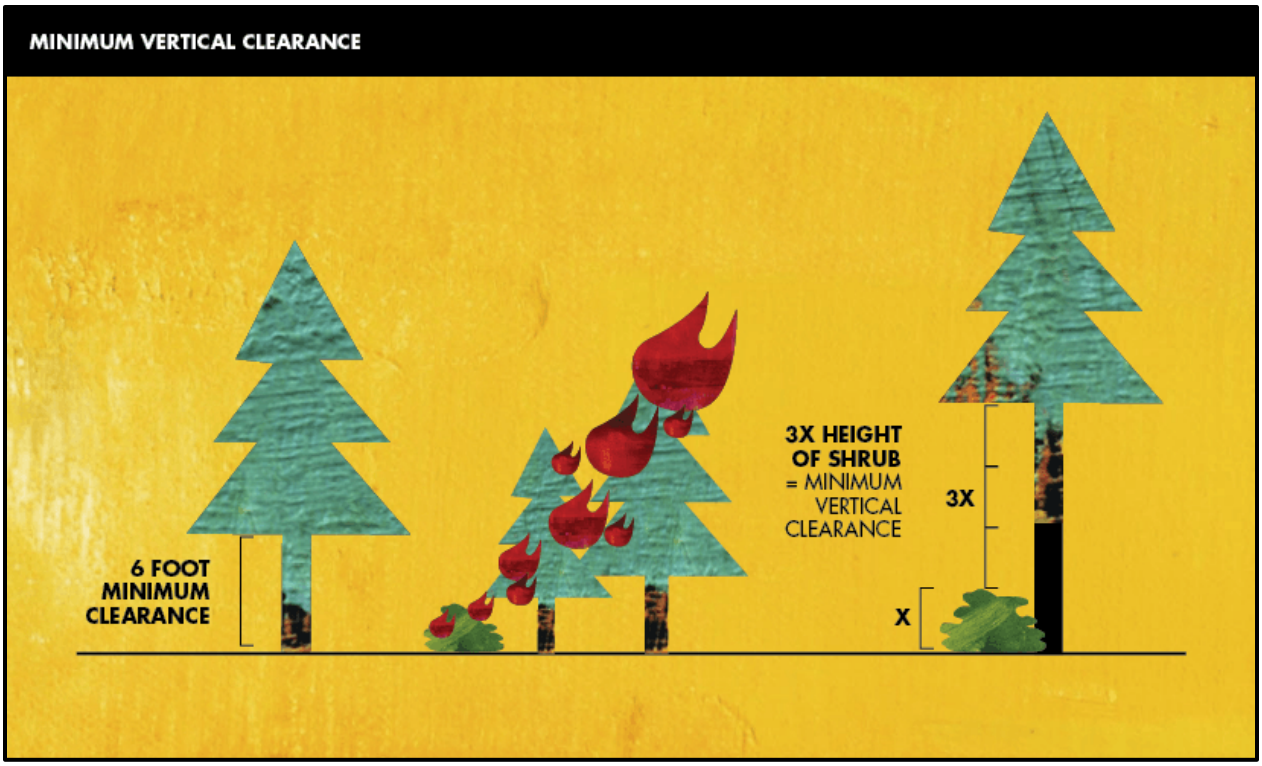

Figure D.3. Recommended minimal vertical clearance.
Source: CAL FIRE 2022

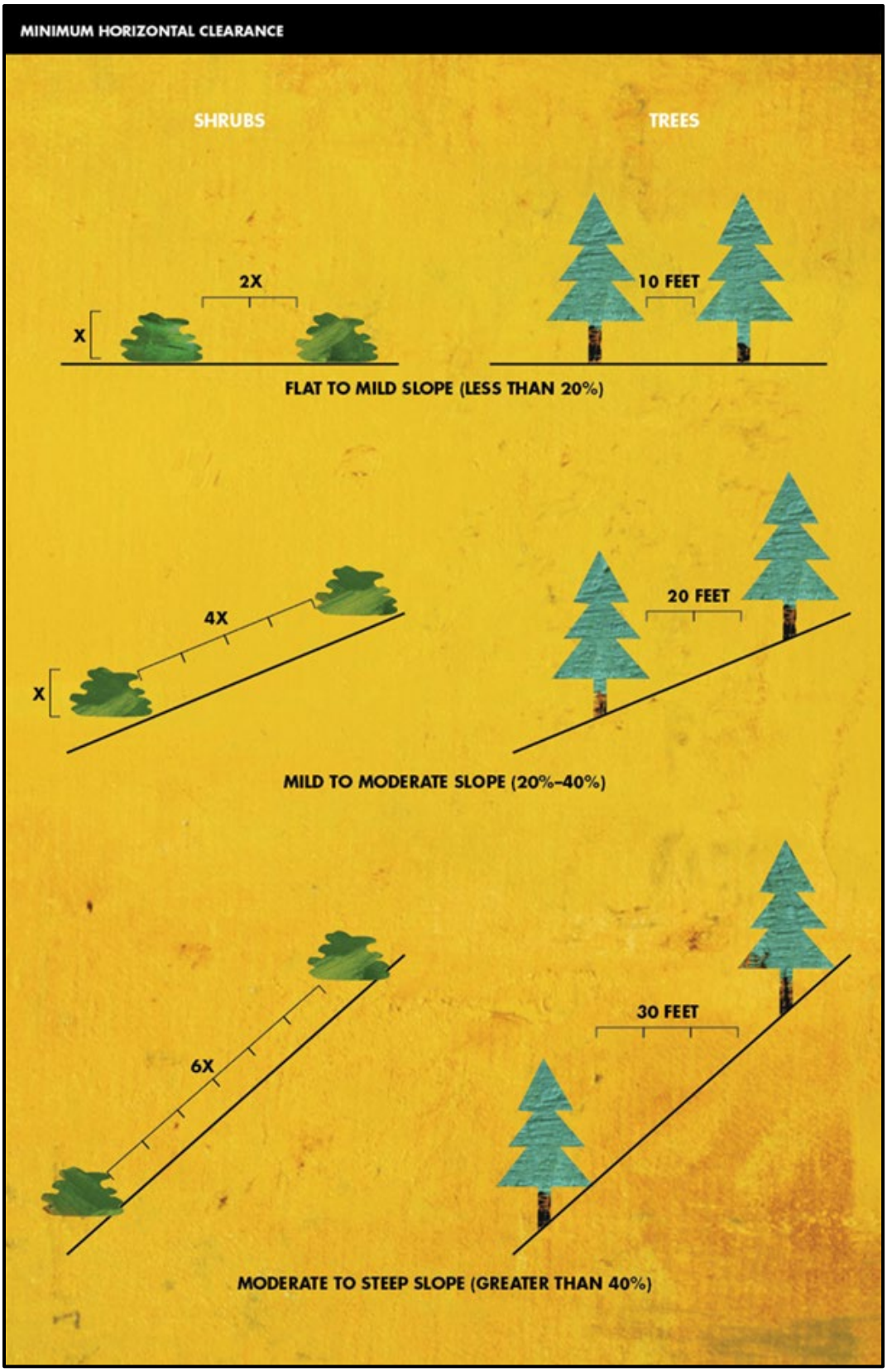

Figure D.4. Recommended minimal horizontal clearance.
Source: CAL FIRE 2022

Creating defensible space does not have to be an overwhelming process. Firewise offers valuable insights and guidance for implementing effective defensible space measures. Specific recommendations should be based on the hazards adjacent to a structure such as slope steepness and fuel type. Moreover, the NFPA offers a free Community Wildfire Risk Assessment Tutorial and an online learning module: Understanding the Wildfire Threat to Homes.

Assisting neighbors may be essential in many cases. Property owners should consider assisting the elderly, sharing ladders for gutter cleaning, and assisting neighbors with large fuels thinning needs. Homeowner actions have been found to also motivate neighbors to act, increasing the scope of wildfire mitigation across a community (Evans et al. 2015). Adopting a phased approach can make the process more manageable and encourage maintenance (Table D.1).

Table D.1. Example of a Phased Approach to Mitigating Home Ignitability

Year	Project	Actions
1	Basic yard cleanup in late summer or fall and whenever applicable (depending on local conditions)	Dispose of clutter and dead branches in the yard and under porches. Move firewood to >30 feet from home Mow and rake grass. Clean off roofs and gutters. Remove combustible vegetation near structures, especially junipers. Coordinate fuels disposal as a neighborhood or community. Post 6-inch reflective address numbers visible from road.
1-2	Understory thinning near structures	Repeat basic yard cleanup. Limb trees up to 6–10 feet. Trim branches back 15 feet from chimneys. Trim or cut down brush. Remove young trees that can carry fire into forest canopy. Coordinate disposal as a neighborhood or community.
1-3	Understory thinning on private property along roads and drainages	Limb trees up to 6–10 feet. Trim or cut down brush. Evaluate the need to thin diseased trees. Remove young trees that can carry fire into forest canopy. Coordinate disposal as a neighborhood or community.
2-4	Overstory treatments on private property	Evaluate the need to thin mature or diseased trees. Prioritize and coordinate tree removal within neighborhoods to increase cost effectiveness.
5	Restart defensible space treatment cycle	Continue the annual basic yard cleanup. Evaluate need to revisit past efforts or catch those that were bypassed.

FUEL BREAKS AND OPEN SPACE CLEANUP

The next location priority for fuels treatments should be where the community meets wildland. This may be the outer margins of a town or an area adjacent to occluded open spaces such as a park. Fuel breaks (also known as shaded fuel breaks) are strips of land where fuel (for example, living trees and brush, dead branches, leaves or downed logs) has been modified or reduced to limit the fire's ability to spread rapidly. Fuel breaks should not be confused with firebreaks, which are areas where vegetation and organic matter are removed down to mineral soil. Shaded fuel breaks may be created to provide options

for suppression resources or to provide opportunities to introduce prescribed fire. In many cases, shaded fuel breaks may be created by thinning along roads. This provides access for mitigation resources and firefighters, as well as enhancing the safety of evacuation routes.

LARGER-SCALE TREATMENTS

Farther away from WUI communities, the emphasis of treatments often becomes broader. While reducing the buildup of hazardous fuels remains important, other objectives are often included, such as forest health and resiliency to catastrophic wildfire and climate change considerations. Wildfires frequently burn across jurisdictional boundaries, sometimes on landscape scales. As such, these larger treatments need to be coordinated on a strategic level. This requires coordination between projects and jurisdictions, as is currently occurring.

Specifically, land managers have carried out numerous pre- and post-fire forest restoration projects across the district and have ongoing projects planned that are designed to reduce hazardous fuels to protect communities and resources, while restoring fire-adapted communities.

Figure D.5. Fuels reduction project in Lory State Park, burn piles used.

ACTION ITEMS FOR PROPERTY OWNERS TO REDUCE STRUCTURAL IGNITABILITY

Limited Investment
• Regularly check fire extinguishers and have a 100-foot hose available to wet perimeter of home.
• Maintain defensible space within 30 feet around home. Collaborate with neighbors to provide adequate fuels mitigation in the event of overlapping property boundaries.
• Ensure that reflective 4-inch house numbers are easily readable from the street.
• Keep wooden fence perimeters free of combustible materials. If possible, 5 feet of non-combustible material should link the house and fence.
• Store combustible materials (liquid fuels, propane, grills, firewood) away from the house.
• Remove flammable material from around propane tanks.
• Clear out materials from under decks and near structures.
• Stack firewood at least 30 feet away from the house.
• Reduce your workload by considering local weather conditions. First, mitigate hazards on the side of your property that faces the prevailing wind direction. Then work around to cover the whole property.
• Keep gutters free of combustible material. Gutters can act as collection points for embers.
• Maintain roofs by flashing, fixing holes, replacing shingles, and closing gaps.
• Purchase or use a National Oceanic and Atmospheric Administration weather alert radio to hear fire weather announcements.
Moderate Investment
• When landscaping in the home ignition zone (HIZ) (approximately 30 feet around the property), select non-combustible plants, decks, lawn furniture, and landscaping material. Combustible plant material like ornamental conifers should be pruned and kept away from siding. If possible, trees should be planted in groups and no closer than 10 feet to the house. Tree crowns should have a spacing of at least 18 feet when within the HIZ. Vegetation at the greatest distance from the structure and closest to wildland fuels should be carefully trimmed and pruned to reduce ladder fuels, and density should be reduced with approximately 6-foot spacing between trees and crowns.
• Work on mitigating hazards on adjoining structures. Sheds, garages, barns, etc. These can act as ignition points to your home.
• Clear and thin vegetation along driveways and access roads so they can act as a safe evacuation route and allow emergency responders access to the home to at least 14-foot clear width and 14-foot height clearance.
• Construct a gravel turnaround in your driveway to improve access and mobilization of fire responders. (e.g., 100-foot-diameter cul-de-sac or T-shape with 28-foot radii).
• Install a roof irrigation system.

High Investment
• Install an environmentally friendly and fire-resistant xeriscape yard.
• Install screen vents with non-combustible meshing. Mesh openings should not exceed nominal 1/8 - 1/16-inch size.
• Enclose open space underneath decks or permanently located manufactured homes using non-combustible skirting and ember resistant skirting vents.
• Install fire-resistant soffits and under eave vents to protect your home from heat and embers that can be trapped beneath roof overhangs.
• Replace exterior windows and skylights with tempered glass or multilayered glazed panels.
• Update your roof to a non-combustible construction. Look for materials that have been treated and given a fire-resistant roof classification of Class A.
• Upgrade exterior walls with fire-resistant siding materials.
• Relocate propane tanks underground.

Additional resources regarding home hardening can be found in Appendix E.

FUEL TREATMENT METHODS

Since specifics of the treatments are not provided in detail in Table D.2, different fuels reduction methods are outlined in the following narrative.

Several treatment methods are commonly used for hazardous fuels reduction, including manual treatments, mechanized treatments, prescribed fire, and grazing (see Table D.2). This brief synopsis of treatment options is provided for general knowledge; specific projects will require further planning. The appropriate treatment method and cost will vary depending on factors such as the following:

- Diameter of materials
- Proximity to structures
- Acreage of project
- Fuel costs
- Steepness of slope
- Area accessibility
- Density of fuels
- Project objectives

It is imperative that long-term monitoring and maintenance of all treatments is implemented. Post-treatment rehabilitation such as seeding with native plants and erosion control may be necessary. In addition, post-treatment fuel cleanup is a must as neglected piles of vegetation may result in increased fire risk.

Table D.2. Summary of Fuels Treatment Methods

Treatment	Comments
Machine mowing	Appropriate for large, flat, grassy areas on relatively flat terrain.
Manual treatment with chipping or pile burning	Requires chipping, hauling, and pile burning of slash in cases where lop and scatter is inappropriate. Slash tree limbs to 6 feet from ground or max of 1/3 of tree height. Remove ladder fuels below / near trees. Pile burning must comply with smoke management policy.
Brush mastication	Brush species tend to re-sprout vigorously after mechanical treatment. Frequent maintenance of treatments is typically necessary. Mastication tends to be less expensive than manual (chainsaw) treatment and eliminates disposal issues.
Timber mastication	Materials up to 10 inches in diameter and slopes up to 30% can be treated. Eliminates disposal issues. Environmental impact of residue being left on-site is still being studied.
Prescribed fire	Ecologically beneficial. Can be used as training opportunities for firefighters. May require manual or mechanical pretreatment. Carries risk of escape. Unreliable scheduling due to weather and smoke management constraints.
Feller buncher	Mechanical treatment on slopes more than 30% or more of materials more than 10 inches in diameter may require a feller buncher rather than a masticator. Costs tend to be considerably higher than masticator.
Grazing	Can be cost effective. Ecologically beneficial. Can be applied on steep slopes and shrubby and flashy fuels. Requires close management.

MANUAL TREATMENT

Manual treatment refers to crew-implemented cutting with chainsaws. Although it can be more expensive than mechanized treatment, crews can access many areas that are too steep or otherwise inaccessible with machines. Treatments can often be implemented with more precision than prescribed fire or mechanized methods allow. Merchantable materials and firewood can be removed while non-merchantable materials are often lopped and scattered, chipped, or piled and burned on-site. Care should be exercised to not increase the fire hazard by failing to remove or treat discarded material in a site-appropriate manner.

Strategic timing and placement of fuels treatments is critical for effective fuels management practices and should be prescribed based on the conditions of each treatment area. Some examples of this would be to place fuel breaks in areas where the fuels are heavier and in the path of prevailing winds and to mow grasses just before they cure and become flammable. Another example is fuel reduction on slopes/ridgelines extending from the WUI to enhance community protection. In areas where the vegetation is sparse and not continuous, fuels treatments may not be necessary to create a defensible area where firefighters can work. In this situation, where the amount of fuel to carry a fire is minimal, it is best to leave the site in its current condition to avoid the introduction of exotic species.

MECHANIZED TREATMENTS

Mechanized treatments such as mowing, including skid-steer, ATV, and tractor-pulled mower decks, can effectively reduce grass and brush fuels adjacent to structures and along highway rights-of-way and fence lines. For heavier fuels, several different masticating machines can be used, including drum- or blade-type masticating heads mounted on machines and ranging in size from a small skid-steer to large front-end loaders. Some masticators can grind standing timber up to 10 inches in diameter. Other masticators are more effective for use in brush or surface fuels. Mowing and mastication do not actually reduce the amount of on-site biomass but alter the fuel arrangement to a less combustible profile.

In existing fuel break areas maintenance is crucial especially in areas of encroaching shrubs or trees. In extreme risk areas more intensive fuels treatments may be necessary to keep the fire on the ground surface and reduce flame lengths. Within the fuel break, shrubs should be removed, and the branches of trees should be pruned from the ground surface to a height of 4 to 8 feet, depending on the height of the fuel below the canopy, and thinned with a spacing of at least two to three times the height of the trees to avoid movement of an active fire into the canopy.

GRAZING

Fuel modifications targeted toward decreasing both vertical and horizontal continuity in fuels is critical as a prevention method against fire proliferation. The primary objectives for these modifications are treating surface fuels and producing low-density and vertically disconnected stands. Strategic livestock grazing can be an effective, nontoxic, nonpolluting, and practically carbon-neutral vegetation treatment method. A livestock grazing system typically consists of a high density of livestock enclosed by a metallic or electrified fence guided by herders. Livestock feed on a variety of foliage and twigs from herbaceous vegetation and woody plants (Lovreglio et al. 2014).

MANAGEMENT OF NONNATIVE PLANTS

The USDA maintains a list of introduced, invasive, and noxious plants by state (USDA 2024). Fuel treatment approaches should always consider the potential for introduction or proliferation of invasive nonnative species as a result of management actions.

For more resources and information on invasive plants and weed management in and surrounding the PFA service area, please, visit:

Larimer County: https://www.larimer.gov/naturalresources/weeds

Weld County: https://www.weld.gov/Government/Departments/Public-Works/Weed-Management

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APPENDIX E:

Homeowner Resources

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ADDITIONAL LINKS AND RESOURCES

LOCAL RESOURCES

Poudre Fire Authority

- Fire Safety Talks and Event Requests: https://www.poudre-fire.org/programs-services/request-pfa-fire-life-safety-talks
- Current Fire Bans and Restrictions: https://www.poudre-fire.org/programs-services/current-fire-bans-and-restrictions
- Youth Firesetter Prevention Program: https://www.poudre-fire.org/programs-services/juvenile-firesetter-intervention
- Community Fire Safety Courses and Programs: https://www.poudre-fire.org/outreach-education/community-courses-and-programs
- Wildfire Prevention Resources: https://www.poudre-fire.org/living-safe/preparing-your-home-for-wildfires
- Emergency Alerts: https://www.poudre-fire.org/living-safe/leta911-emergency-alerts
- Fire Extinguisher Training: https://www.poudre-fire.org/online-services/request-fire-extinguisher-training

Larimer County Office of Emergency Management

- Emergency Preparedness Guide: https://www.larimer.gov/sites/default/files/uploads/2023/em_prep_guide_final_04.26.2023.pdf
- 2021 Hazard Mitigation Plan: https://www.larimer.gov/emergency/hazard-mitigation-plan
- Wildfire Safety Resources: https://www.larimer.gov/sheriff/support-services/emergency-services-and-fire-rescue/wildfire-safety
- Regional Emergency Alerts and Sign Up: https://nocoalert.org/
- Office of Emergency Management Overview: https://www.larimer.gov/sites/default/files/uploads/2022/larimer_oem_program.pdf
- Shelter-in-place Information: https://www.redcross.org/content/dam/redcross/atg/PDF_s/Preparedness___Disaster_Recovery/Disaster_Preparedness/Terrorism/shelterinplace.pdf

Misc.

- Larimer County After the Disaster Guidebook: https://www.larimer.gov/sites/default/files/uploads/2022/after_the_disaster_guidebook_larimer_county.pdf
- Landowner Conservation Resources: https://www.larimer.gov/naturalresources/openlands/landowner-conservation

- Wildfire Crisis Strategy: https://www.larimer.gov/sites/default/files/uploads/2022/confronting-wildfire-crisis.pdf

STATE PROGRAMS AND RESOURCES

Colorado State Forest Service

CSFS maintains a variety of resources and programs to aid homeowners, landowners, and communities in managing forests, using wood products, and preparing properties and community for wildfire. For forest health and management, a number of research papers, guides, and funding sources are available which can help landowners understand their forested land and manage it in a resilient manner. CSFS also houses the Colorado Forest Atlas, which includes interactive mapping for the 2020 Forest Action Plan and a risk viewer. A library of wildfire mitigation resources is also available, including defensible space and home hardening guides, a local risk viewer with interactive mapping, and fire-adapted communities' resources.

A list of specific resources that may be valuable to property owners from the CSFS can be found here:

- Prepare Your Home for Wildfire: https://csfs.colostate.edu/live-wildfire-ready/
  - Contains videos, checklists, and further resources for home wildfire mitigation.
- Wildfire Mitigation: https://csfs.colostate.edu/wildfire-mitigation/
  - Offers management, mitigation, and educational resources.
- Educational Resources and Publications: https://csfs.colostate.edu/csfspublications/
  - Includes wildfire mitigation and education for property owners.
- Resources for Property Owners: https://csfs.colostate.edu/homeowners-landowners/
  - Includes resources to help you manage your property.
- Resources for Communities: https://csfs.colostate.edu/communities/
- Programs for Property Owners: https://csfs.colostate.edu/forest-management/programs-for-homeowners-landowners/
  - Grant programs and homesite assessments.
- Post-Fire Forest Restoration and Rehabilitation: https://csfs.colostate.edu/forest-management/restoration-rehabilitation/
  - Includes rehabilitation practices, restoration publications, and burned tree management for various species.
- Home Ignition Zone and Defensible Space Guide:
  - https://csfs.colostate.edu/wp-content/uploads/2021/04/2021_CSFS_HIZGuide_Web.pdf
- Planning for Hazards Guide: https://www.planningforhazards.com/about-guide

Colorado Division of Fire Prevention and Control

DFPC manages several programs and training to aid communities in preparing or wildfire and improving emergency response. On the division website, you can find the Colorado Wildfire Preparedness Plan,

Wildfire Information Resource Center, and a number of guides and resources to aid homeowners in preparing their properties, preventing wildfires, and planning for evacuation. Information is also available on active, contained, and historic wildfires with associated data. Professional qualifications, training, and certifications for firefighters are available through the website along with information on various funding sources. Explore the many resources, trainings, and data available through the DFPC site here: https://dfpc.colorado.gov/

Colorado Department of Natural Resources

The Colorado Department of Natural Resources (CDNR) Division of Forestry website includes links and information about several state programs and resources related to forest health and wildfire resilience, including an overview of the state's forestry program and information about the Colorado Forest Health Council. In 2021, CDNR completed an analysis of wildfire mitigation efforts and recommendations, which can be found at the site. Finally, the site also provides information about the Colorado Strategic Wildfire Action Program, which aims to increase on-the-ground mitigation efforts by funding Conservation Corps crews, state wildland inmate fire team (SWIFT) crews, and workforce development training. Follow the link for additional information about CDNR programs and resources: https://dnr.colorado.gov/.

Colorado Department of Local Affairs

The Colorado Department of Local Affairs manages multiple funding sources related to wildfire mitigation, prevention, and recovery for residents. Notably, the Wind and Wildfire Home Protection Mitigation Program was launched in 2023, which aids homeowners impacted by a wildfire in rebuilding with fire resilience considerations such as fire-resistant windows and fencing upgrades. The department often releases funds specific to a declared wildfire disaster. Also available is information on home codes pertinent to wildfire resilience. The Department of Local Affairs also houses the Colorado Resiliency Office, which has additional resources on emergency preparation, wildfire recovery, and climate and disaster resilience. Follow the link below for all Department of Local Affairs resources and funding: https://cdola.colorado.gov/

Fire Adapted Colorado

Fire Adapted Colorado was developed from the broader nonprofit group, Fire Adapted Communities Learning Network, a national group working to improve resilience capacity for fire-prone communities. The group facilitates conferences and learning events, provides homeowner and community resources and guides, and connects communities with mitigation specialists in the state. To view all of the resources and programs available through Fire Adapted Colorado, please visit the link: https://fireadaptedco.org/.

Colorado Misc.

- Community Preparedness – Living in the WUI and Vehicle Safety Tips: https://dfpc.colorado.gov/communityfireprep
- Colorado Wildfire Preparedness Plan: https://dfpc.colorado.gov/colorado-wildfire-preparedness-plan
- Colorado Association of Realtors Colorado Project Wildfire: https://coloradorealtors.com/projectwildfire/

- Colorado Forest Atlas: https://coloradoforestatlas.org/
    - Includes spatial maps for the 2020 Forest Action Plan, Wildfire Risk Reduction Planner, and Wildfire Risk Viewer.
- Common Colorado Insects and Diseases: https://csfs.colostate.edu/forest-management/common-forest-insects-diseases/
- Ignition Resistant Construction Design Manual: https://coloradosprings.gov/sites/default/files/2020_ignition_resistant_design_manual_march_2020.pdf
- Colorado Property and Insurance Wildfire Preparedness Guide: https://93j20c.p3cdn2.secureserver.net/wp-content/uploads/2021/08/Wildfire_22x8.5_2021.pdf
- Small-Acreage Rangeland/Pasture Management Guides: https://sam.extension.colostate.edu/topics/pasture-range/
- Guidelines for Revegetation of Disturbed Areas: https://www.larimer.org/sites/default/files/uploads/2017/seeding.pdf

NATIONAL RESOURCES

Wildfire Risk to Communities

The USFS developed this interactive tool to provide citizens with an easy-to-use tool for determining their local risk factor and understanding the factors contributing to local risk. The tool is free to use and provides an overall risk rating and a breakdown of contributing factors based on the selected location. The risk assessment also shows the roles of different community members in preventing and recovering from a wildfire. The link below shows the assessed risk for Colorado: https://wildfirerisk.org/explore/overview/08/

Federal Emergency Management Agency

FEMA provides a number of educational resources, funding programs, research, and other tools to help communities understand wildfire better and increase actions that improve resilience. Resources are categorized into before, during, and after an event and include information on evacuation preparations, insurance, alerts, warnings, sheltering, post-burn flooding, debris flow, and recovery first steps. Available funding programs are related to both preparations and recovery. To view all FEMA resources, please follow the link: https://community.fema.gov/ProtectiveActions/s/article/Wildfire.

U.S. Environmental Protection Agency

The EPA maintains wildfire resources that can help communities better prepare for an recover from a disaster. The EPA is a particularly good resource for smoke and air quality related research and guidance. The agency manages a local air quality search tool, has guides on dealing with wildfire smoke, and information on the health effects of smoke. A full list of EPA resources and research is available at the agency website link: https://www.epa.gov/natural-disasters/wildfires.

Ready.Gov

Ready.Gov is a program developed by the Department of Homeland Security intended to provide disaster and emergency information and preparation resources. Similar to FEMA resources, documents and information are categorized by before, during, and after an emergency. The site provides guides, educational documents, and other resources to help citizens harden their homes and foster defensible space, plan for a wildfire, stay safe during an event, and safely return home or rebuild following a wildfire. The full list of resources is available here: https://www.ready.gov/wildfires.

National Fire Protection Association Firewise USA

The NFPA is a global nonprofit organization devoted to eliminating death, injury, and economic loss due to fire. Its 300 codes and standards are designed to minimize the risk and effects of fire by establishing criteria for building, processing, design, service, and installation around the world (NFPA 2013).

The NFPA develops easy-to-use educational programs, tools, and resources for all ages and audiences, including Fire Prevention Week, an annual campaign that addresses a specific fire safety theme. The NFPA's Firewise USA program (www.firewise.org) encourages local solutions for wildfire safety by involving homeowners, community leaders, planners, developers, firefighters, and others in the effort to protect people and property from wildfire risks.

The NFPA is a premier resource for fire data analysis, research, and analysis. The Fire Analysis and Research division conducts investigations of fire incidents and produces a wide range of annual reports and special studies pertaining to fire hazards.

National Interagency Fire Center

The NIFC provides a wide array of fire resources and services and can provide communication assistance to over 32,000 firefighters and 50 major events at any given time (NIFC 2022). The program also offers wildfire forecasts and predictions using fuel and weather data collected from their remote automated weather base with over 2,000 weather stations. Additionally, the NIFC has a training branch where national curriculums are developed, including FireWorks, an educational program designed for kids K-12. The program teaches children about wildland fire science, ecosystem fluctuations, human interaction on the environment, and other environmental science topics.

NIFC public education resources can be found here: https://disastersafety.org/wildfire/wildfire-ready/

U.S. Fire Administration's WUI Toolkit

The U.S. Fire Administration (USFA) is an entity of FEMA that aids in the preparation for and response to fire. Their WUI toolkit consists of websites and other information regarding risk assessments, public outreach, and community training. Find the toolkit here: https://www.usfa.fema.gov/wui/.

Wildfire Research Center (WiRē)

Wildfire Research Center (WiRē) is a nonprofit organization that works with local wildfire services to highlight community-tailored pathways to reduce risk to wildfire while simultaneously promoting pathways to fire adaptation. WiRē's mission states that fire adaptation is "about living with fire", while "creating safe and resilient communities that reduce wildfire risk on their properties before a fire, and supporting

effective response when fires threaten a community." WiRē states that wildfire is an integral component of many ecosystems, and that safe fire must be allowed to ensure healthy forests.

To achieve its goals and serve communities, WiRē typically assesses factors contributing to wildfire risks; factors include building materials, vegetation near homes, background fuels, local topography, and access to emergency fire services. Additionally, they conduct social surveys to gauge residents' perceptions about wildfire, wildfire risk, risk mitigation behavior, and assess their willingness to take action in reducing wildfire risks.

For more information, please visit https://wildfireresearchcenter.org/.

Community Navigators

Coalitions & Collaboratives, Inc. (COCO) partners with the USFS and various nonprofits to deliver Community Navigator (CN) services. These services support historically underserved communities. CN connects communities to appropriate resources for building climate resilience such as access funding and partnership support. The program aims to create mutually beneficial relationships between local communities, the USFS, and other federal agencies that contribute to community and ecosystem resilience. Through their website, community leaders can request a navigator; resources are available in Spanish and English and accessibility accommodations are available.

For more information, please visit: https://co-co.org/community-navigator/.

American Red Cross

The American Red Cross is a leading disaster response and recovery agency primed to provide disaster relief. Additionally, the Red Cross provides a number of preparation guides and resources for individuals and families and empower community members to assist in relief and recovery efforts. Following the Marshall Fire, the Red Cross had over 100 volunteers assisting victims in recovery. For the full list of Red Cross resources and trainings, follow the link: https://www.redcross.org/get-help/how-to-prepare-for-emergencies/types-of-emergencies/wildfire.html.

Additional National Resources:

Protecting Your Home

- Preparing Homes for Wildfire: https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Preparing-homes-for-wildfire
- If your Home Doesn't Ignite, It Can't Burn: https://www.youtube.com/watch?v=RqKFDDBGd5o
- How do Homes Burn in a Wildfire? https://www.youtube.com/watch?v=3QthynXympI
- Wildfire Community Preparedness Day Toolkit: https://go.nfpa.org/l/14662/2022-01-11/8j6nqh
- 5 Key Areas Around the Home You Must Examine When Assessing Wildfire Risk: https://www.youtube.com/watch?v=MIUQVL3BvVg
- Your Home and Wildfire, Choices that Make a Difference: https://www.youtube.com/watch?v=pfbEcMeYFFA

Preparation and Evacuation

- Wildfire Preparedness Tips: https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Wildfire-safety-tips
- Wildfire Preparedness for Household Pets and Horses: https://www.nfpa.org/education-and-research/wildfire/household-pets-and-horses?l=92
- Outthink a Wildfire; Wildfire Action Policies: https://www.nfpa.org/wildfirepolicy

FEMA

- Protective Actions for Wildfires FEMA: https://community.fema.gov/ProtectiveActions/s/article/Wildfire
- Flood Insurance Information: https://www.fema.gov/flood-insurance
- National Risk Index by County for risk, expected annual loss, social vulnerability, and community resilience: https://hazards.fema.gov/nri/map

RED CROSS

- Red Cross – How to Prepare For Emergencies: https://www.redcross.org/get-help/how-to-prepare-for-emergencies.html
- Red Cross – Wildfire Checklist (English): https://www.redcross.org/content/dam/redcross/get-help/pdfs/wildfire/EN_Wildfire-Safety-Checklist.pdf
- Red Cross – Wildfire Checklist (Spanish): https://www.redcross.org/content/dam/redcross/get-help/pdfs/wildfire/ES_Wildfire-Safety-Checklist.pdf
- Red Cross – Preparing for Disaster for People with Disabilities and Other Special Needs: https://www.redcross.org/content/dam/redcross/atg/PDF_s/Preparedness___Disaster_Recovery/General_Preparedness___Recovery/Home/A4497.pdf

EPA

- Smoke Ready Toolbox for Wildfires EPA: https://www.epa.gov/smoke-ready-toolbox-wildfires
- AirNow: https://www.airnow.gov/
- AirNow Fire and Smoke Map: https://fire.airnow.gov/
- Smoke Advisories: https://www.airnow.gov/air-quality-and-health/fires/smoke-advisories/
- Fires and Your Health: https://www.epa.gov/burnwise/burn-wise-facts-figures-health-and-safety-tips
- Wildfires and Indoor Air Quality: https://www.epa.gov/indoor-air-quality-iaq/wildfires-and-indoor-air-quality-iaq
- Smoke Sense App: https://www.epa.gov/air-research/smoke-sense-study-citizen-science-project-using-mobile-app
- Prepare For Natural Disasters and Recovery: https://www.epa.gov/natural-disasters

READY.GOV

- Wildfires Ready.gov: https://www.ready.gov/wildfires
- Family Disaster Readiness: https://www.ready.gov/kids
- Kids: https://www.ready.gov/kids/be-ready-kids
- Teens: https://www.ready.gov/kids/teens
- Families: https://www.ready.gov/kids/prepare-your-family
- Educators and Organizations: https://www.ready.gov/kids/educators-organizations
- Wildfire Information Sheet: https://www.ready.gov/sites/default/files/2021-12/ready_wildfire_info-sheet.pdf

MISC.

- Climate Mapping for Resilience and Adaptation (CMRA) portal, which provides a live dashboard to help communities see extreme weather and other hazards from climate change: https://resilience.climate.gov/#real-time-data
- Community Planning for Wildfire Assistance Program (CPAW) – Assists city and county planning departments with wildfire risk-reduction communications, increasing land use planning capacity, and collaborating with agencies to identify overlaps in scopes of work: https://cpaw.headwaterseconomics.org/
- Wildfire Ready App:
    - App Store: https://apps.apple.com/us/app/wildfire-ready-virtual/id1540773278?msclkid=4eac0069a71411ecb26fa03c0b08eba2
    - Google Play: https://play.google.com/store/apps/details?id=com.BaltiVirtual.Wildfire&gl=US&msclkid=4eabc8f6a71411ecbfe27aa64cd6d835

APPENDIX F:

Post-Fire Recovery and Restoration

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POST-FIRE RESPONSE AND RECOVERY

The recent increase in severe fires has highlighted the numerous complexities of post-fire response. Research indicates that high-severity burn areas may produce erosion and runoff rates five to ten times higher than the rates produced by moderate-severity burn areas (Sierra Nevada Conservancy 2021). The most recent fire over 20 acres in the PFA service area was the Cameron Peak Fire, which quickly became the largest wildfire in Colorado state's history, resulting in 208,913 acres burned and destroyed or damaged over 400 homes and commercial structures (USDA 2021). The fire spread quickly due to high winds and dry conditions, and left debris, ash, and burnt vegetation in its wake.

Additionally, the fire dramatically reduced vegetative cover, resulting in exposed mineral soils prone to water repellency and increasing runoff. This exposed mineral soil is readily transported during rain events and likely resulted in elevated soil erosion and sediment loading in streams, creeks, and rivers. Following a fire, heavy rains may result in widespread floods carrying trees, boulders, and soil through canyons, ultimately damaging communities and critical infrastructure. In addition, aquatic resources, such as the Poudre and Big Thompson Rivers, as well as water processing facilities, may be negatively impacted or contaminated by post-fire debris and ash.

A comprehensive story map showing the progress toward recovering from the Cameron Peak Fire can be found here: https://storymaps.arcgis.com/stories/66393e20dd674741b43d024a2f2d9188

LARIMER COUNTY AFTER THE DISASTER GUIDEBOOK

Even after the flames are extinguished, several dangers persist after a wildfire. These hazards include potential flash flooding, structural damage, downed power lines, unstable roads, weakened trees, remaining hot spots, and the presence of wildlife predators in the area. Property owners that have experienced property damage during a wildfire event are advised to make an initial trip to assess the damage, identify post-fire hazards, and plan for necessary restoration tasks before starting cleanup or returning home. The recovery process begins with assessing and documenting losses, taking pictures, and notes. Re-entry safety tips and a post-fire supply list are available within the Guidebook to aid in this process.

For more information in post-fire actions and a supply list, please visit:
https://www.larimer.gov/sites/default/files/uploads/2022/after_the_disaster_guidebook_larimer_county.pdf

WILDFIRE RECOVERY AND RETURNING HOME

Recovery from wildfire impacts can vary greatly across income levels and demographics. Rural areas, low-income neighborhoods, and immigrant communities generally do not have the necessary resources to cover insurance and rebuilding expenses that occur after a fire. As a result, many of these areas take more time to recover than those with greater access to resources. In addition, the occurrence of wildfire can worsen existing mental health conditions and lead to post-traumatic stress, low self-esteem, and depression for at-risk populations (CA GOPR 2020).

First and foremost, follow the advice and recommendations of emergency management agencies, fire departments, utility companies, and local aid organizations regarding activities following the wildfire. Do not attempt to return to your home until fire personnel have deemed it safe to do so.

When driving, watch for trees, brush, and rocks which may have been weakened or loosened by the fire. Be aware of any damage or debris on roads and driveways. Traffic may be delayed, or lanes closed due to firefighter operations. Use extreme caution around trees, power poles, and any other tall objects that may have been weakened by the fire (Colorado Silver Jackets 2021).

Even if the fire did not damage your house, do not expect to return to normal routines immediately. Expect that utility infrastructure may have been damaged and repairs may be necessary. When you return home, check for hazards, such as gas or water leaks and electrical shorts. Turn off damaged utilities if you did not do so previously. Request that the fire department or utility companies turn the utilities back on once the area is secured. Similarly, water supply systems may have been damaged; do not drink from the tap until you have been advised that it is safe to do so. Finally, keep a "fire watch"; look for smoke or sparks in houses and other buildings (Colorado Division of Homeland Security and Emergency Management [CDHSEM] 2022). Once at home, check for the following (CDHSEM 2022):

- Use caution when walking through burned areas. Hazards, such as hot spots and flareups, may still exist.
- Keep a "fire watch" for several hours after returning to watch for smoke and sparks.
- Leave immediately if there is heat or smoke coming from a damaged structure.
- Avoid damaged or fallen power lines, poles, and downed wires.
- Mark ash pits properly and warn others of them. Stay clear of pits when possible.
- Keep animals close by; do not allow them to wander as hot spots and embers can burn their paws.
- Listen to instructions given by those in charge. Remain calm and deal with the most urgent issues first.
- If there is damage to your property, contact your insurance company.

LONG-TERM COMMUNITY RECOVERY

On non-federal land, recovery efforts are the responsibility of local governments and private landowners. Challenges associated with long-term recovery arise when homes were saved but are located in high-severity burn areas or within other hazard prone areas. Economically, essential businesses that were burned, damaged, or otherwise forced to close pose a challenge to communities of all sizes. Given these complications, rebuilding and recovery efforts can last for years, with invasive species control and ecosystem restoration lasting even longer (Coalition for the Upper South Platte [CUSP] 2016). It is critical that a long-term plan is in place and there is sufficient funding and support to properly restore the ecosystem and community.

To learn about more post-fire recovery resources, visit the After the Flames website here: https://aftertheflames.com/resources/.

After the Fire

Rebuilding and recovery from wildfire can vary greatly across income levels and demographics. Rural areas, low-income neighborhoods, and immigrant communities generally do not have the necessary resources to cover insurance and rebuilding expenses that occur after a fire. Therefore, many of these areas take more time to recover than those with greater access to resources. According to After the

Flames (ATF), a COCO program, “counties, tribes, municipalities, and water providers are typically the entities most directly and immediately impacted by wildfire and port-erosion flooding” (ATF 2021). Recovery can take anywhere from months to several years to complete rebuilding and restoration efforts. It is important to note that the impact of disaster events and recovery efforts differs between various communities and organizations, especially because Colorado is a home-rule state and disasters can occur at any time, where some people will be more prepared than others. Home-rule means that state agencies are made aware of restoration efforts but without direction from local governments, they are incapable of guiding the restoration efforts. Therefore, if a restoration-project sponsor is inexperienced in post-fire watershed restoration, the impacted area could experience a disadvantaged recovery process. Given the community efforts required to improve forest health and fire recovery efforts, the 2021 Colorado Post-Fire Playbook provides guidance for counties, Tribes, municipalities, and water providers to navigate the aftermath of fires along a recommended timeline (CSFS 2020). This playbook is also helpful in providing paperwork and demonstrating access to state grants that provide funding for the necessary restoration projects, as well as formats to compile critical sources of contact to support recovery efforts.

Returning Home

First and foremost, follow the advice and recommendations of emergency management agencies, fire departments, utility companies, and local aid organizations regarding activities following the wildfire. Evacuate your home as early as possible and do not linger once evacuation orders have been given. The more quickly neighborhoods can evacuate, the sooner wildfire response and emergency resources can ingress to begin suppression activities (NFPA 2023). Additionally, to ensure personal safety, do not attempt to return to your home until fire personnel have deemed it safe to do so.

When driving, watch for trees, brush, and rock which may have been weakened or loosened by the fire. Be aware of any damage or debris on roads and driveways. Use extreme caution around trees, power poles, and any other tall objects that may have been weakened by the fire (Kimbrough 2020).

Even if the fire did not damage your house, do not anticipate an immediate return to normal routine. Instead, look for damaged utility infrastructure and necessary repairs. When you return home, check for hazards, such as gas, water leaks, and electrical shorts. Turn off damaged utilities if you did not do so previously. Request that the fire department or utility companies turn the utilities back on once the area is secured. Similarly, water supply systems may have been damaged; do not drink from the tap until you have been advised that it is safe to do so. Finally, keep a “fire watch”; look for smoke or sparks in houses and other buildings. Once at home, check for the following (CAL FIRE 2019):

- Check the roof and exterior areas for sparks or embers.
- Check grounds for hot spots, smoldering stumps, and vegetation.
- Check for fire damage to your home, turn off all appliances and make sure the meter is not damaged before turning on the main circuit breaker.
- Check the attic and throughout your house for any hidden burning sparks or embers.
- Do not drink water from the faucet until emergency officials say it is okay, water supply systems can be damaged and become polluted during wildfires.
- Discard any food that has been exposed to heat, smoke, flood water, or soot.
- If you have a propane tank or natural gas, leave valves closed until the supplier or utilities can inspect your system.

- If you have a solar electrical system, this system should be inspected by a licensed technician to verify that the solar panels and electrical wiring are safe for continued operation.
- Consult local experts on the best way to restore and plant your land with fire-safe landscaping.
- Contact 911 if any danger is perceived.
- Ash contains toxic substances and may be irritating to the eyes, nose, throat, and skin. Ash is harmful to inhale and may trigger asthma attacks. Follow these tips to reduce your exposure to ash (California Department of Public Health 2017):
    - Do not allow children to play in the ash and sanitize children's toys before they are played with.
    - Immediately wash any part of your body that touches ash to avoid irritation.
    - Wash fruits and vegetables from your garden thoroughly before eating them.
    - Keep pets out of ashy areas.
    - Frequently clean indoor surfaces by wet mopping.
    - Wear protective clothing and a respirator when working outside.

INSURANCE CLAIMS

Your insurance agent is the best source of information for submitting a claim. If you do not have insurance, reach out to local disaster recovery groups, such as the Recovery Navigators listed above. It is recommended you take photos of your home, both inside and out, in preparation of an emergency. Keep the photos in a safe place as this will make the insurance claim process easier. Most expenses incurred during the time you are displaced may be reimbursed, so be sure to keep all receipts. Additional items that may be covered are extra transportation costs to and from work or school, telephone installation, furniture rental, extra food costs, and water damage. Do not start any repairs without the approval of your claims adjuster (Colorado Division of Insurance 2020).

Natural disasters aren't always predictable, but there are steps property owners can take to better prepare for an emergency.

> Review your insurance policy annually to see if your home is adequately insured.
>
> Know your "loss of use" section – these cover living expenses should your home become unlivable due to fire, smoke, or otherwise.

You can view a guide on creating a home inventory here: https://www.iii.org/article/how-create-home-inventory.

Learn more about insurance decisions in the Colorado Property and Insurance Wildfire Preparedness Guide: https://93j20c.p3cdn2.secureserver.net/wp-content/uploads/2021/08/Wildfire_22x8.5_2021.pdf.

COMMUNITY SAFETY: POST-FIRE FLOODS AND DEBRIS FLOWS

There are numerous natural hazards after a wildfire. The most dangerous are potential flash floods and landslides that can occur with rainfall in a burned area. Wildfires increase the risk of flooding because burned soil is unable to absorb rainfall and it becomes hydrophobic. Factors that contribute to flooding

and debris flows are steep slopes, heavy rainfall, weak or loose rock and soil, and improper construction and grading. Even small rainfall can cause a flash flood, transporting debris and damaging homes and other structures. Following a wildfire, burned areas are susceptible to debris flows for 5-10 years, leaving downhill residents in danger. It is crucial to be aware of your surroundings and take note of steep, unstable slopes that could require hasty evacuation (Colorado Geological Survey 2021). Develop an evacuation plan with your family and stay away from waterways. Be aware of your risk, pay attention to weather forecasts, listen to local authorities, and have a household inventory with copies of critical documents (Colorado Geological Survey 2021).

MOBILIZING YOUR COMMUNITY

Wildfires that produce extensive damage require a community-scale response. The local Emergency Manager will collaborate with state and federal partners to manage disaster response and urgent needs. Additional mobilization of a response and recovery team or group of teams in a community can function as a vital part of the recovery procedure. Coordinated and informed direction throughout community-level volunteers and all levels of government are necessary for successful recovery (Colorado Silver Jackets 2021).

Community Emergency Response Team

Developed by FEMA, the Community Emergency Response Team (CERT) training is a program that educates community members about disaster preparedness for hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, and team organization. Supplemental training modules are available to better assist professional responders in various emergency situations. Advanced training includes topics such as animal response, emergency communications, traffic and crowd management, and flood response.

In addition, each community is encouraged to create its own type of a Post-Fire Coordination Group (PFCG) to direct the response to any ensuing post-wildfire natural hazards and aid in determining post-fire mitigation actions. The PFCG should work directly with local, state, or federal agencies, emergency response officials, and others to aid in a coordinated response. Primary duties of the PFCG include coordinating the exchange of information among agencies, assembling and exchanging geospatial data, assisting public communications, and coordinating with elected officials (Colorado Silver Jackets 2021).

The recovery coordinator should become familiar with representatives from local, state, and government agencies that will be helping with coordination or funding of post-fire recovery. Any large wildfire will also involve an Incident Command System (ICS), an appropriately sized team assigned to aid in post-fire recovery. Learn more at https://www.nps.gov/articles/wildland-fire-incident-command-system-levels.htm.

COMMUNICATION

After a team is assembled and immediate tasks are identified, find the best way to spread information in your community. You may distribute flyers, set up a voicemail box, work to find pets or livestock that have been displaced, develop a mailing list for property owners, hold regular public meetings, etc. It is important that a long-term communications plan is developed (California Silver Jackets 2019). Applying the following steps can aid in successful communication (California Silver Jackets 2019):

- Convey post-wildfire hazards to the public.

- Develop and maintain emergency notification systems that allow authorized official to alert residents of emergency situations.
- Public meetings to inform the public about programs and services available in the community.
- Determine the best way to relay information, e.g., phone calls, radio, TV, or social media.
- Find out how emergency response teams, local officials, and volunteers will communicate with the community.

POST-FIRE REHABILITATION AND RESOURCES

The NRCS's Emergency Watershed Protection (EWP) program provides technical and financial services for watershed repair on public (state and local) and private land. The goal is to reduce flood risk through funding and expert advice on land treatments. The EWP program can provide up to 75% of funds and remaining funds are often paid with in-kind volunteer labor (Coalition for the Upper South Platte [CUSP] 2016). This funding is used by the State Emergency Rehabilitation Team (a multi-agency group assembled by the NRCS) to develop specific recovery and treatment plans.

Examples of potential treatments include:

- Hillside stabilization (for example, placing bundles of straw parallel to the slope to slow erosion).
- Hazard tree cutting.
- Felling trees perpendicular to the slope contour to reduce runoff.
- Mulching areas seeded with native vegetation.
- Stream enhancements and construction of catchments to control erosion, runoff, and debris flows.
- Planting or seeding native species to limit the spread of invasive species.

The Colorado State Forest Service maintains a webpage with Colorado-specific forest restoration resources. This page includes guides on soil and erosion treatment techniques, rehabilitation and replanting for success guides, and a link to the Colorado Post-Fire Playbook. These resources are available here: https://csfs.colostate.edu/forest-management/restoration-rehabilitation/

A comparison of potential hillside, channel, and road treatments is available at: https://www.afterwildfirenm.org/post-fire-treatments/which-treatment-do-i-use

The effectiveness of various treatments is described at: https://www.fs.usda.gov/rm/pubs/rmrs_gtr240.pdf

Invasive Species Management and Native Revegetation

Wildfire provides opportunities for invasive species to dominate because many of these species thrive on recently burned landscapes. It is imperative that landowners prevent invasive establishment by eradicating weeds early, planting native species, and limiting invasive seed dispersal (CUSP 2016).

Planting native seeds is an economical way to restore a disturbed landscape. Vegetation provides protection against erosion and stabilizes exposed soils. To be successful, seeds must be planted during the proper time of year, using correct techniques. Use a native seed mixture with a diversity of species and consider the species' ability to compete with invasive species. If you choose to transplant or plant

native species, consider whether the landscape has made a sufficient recovery to ensure the safety of the individuals (CUSP 2016).

Specific Treatment Method Details

Hillslope Treatments

Cover Applications:

Dry mulch: provides immediate ground cover with mulch to reduce erosion and downstream flow.

Wet mulch (hydromulch): provides immediate cover to hold moisture and seeds on slopes using a combination of organic fibers, glue, suspension agents, and seeds (most effective on inaccessible slopes).

Slash spreading: provides ground cover to reduce erosion by felling trees in burned areas.

Seeding: reduces soil erosion over time with an application of native seed mixtures (most successful in combination with mulching). Breaking up and loosening topsoil to break down the hydrophobic layer on top of the soil is also effective.

Erosion Barrier Applications:

Erosion control mat: organic mats staked on the soil surface to provide stability for vegetation establishment.

Log erosion barrier: trees felled perpendicular to the hillslope to slow runoff.

Fiber rolls (wattles): rolls placed perpendicular to the hillslope to reduce surface flows and reduce erosion.

Silt fencing: permeable fabric fencing installed parallel to the slope contour to trap sediment as water flows down the hillslope.

Channel Treatments

Check dam: small dams built to trap and store sediment in stream channels.

In-channel tree felling: felling trees in a staggered pattern in a channel to trap debris and sediment.

Grade stabilizer: structures made of natural materials placed in ephemeral channels for stabilization.

Stream bank armoring: reinforcing streambanks with natural materials to reduce bank cutting during stream flow.

Channel deflector: an engineered structure to direct flow away from unstable banks or nearby roads.

Debris basin: constructed to store large amounts of sediment moving in a stream channel.

Road and Trail Treatments

Outsloping and rolling dips (water bars): alter the road shape or template to disperse water and reduce erosion.

Overflow structures: protect the road by controlling runoff and diverting stream flow to constructed channels.

Low water stream crossing: culverts replaced by natural fords to prevent stream diversion and keep water in the natural channel.

Culvert modification: upgrading culvert size to prevent road damage.

Debris rack and deflectors: structure placed in a stream channel to collect debris before reaching a culvert.

Riser pipes: filter out debris and allow the passage of water in stream channels.

Catchment-basin cleanout: using machinery to clean debris and sediment out of stream channels and catchment basins.

Trail stabilization: constructing water bars and spillways to provide drainage away from the trail surface.

These treatments and descriptions are further detailed at: https://afterwildfirenm.org/post-fire-treatments/treatment-descriptions

For more information about how to install and build treatments, see the Wildfire Restoration Handbook at: https://www.rmfi.org/sites/default/files/hero-content-files/Fire-Restoration-HandbookDraft_2015_2.compressed_0.pdf

Timber Salvage

Salvage logging, often referred to as timber salvage consists of the removal of fallen or damaged trees after a wildfire, or timber left standing but burned on the landscape. Salvage logging can remove biomass from the landscape and allow for economic benefit after a natural disaster. Many private landowners may decide to harvest trees killed in the fire, a decision that can be highly controversial. Trees remaining post-fire can be instrumental for soil and wildlife habitat recovery, but dead standing trees may also pose safety concerns and fuel loadings may still be conducive to future high intensity wildfires. Salvage logging can remove hazard trees from the landscape which can be particularly useful in the WUI, surrounding communities, or in areas of high recreation such as popular trails, campgrounds, and fishing and hunting areas. Burned soils are especially susceptible to soil compaction and erosion so it is recommended to have professionals perform the timber salvage. Several programs assist landowners with timber salvage, including the NRCS Environmental Quality Incentives Program (EQIP) (CUSP 2016). It has been shown that salvage logging has negative effect on regulating ecosystem services, and it is suggested that salvage logging occur 2-4 years after wildfire occurrence to reduce these negative effects without affecting surface fuel loads (Leverkus et al. 2020).

Invasive Species Management and Native Revegetation

Wildfire provides opportunity for many invasive species to dominate the landscape because many of these species thrive on recently burned landscapes. Invasive species are often opportunists and can quickly colonize a recently disturbed area. Post-fire ecosystem changes can allow for invasive species to dominate a landscape. Continual disturbances post fire such as grazing or logging may promote invasive species to be able to dominate a landscape. It is imperative that landowners prevent invasive establishment by eradicating weeds early, planting native species, and limiting invasive seed dispersal (CUSP 2016).

Planting native seeds is an economical way to restore a disturbed landscape. Vegetation provides protection against erosion and stabilizes exposed soils. In order to be successful, seeds must be planted during the proper time of year and using correct techniques. Use a native seed mixture with a diversity of species and consider the species' ability to compete with invasive species. Before planting, the seedbed must be prepared with topsoil and by raking to break up the hydrophobic soil layer. If you choose to transplant or plant native species, consider whether the landscape has made a sufficient recovery to ensure the safety of the individuals (CUSP 2016).

Long-term Community Recovery

On non-federal land, recovery efforts are the responsibility of local governments and private landowners. Challenges associated with long-term recovery include homes that were severely damaged or were saved but are located in high-severity burn areas. Furthermore, homes saved but located on unstable slopes or in areas in danger of flooding or landslides present a more complicated challenge. Economically, essential businesses that were burned or were otherwise forced to close pose a challenge to communities of all sizes. Given these complications, rebuilding and recovery efforts can last for years, with invasive species control and ecosystem restoration lasting even longer (CUSP 2016). It is critical that a long-term plan is in place and there is sufficient funding and support for all necessary ecosystem and community recovery. To learn about more post-fire recovery resources, visit the After the Flames website here: https://aftertheflames.com/resources/.

Additional resources regarding post-fire return and recovery are provided in Appendix I.

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APPENDIX G:

Project Outreach

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COMMUNITY OUTREACH

Table G.1 presents examples of the public outreach completed as part of the CWPP development. To maximize audience reached, online resources were used to provide information to the public and solicit feedback. Figures G.1 and G.2 show examples of online posts.

Table G.1. Public Outreach Resources

Resource Description	Location	URL	Date
Community Survey	Online	https://survey123.arcgis.com/share/5ede8c451e2e45ff9f81f5250e779bda	June 2024 through October 2024
Press Release for the PFA CWPP Update Open House	Online	https://www.poudre-fire.org/Home/Components/Calendar/Event/307/19	August 2024
Facebook Calendar Event	PFA's Facebook	https://www.facebook.com/events/471218689197028	07/31/2024
Poudre Fire Authority CWPP Update Open House	Fort Collins, Co Training Center	N/A	08/28/2024

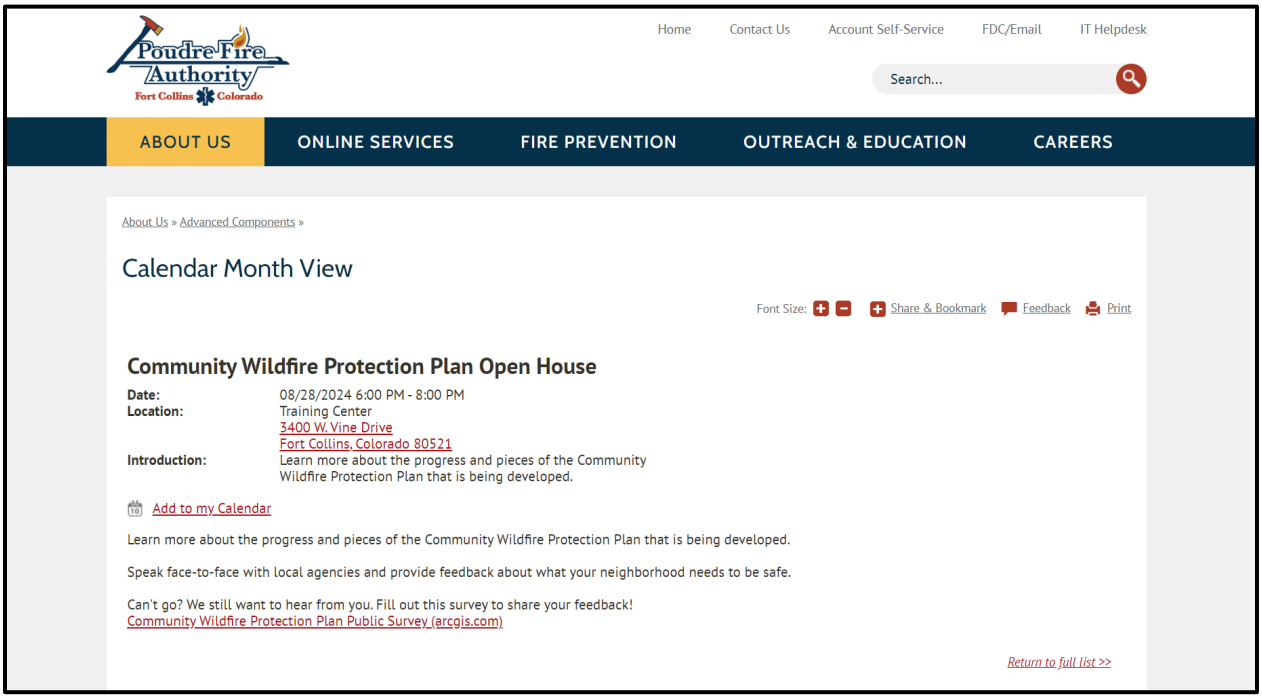

Figure G.1. PFA's calendar event for the PFA CWPP Update Open House at the Fort Collins Training Center.

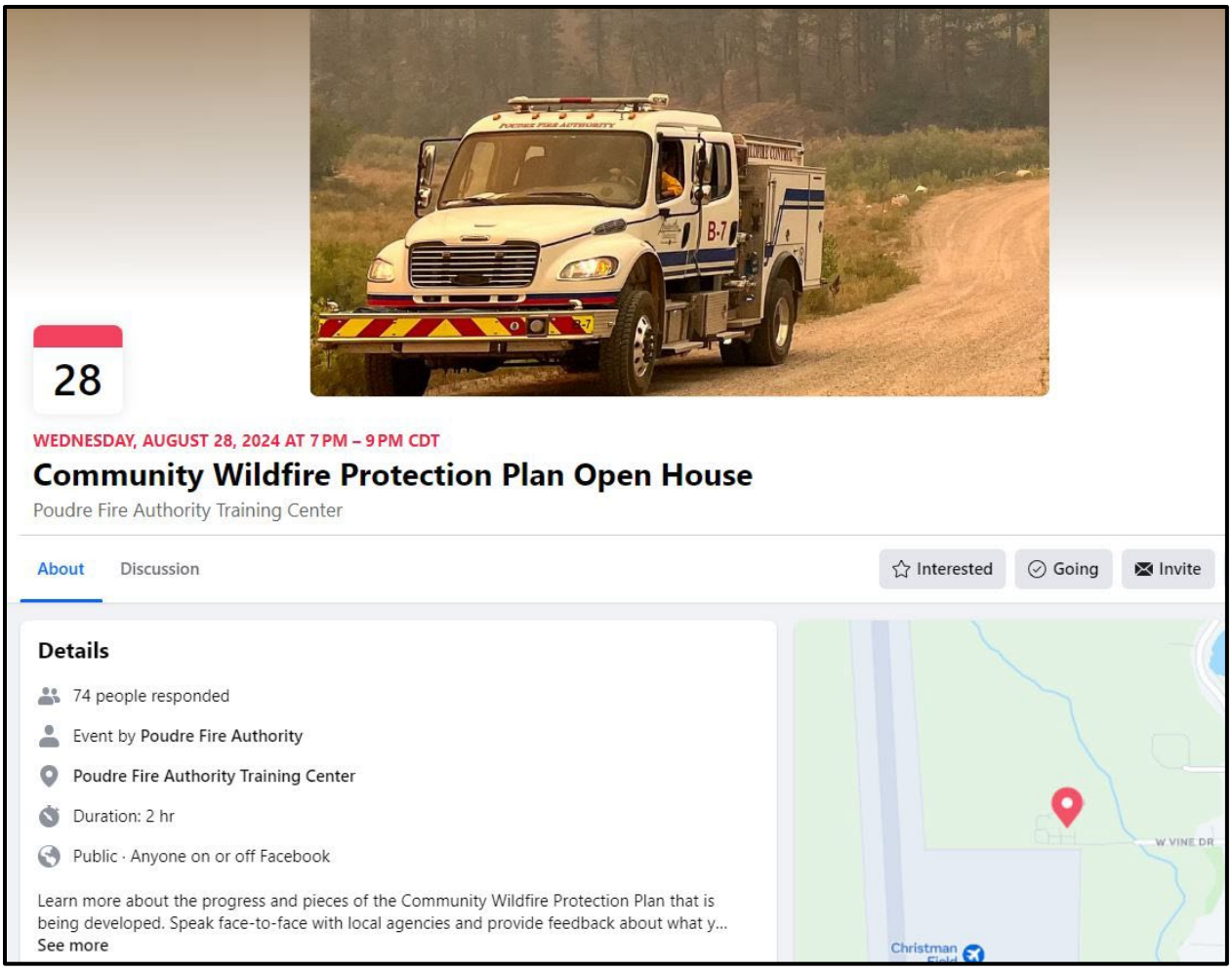

Figure G.2. Facebook post from the PFA advertising the Open House.

COMMUNITY SURVEY

During the public review period of the CWPP process, community members provided feedback and information on various aspects related to wildfire preparedness in their community. This included assessments of community preparedness and housing risks, concerns about wildfire vulnerability, prioritization of wildfire preparedness actions, challenges to making homes fire-safe, funding priorities, prescribed fire usage, evacuation planning, emergency kits, knowledge of evacuation routes, willingness to evacuate under different circumstances, familiarity with emergency notifications, and registration for local emergency notifications.

SWCA held the public survey period open from June 2024 through October 2024 and received a total of 184 responses. Concerns raised during this feedback process were addressed through diligent adaptations and additions to the plan's content and mitigative recommendations. Figures G.3 through G.27 provide visualizations of the data received through the public survey responses.

Note: Variations in the quantity of responses and percentage totals across survey questions are due to respondents abstaining from certain questions.

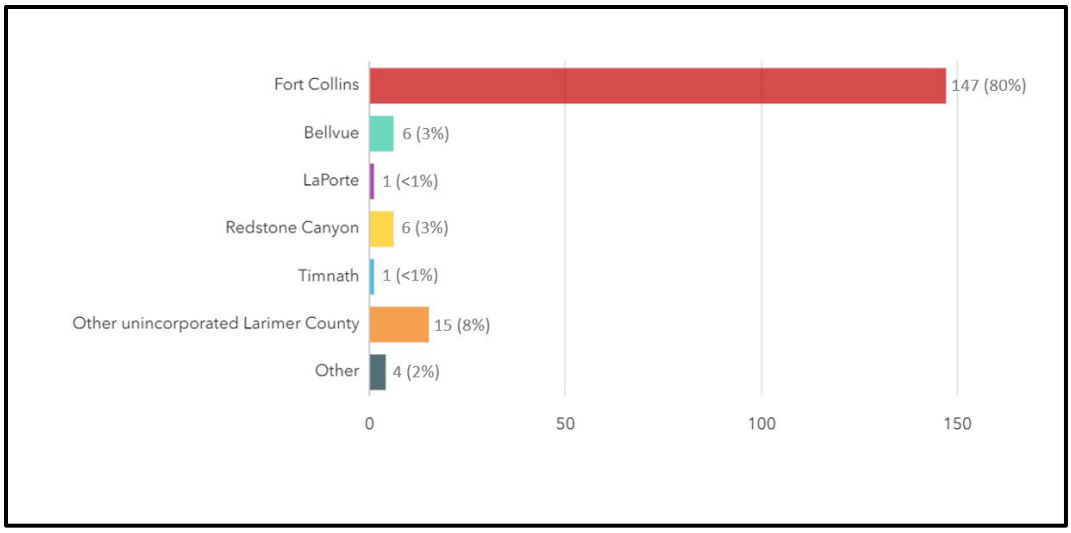

Figure G.3. Reponses to public survey question "Where is your primary residence?"

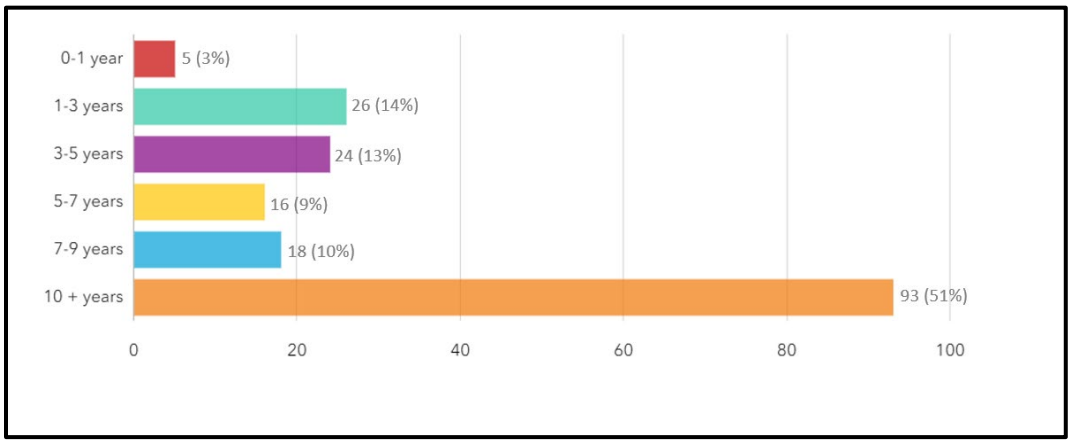

Figure G.4. Reponses to public survey question "How long have you lived at this residence?".

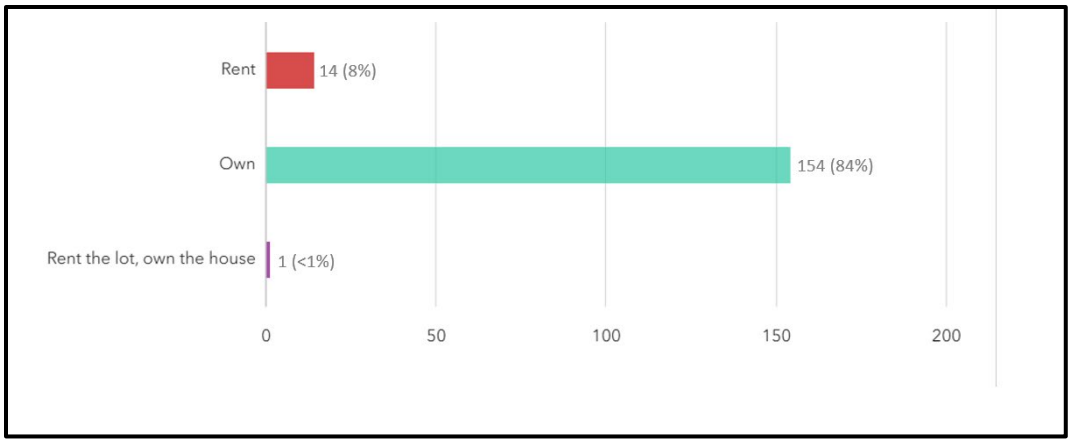

Figure G.5. Reponses to public survey question "Do you rent or own your home?"

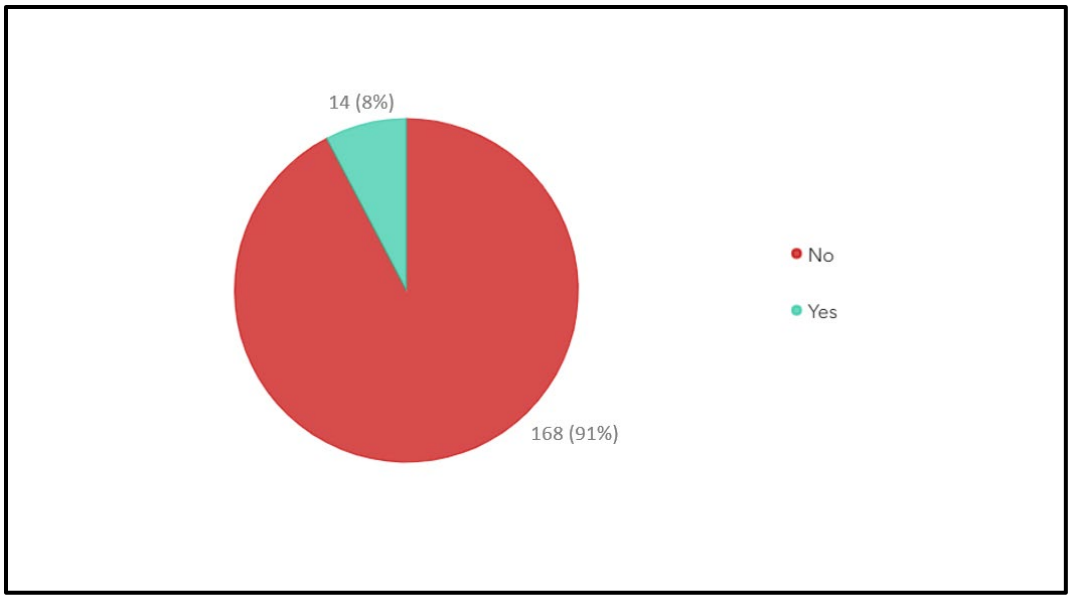

Figure G.6. Reponses to public survey question "Do you identify as a person with a disability as defined by the Americans with Disabilities Act (ADA)?".

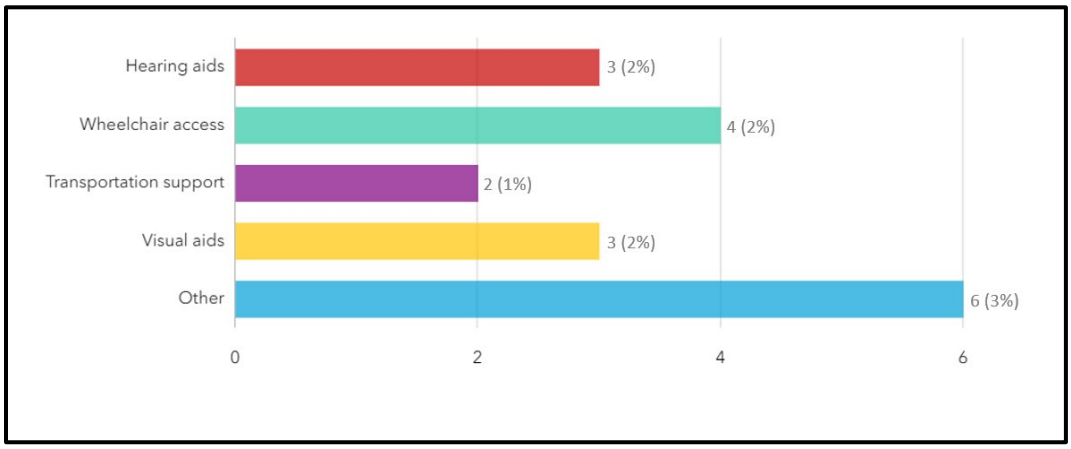

Figure G.7. Reponses to public survey question "What sort of access and functional needs do you require?".

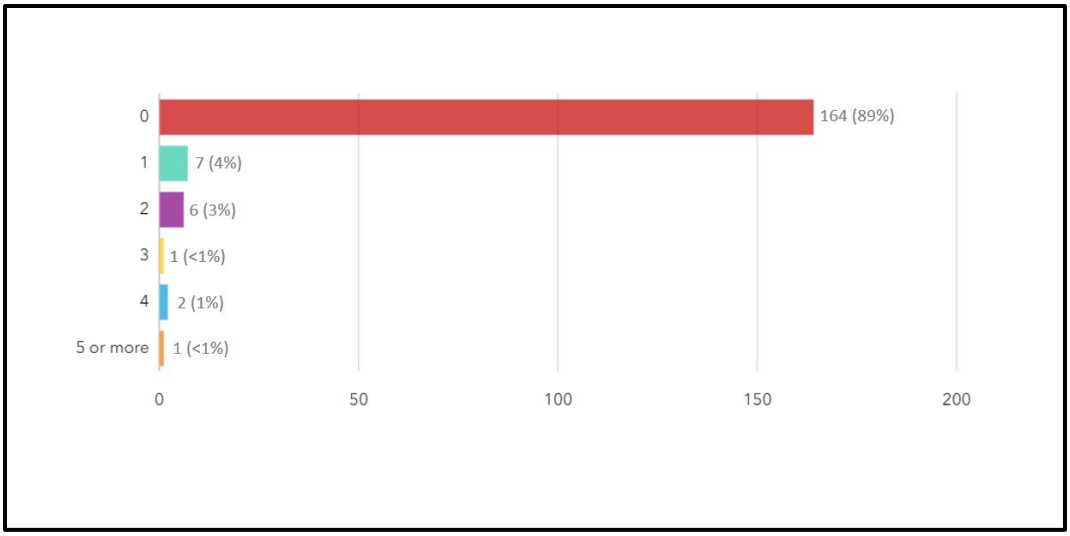

Figure G.8. Reponses to public survey question "How many times have you evacuated from your residence in Northern Colorado because of wildfire or threat of wildfire in the last 10 years (mandatory or voluntary)?".

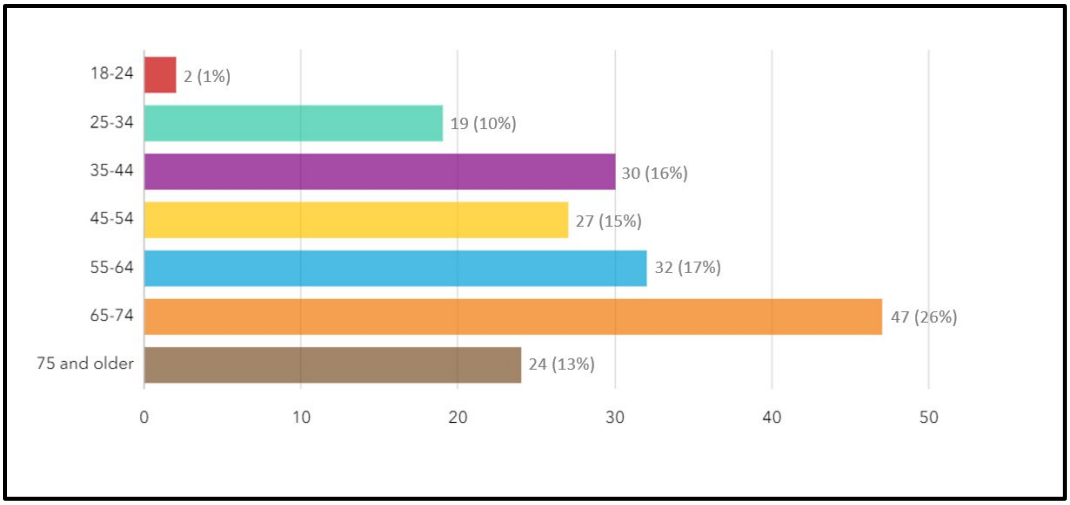

Figure G.9. Reponses to public survey question "What is your age?".

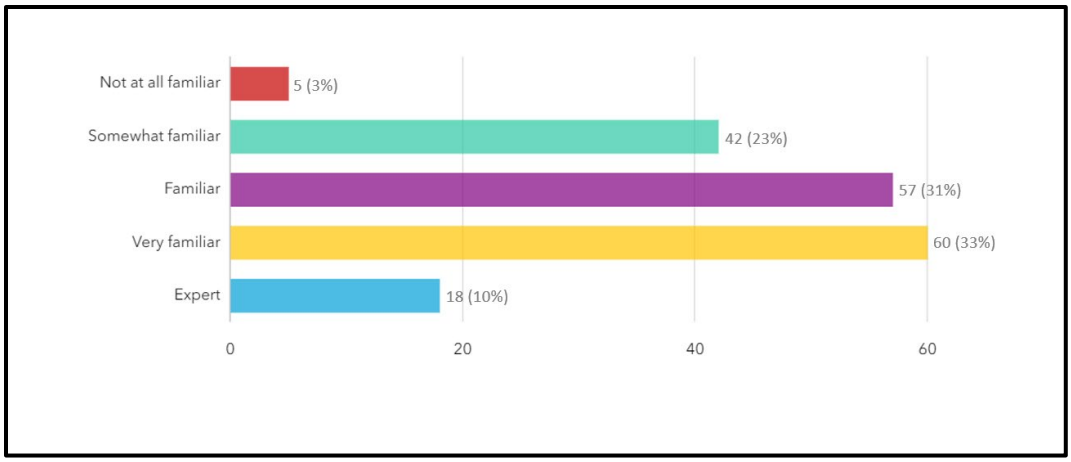

Figure G.10. Reponses to public survey question "What is your level of familiarity or knowledge about wildlife?".

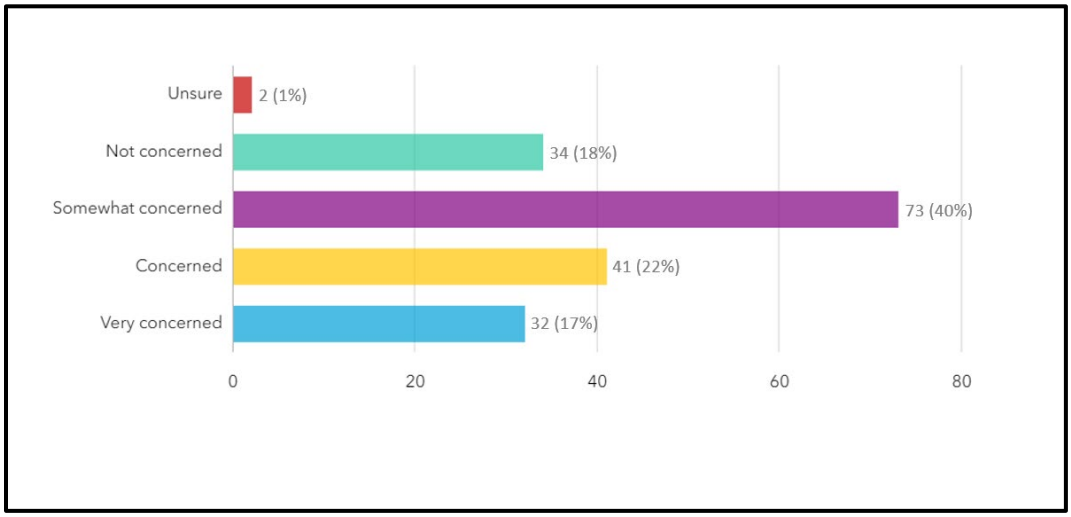

Figure G.11. Reponses to public survey question "How concerned are you about the risk of wildfire where you live and the threat of wildfire poses to your primary residence?".

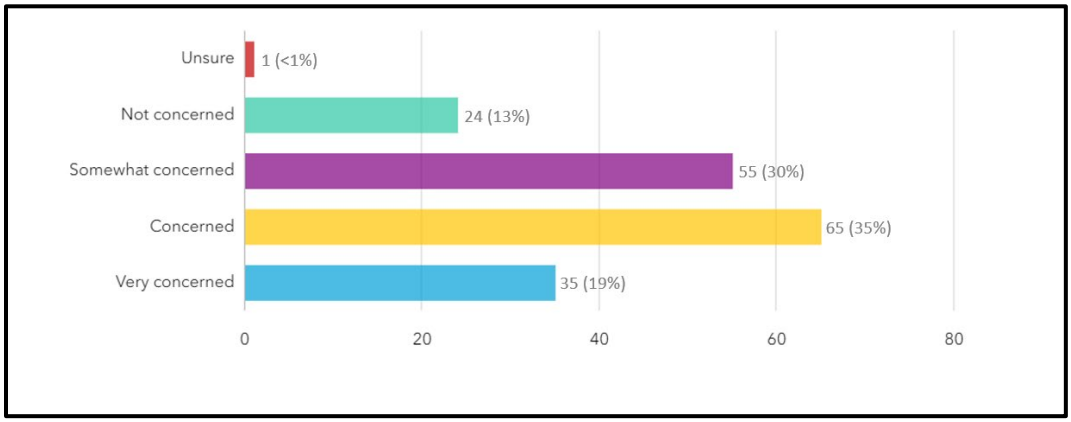

Figure G.12. Reponses to public survey question "Compared to five years ago, how would you describe your level of concern regarding your safety from wildfires and the safety of your family, home, and assets?".

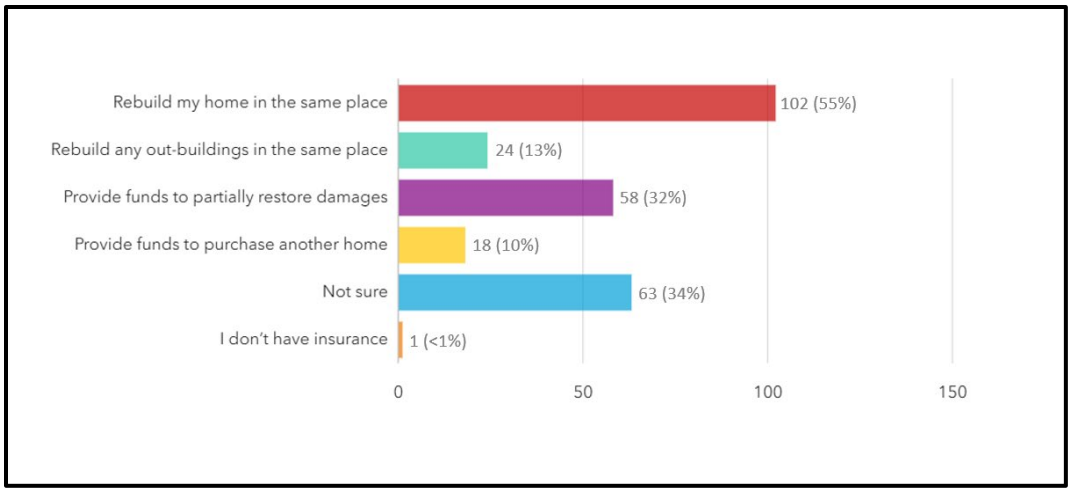

Figure G.13. Reponses to public survey question "What do you think your current insurance would cover in the event of a wildfire?". Respondents were allowed to make multiple selections. Count represents the number of times the choice was selected. Percentages represent the proportion of respondents that included the choice within their response.

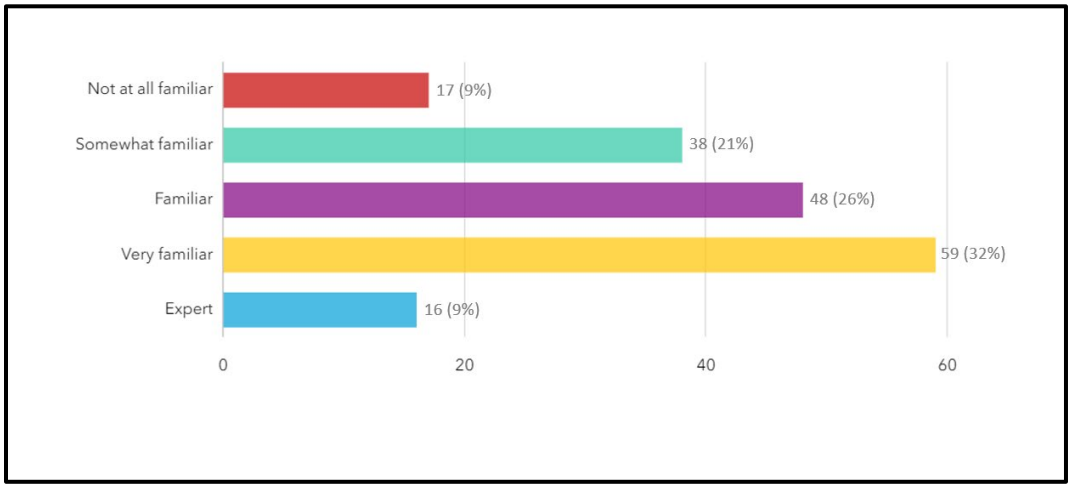

Figure G.14. Reponses to public survey question "Are you familiar with where to get updates and information regarding evacuation or incidents?".

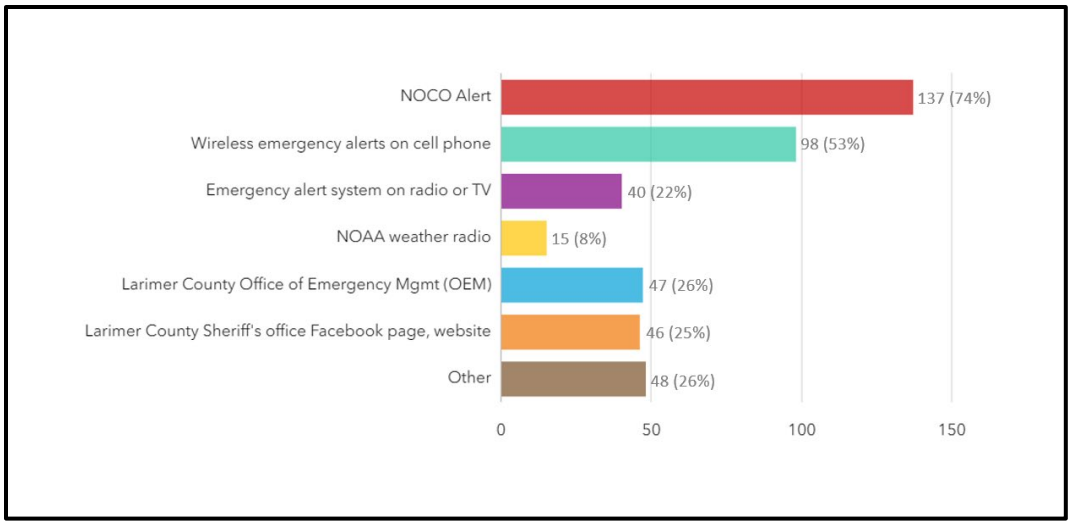

Figure G.15. Reponses to public survey question "Where do you currently get most of your updates and information regarding evacuations?". Respondents were allowed to make multiple selections. Count represents the number of times the choice was selected. Percentages represent the proportion of respondents that included the choice within their response.

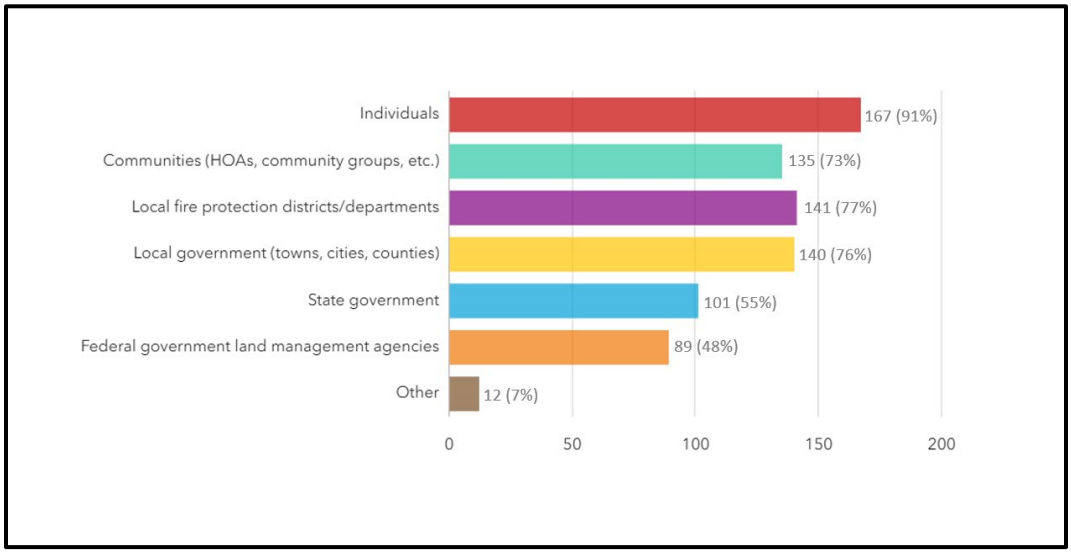

Figure G.16. Reponses to public survey question "In your opinion, whose responsibility is fire preparedness?". Respondents were allowed to make multiple selections. Count represents the number of times the choice was selected. Percentages represent the proportion of respondents that included the choice within their response.

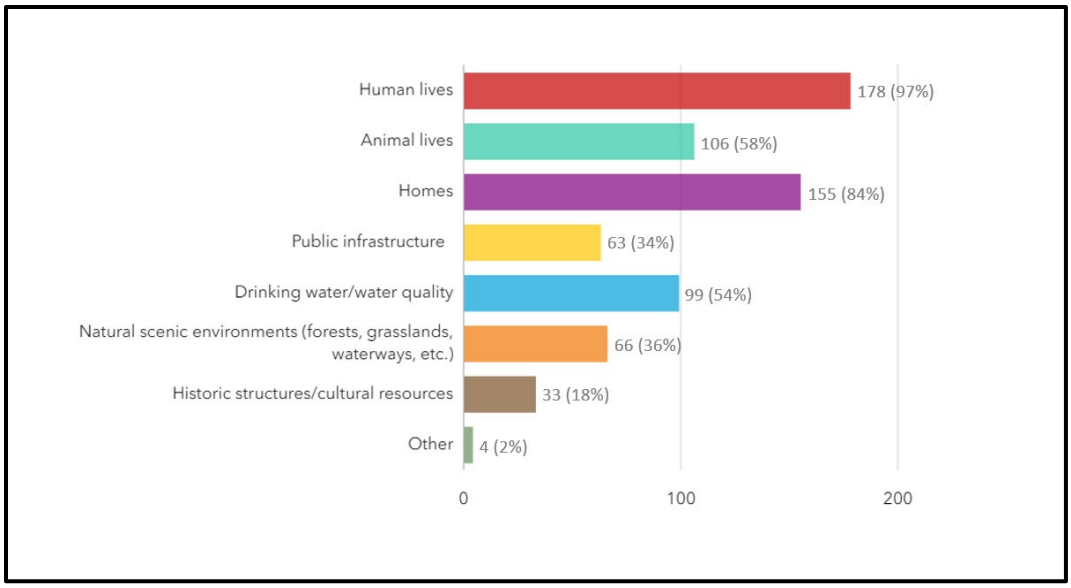

Figure G.17. Reponses to public survey question "What are the assets that you want protected in the immediate area around your residence (~ 1 mile)?". Respondents were allowed to make multiple selections. Count represents the number of times the choice was selected. Percentages represent the proportion of respondents that included the choice within their response.

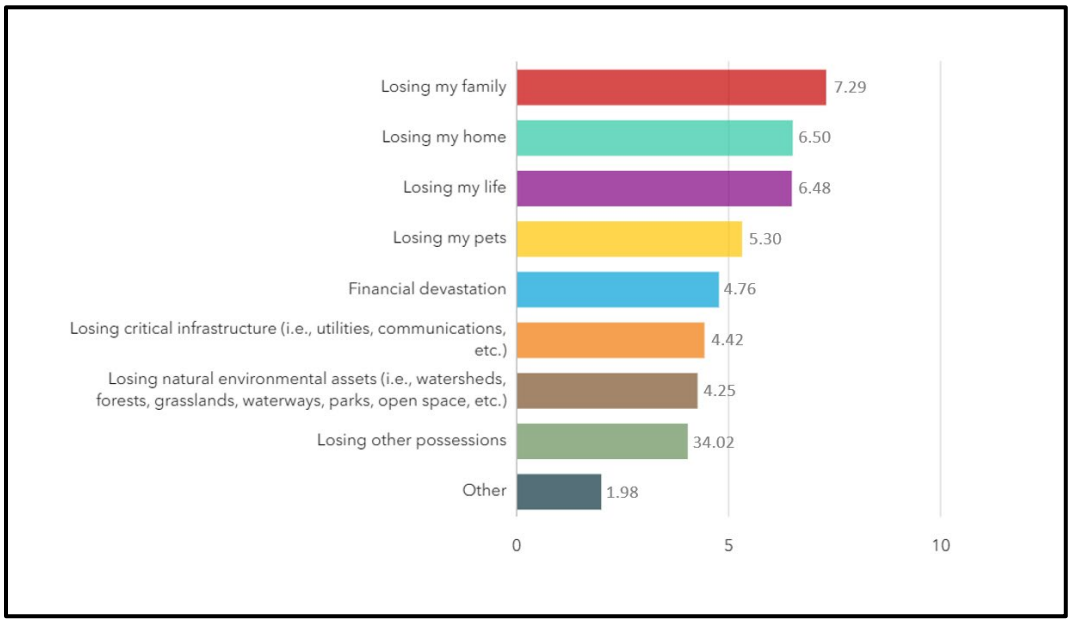

Figure G.18. Reponses to public survey question "What are the greatest concerns that you have about the risk from wildfire? Please rank these in order with 1 being the greatest concern, 2 being the next highest concern, etc.". Count represents the average rank.

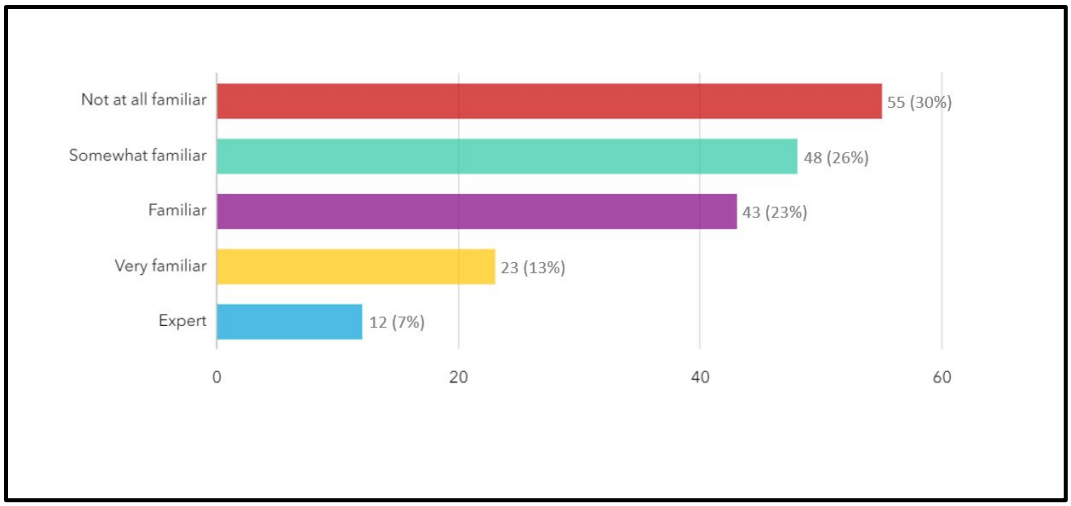

Figure G.19. Reponses to public survey question "Home hardening is the concept of implementing fire-resistant upgrades to your home. Are you familiar with 'home hardening' concepts and how they pertain to residential property (i.e., the physical structure itself, including mesh vents, siding, roof types, eves, windows, chimneys, fences, etc.)?".

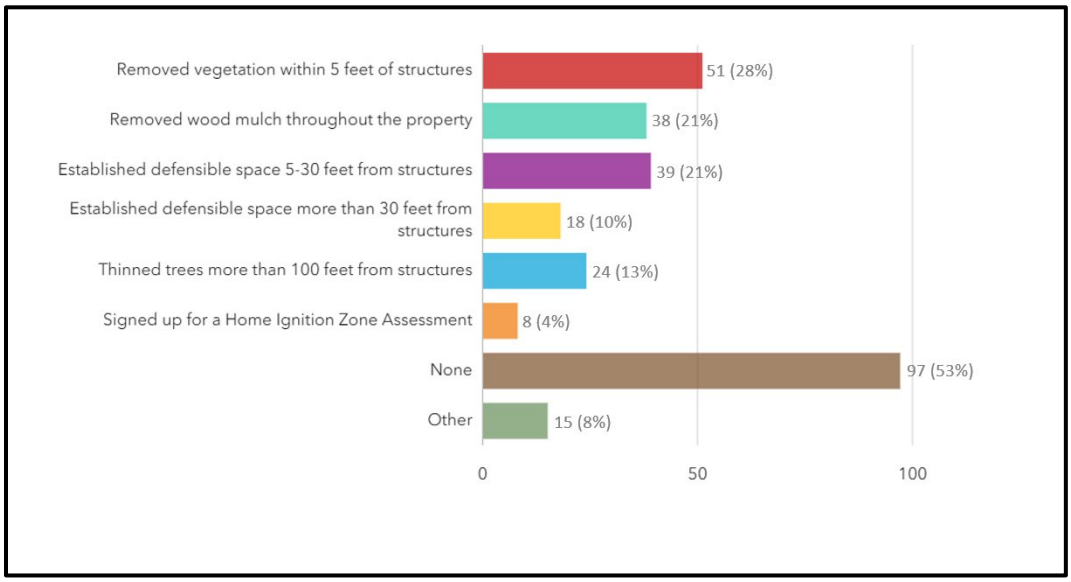

Figure G.20. Reponses to public survey question "Defensible space is the 100 feet between your property and the surrounding area. Which of the following defensible space activities have you completed?". Respondents were allowed to make multiple selections. Count represents the number of times the choice was selected. Percentages represent the proportion of respondents that included the choice within their response.

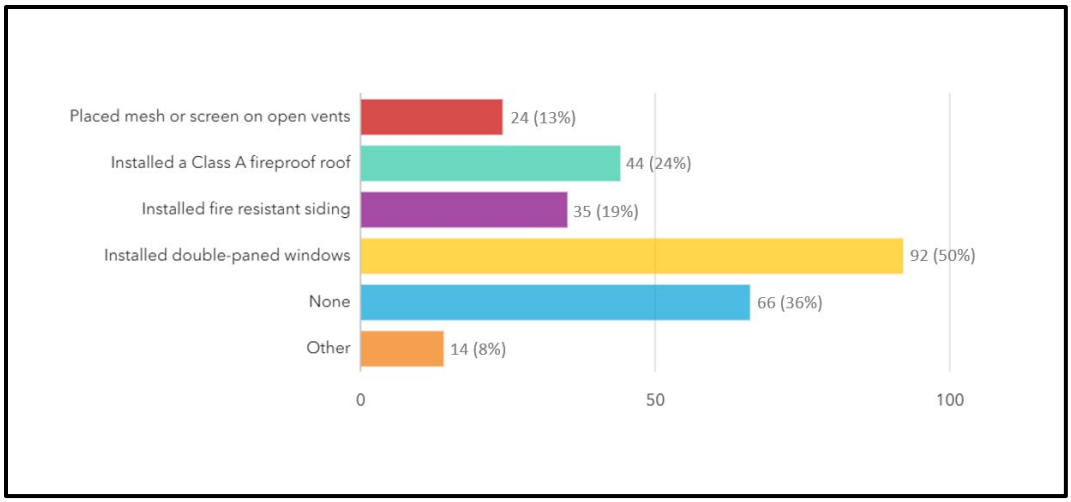

Figure G.21. Reponses to public survey question "Which of the following home hardening activities have you completed?". Respondents were allowed to make multiple selections. Count represents the number of times the choice was selected. Percentages represent the proportion of respondents that included the choice within their response.

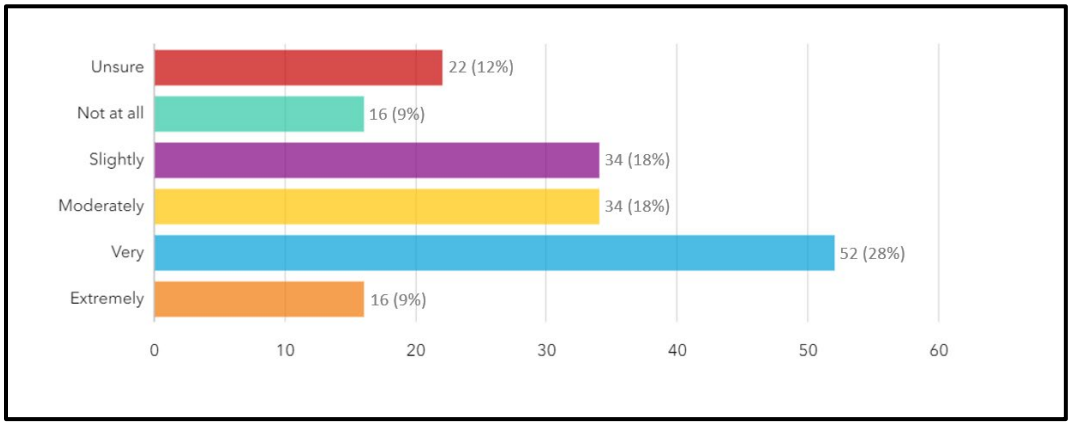

Figure G.22. Reponses to public survey question "Are you interested in implementing "home hardening" on your own residential property?".

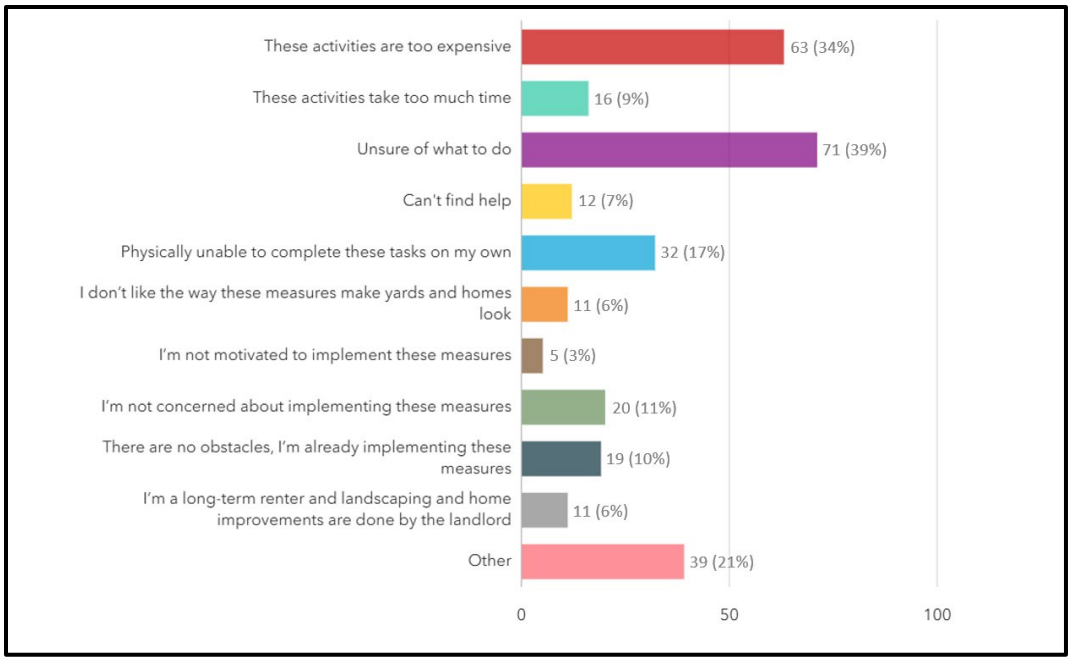

Figure G.23. Reponses to public survey question "Are there any obstacles preventing you from implementing defensible space and home hardening measures on your home?". Respondents were allowed to make multiple selections. Count represents the number of times the choice was selected. Percentages represent the proportion of respondents that included the choice within their response.

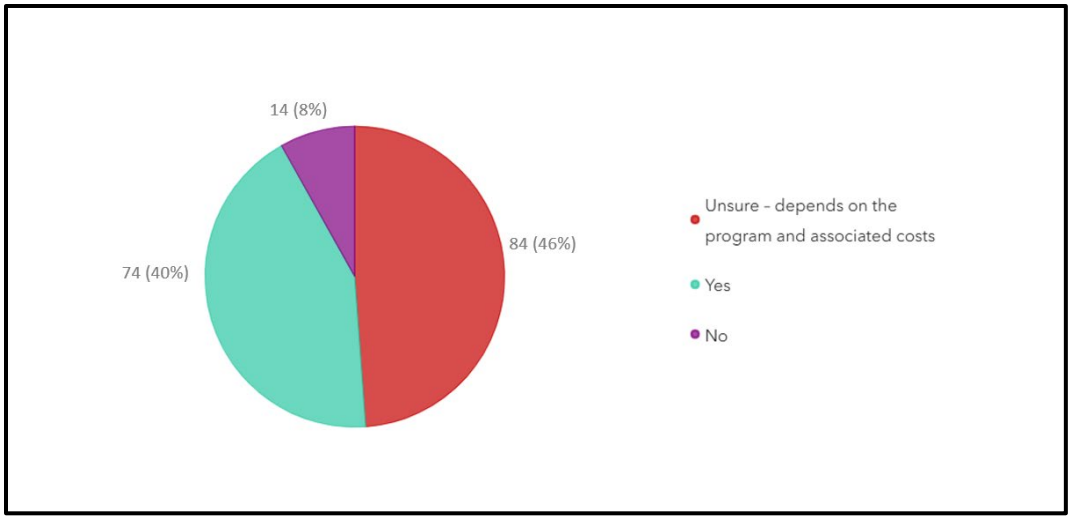

Figure G.24. Reponses to public survey question "Have you participated in implementation efforts in the last 10 years?".

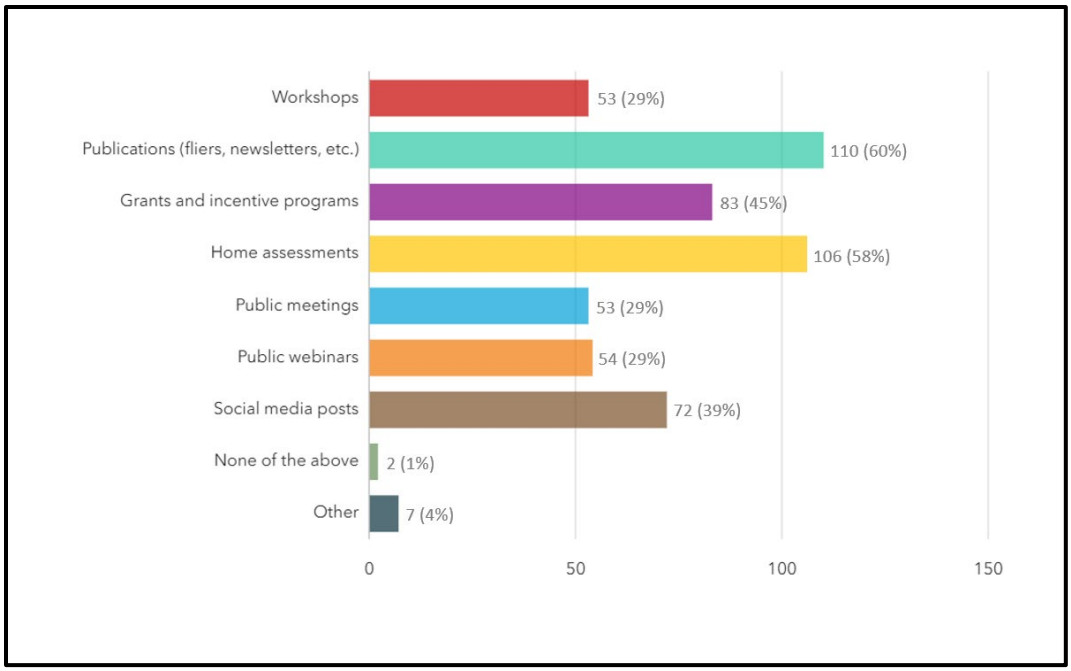

Figure G.25. Reponses to public survey question "What do you think are the most effective ways for residents and the community to become more aware of wildfire risks and hazards?". Respondents were allowed to make multiple selections. Count represents the number of times the choice was selected. Percentages represent the proportion of respondents that included the choice within their response.

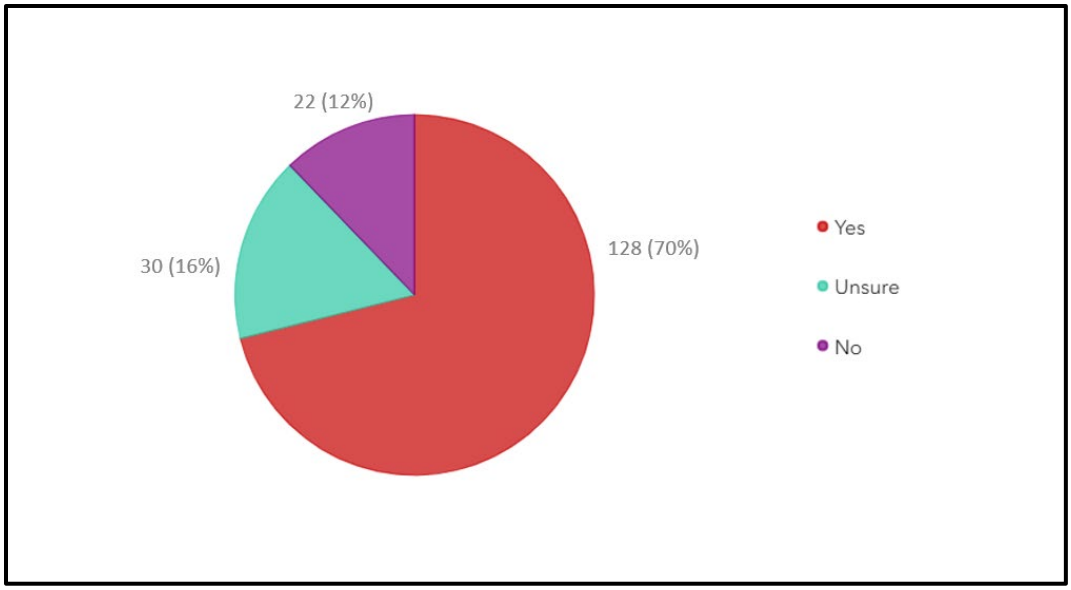

Figure G.26. Reponses to public survey question "Do you believe you would know how to safely evacuate in the event of a wildfire?".

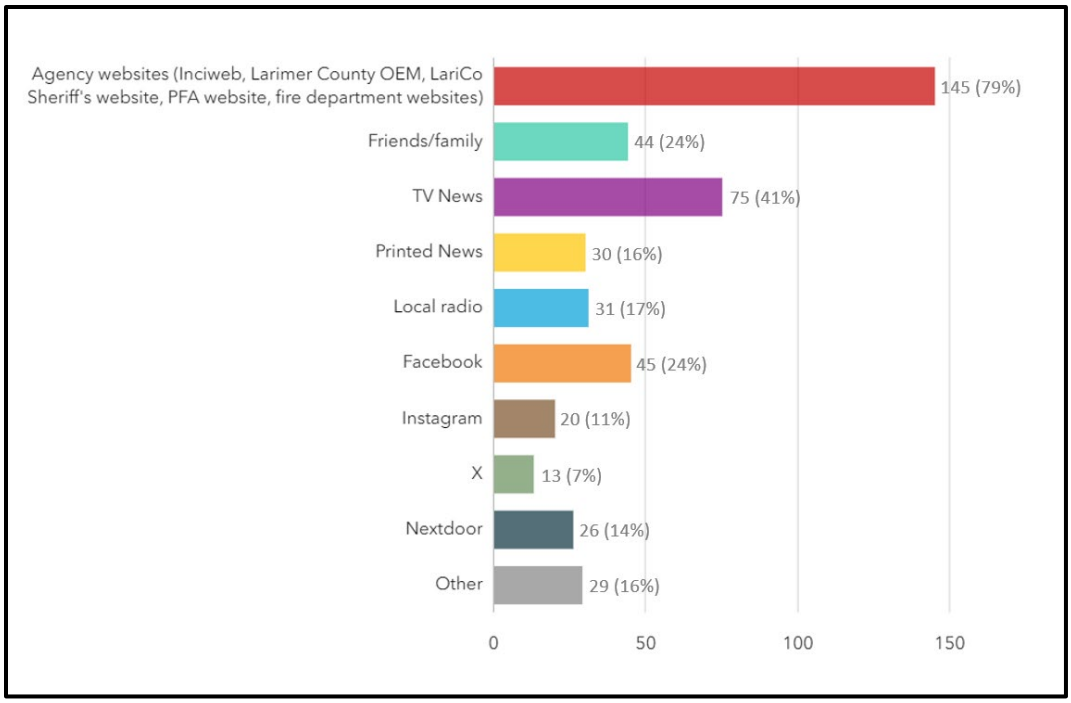

Figure G.27. Reponses to public survey question "Where do you get information about local wildfires?". Respondents were allowed to make multiple selections. Count represents the number of times the choice was selected. Percentages represent the proportion of respondents that included the choice within their response.

APPENDIX H:

Additional Mapping

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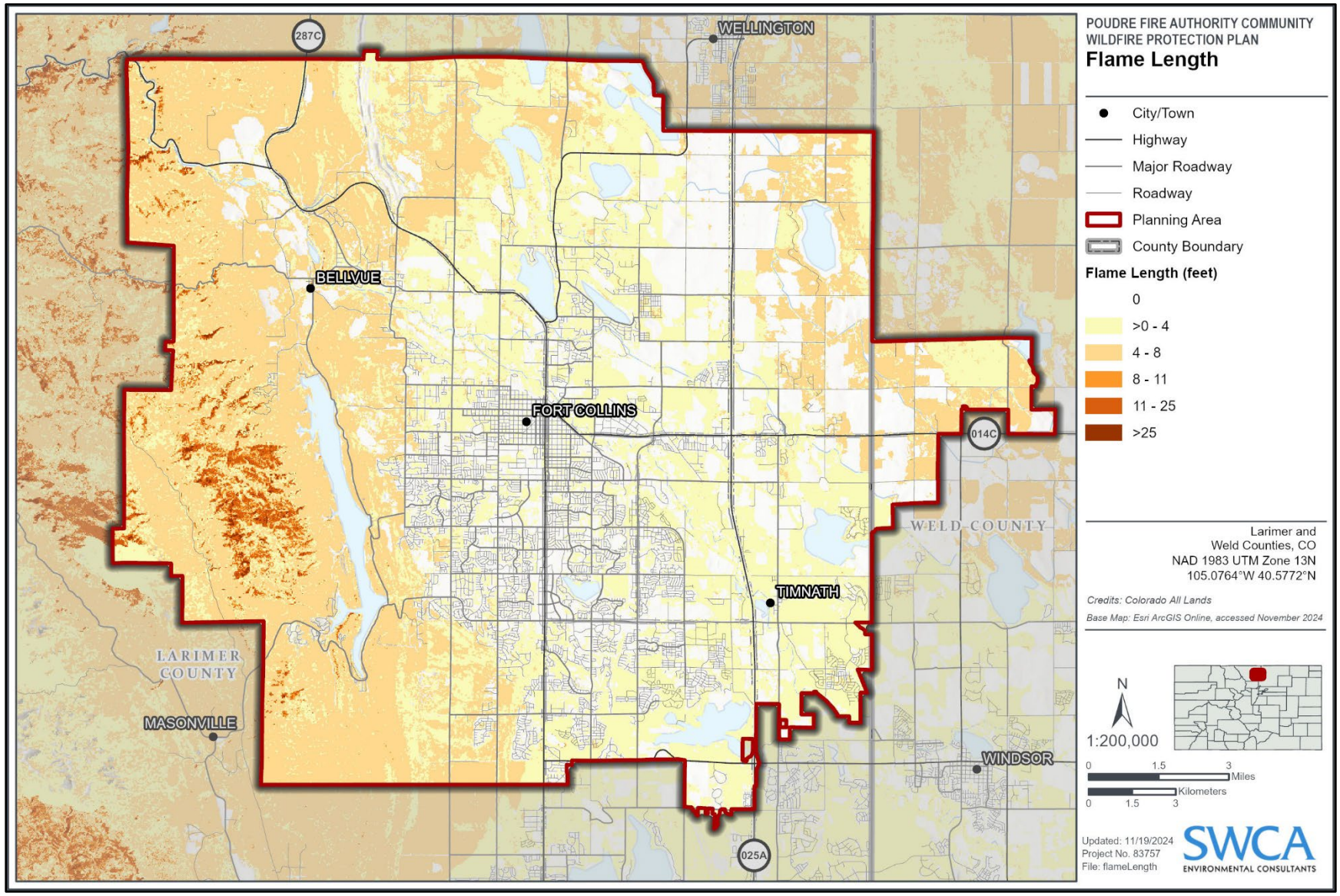

Figure H.1. Quantitative Risk Assessment inputs: flame length. This map shows the simulated flame lengths produced by fuel models under measured weather parameters from a nearby RAWS.

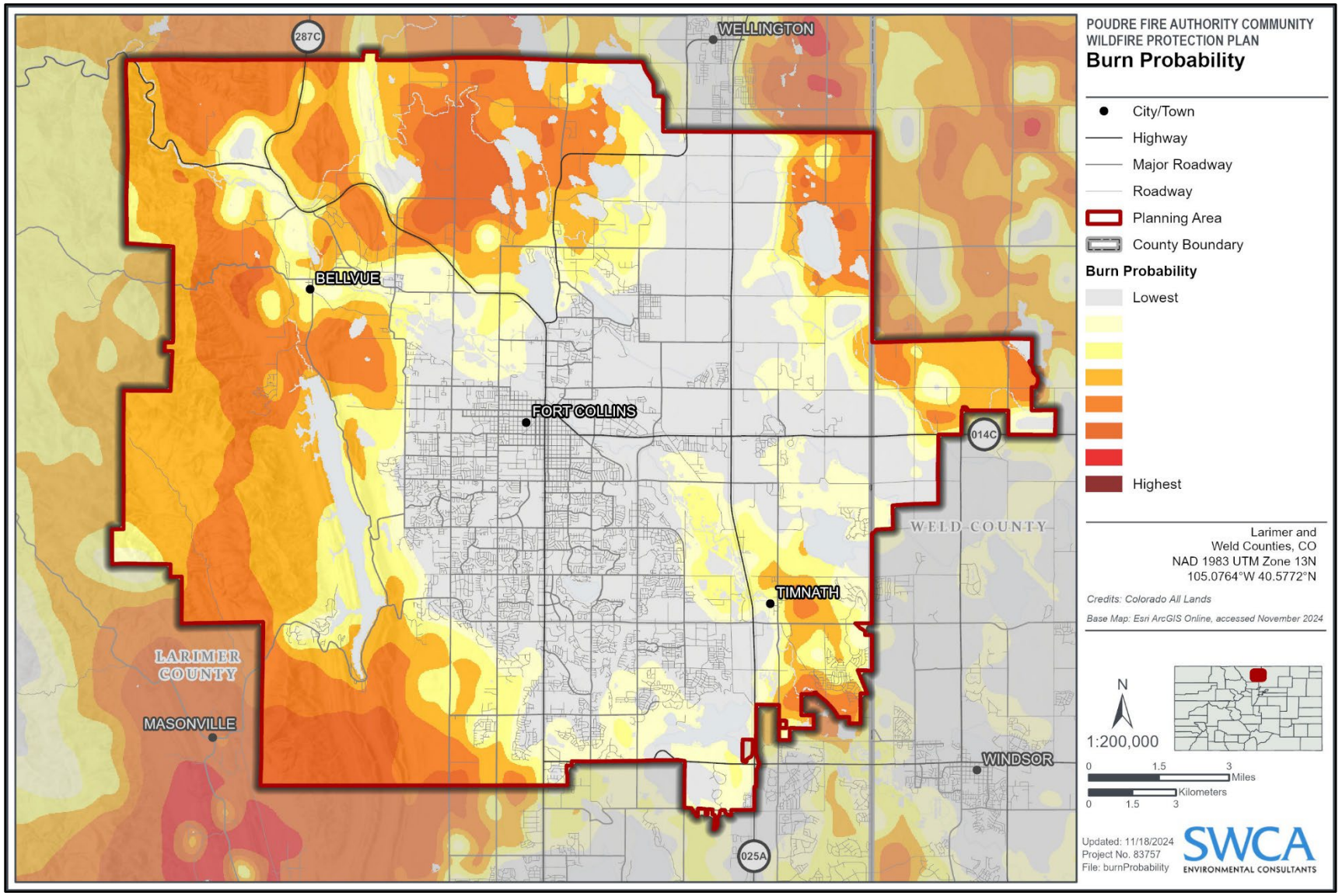

Figure H.2. Quantitative Risk Assessment inputs: burn probability. This map depicts burn probability, which is calculated by using FSim to simulate thousands of fires under historic weather conditions for each 30-meter grid square in the PFA service area. The simulation results for each grid square are interpolated and classified into the raster image above.

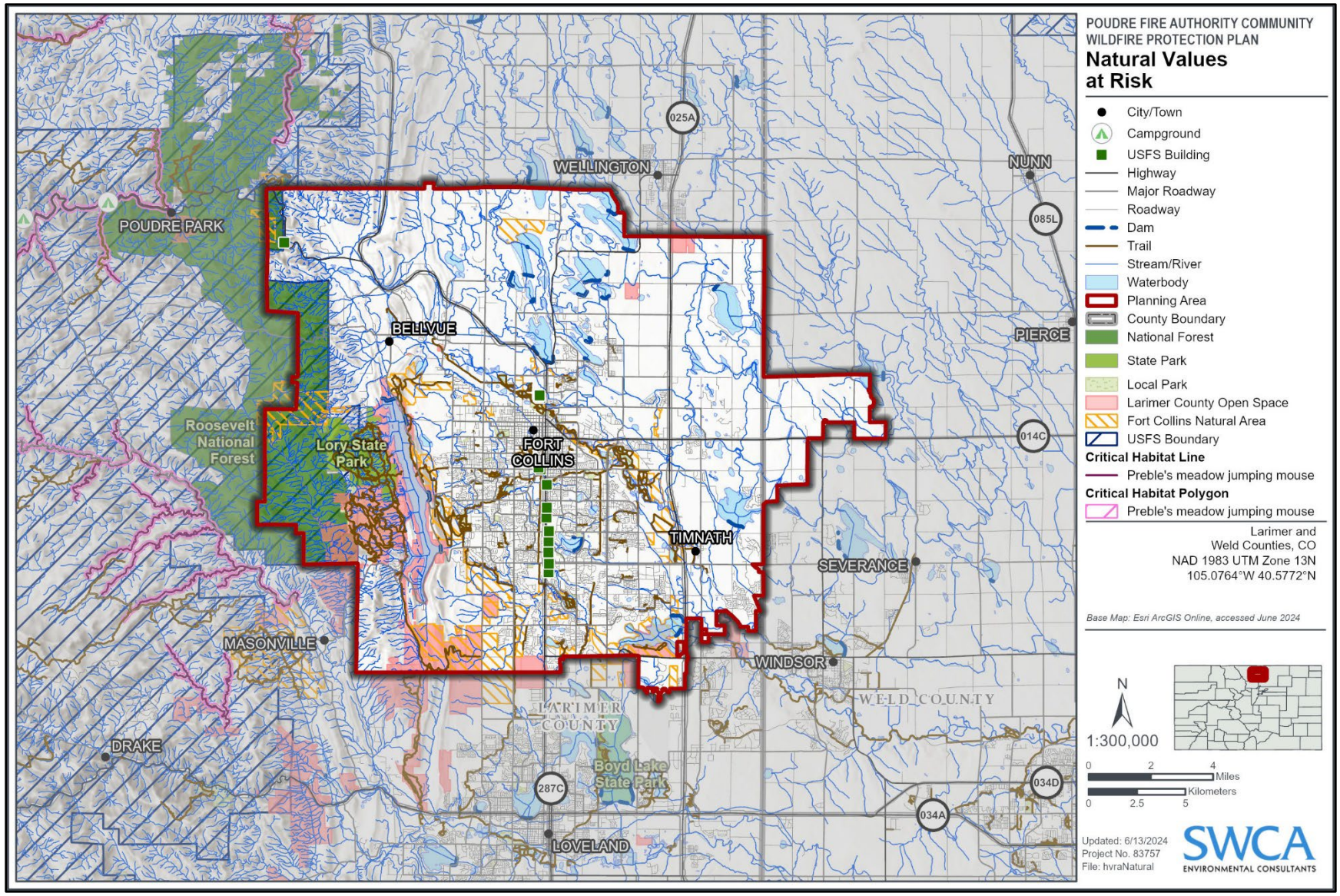

Figure H.3. Highly valued natural resources at risk. Natural values include scenic trail systems, viewsheds, critical habitat, and water sources. Natural resources are often susceptible to short-term negative effects due to wildfire.

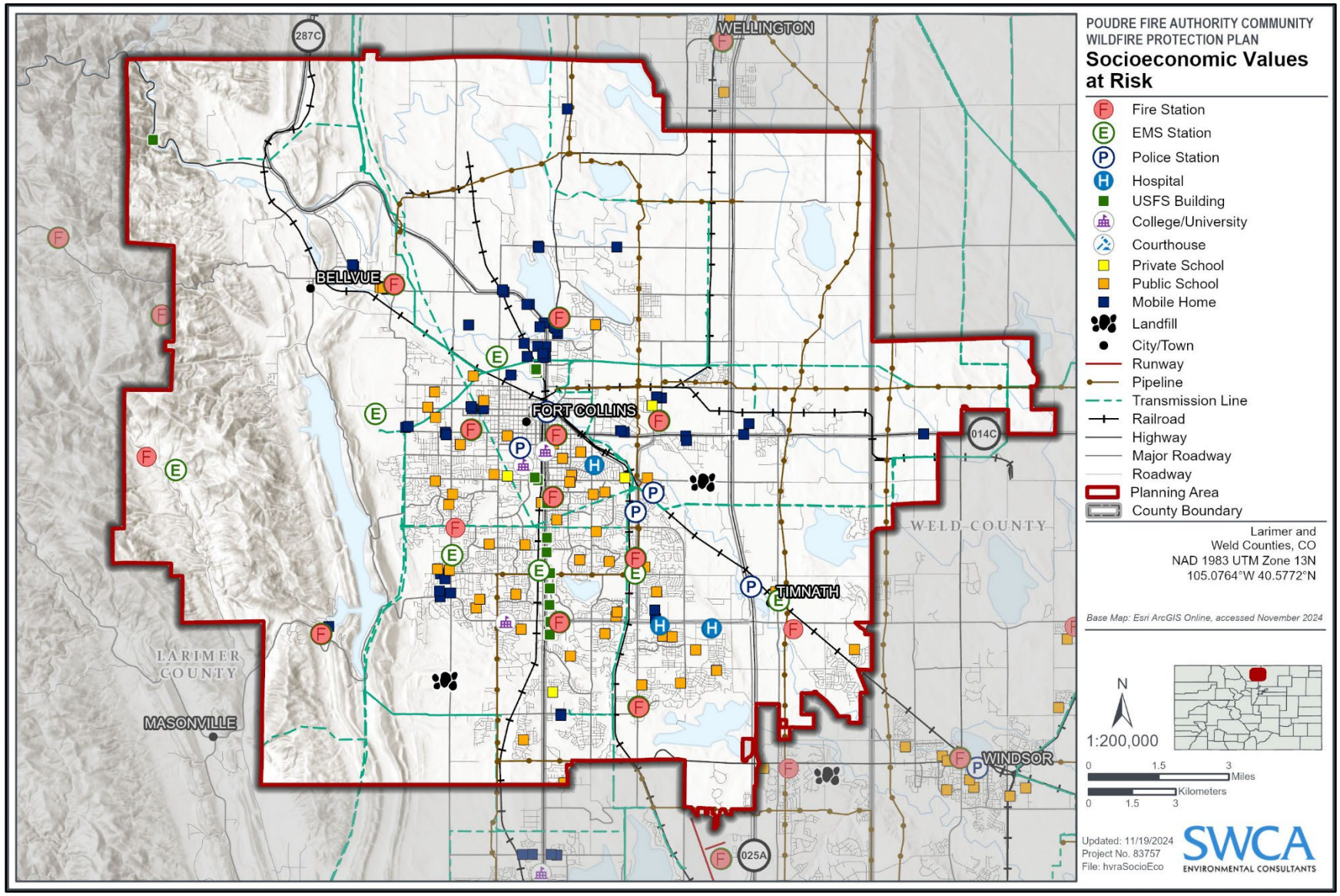

Figure H.4. Highly valued socioeconomic resources at risk. Socioeconomic values at risk can be represented by utilities, infrastructure, and other human-made creations that are crucial to the economic and social well-being of citizens in the area

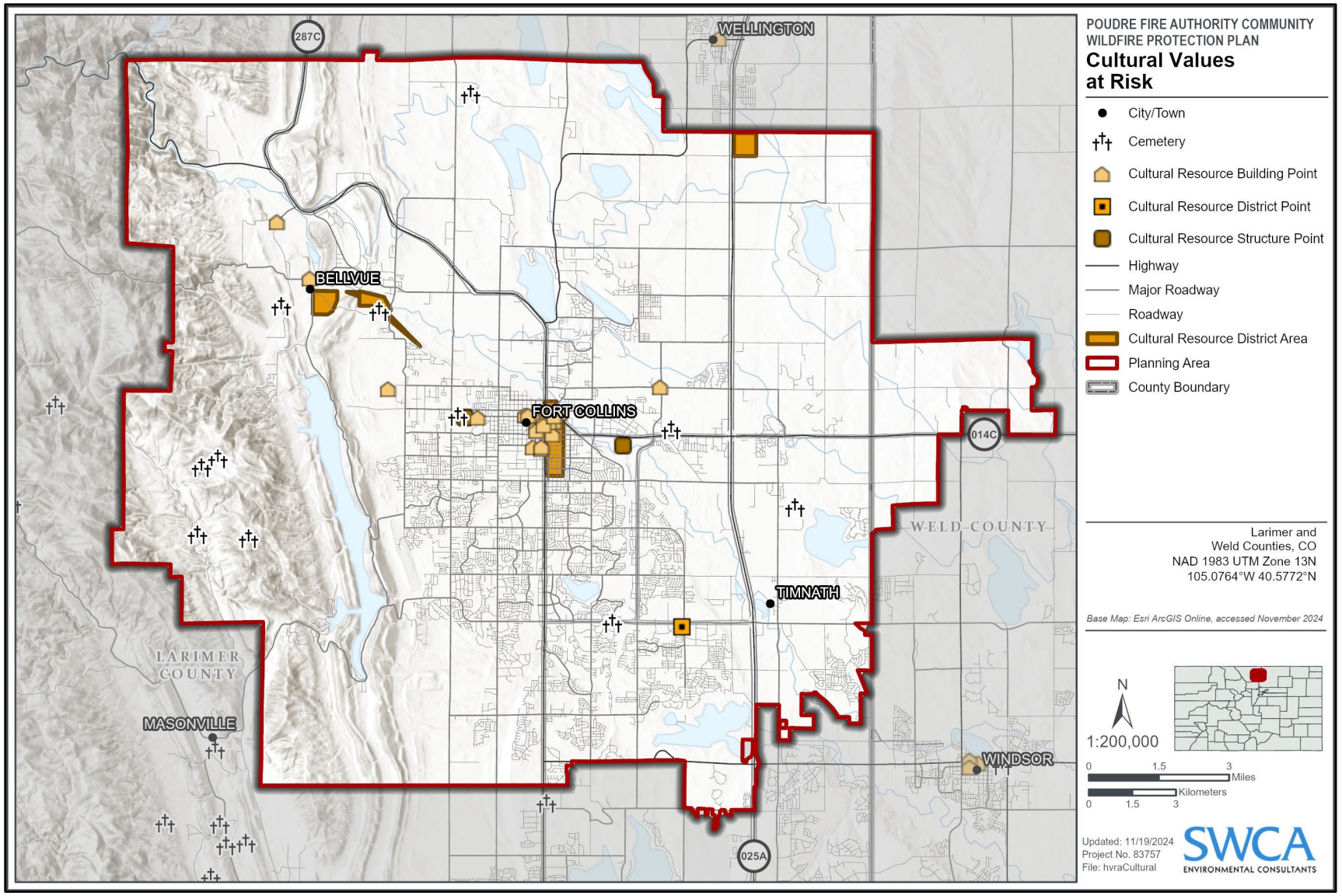

Figure H.5. Highly valued cultural resources at risk. Cultural values are modern or historical human-made creations that are culturally significant to people in the area. Cultural resource district areas are often valuable zones of cultural significance and should be protected from natural disasters such as wildfire.

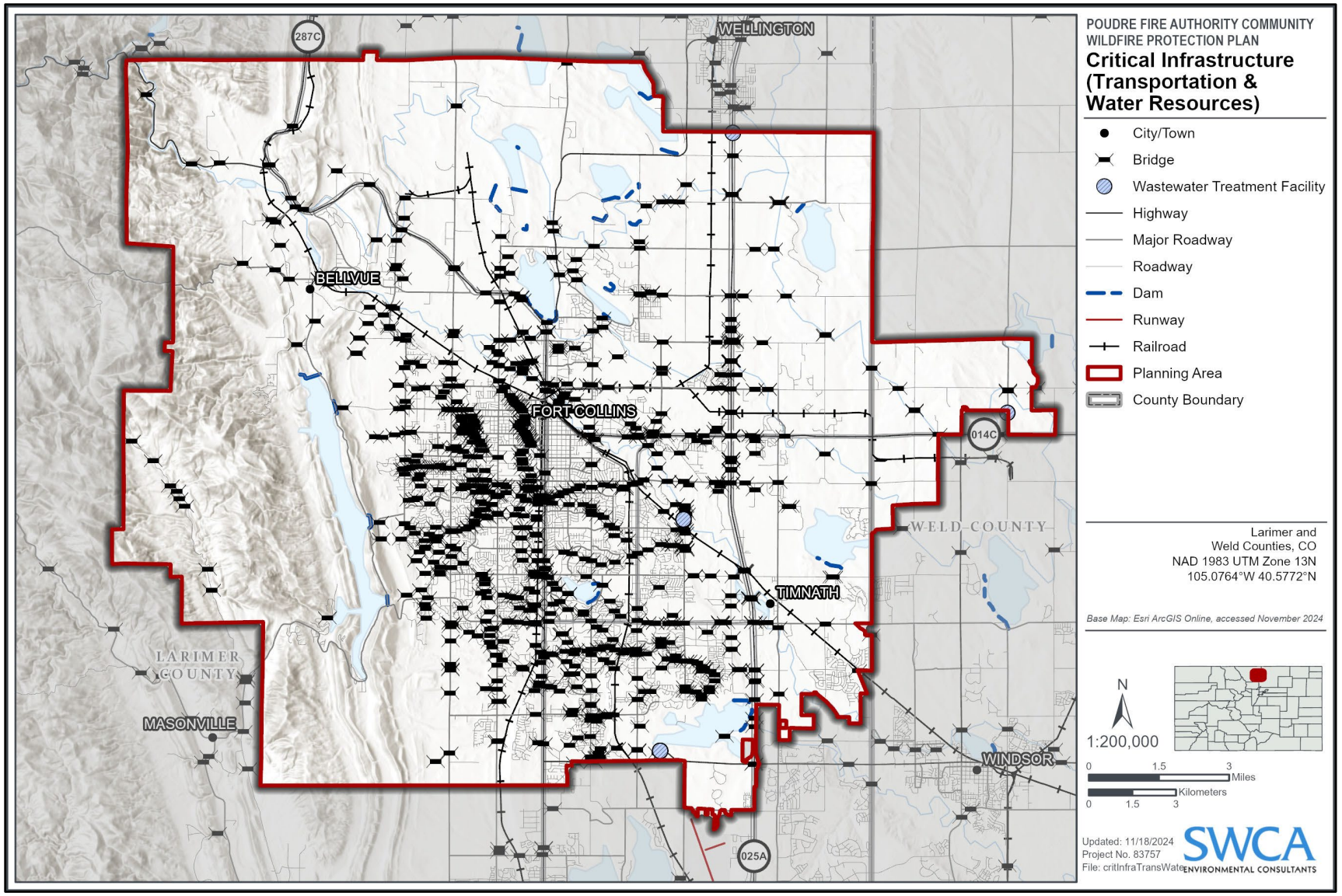

Figure H.6. Critical infrastructure (water and transportation resources). This map specifically calls out critical water and transportation resources that could be impacted by a wildfire event. These resources are often vital to the function of local municipalities and communities.

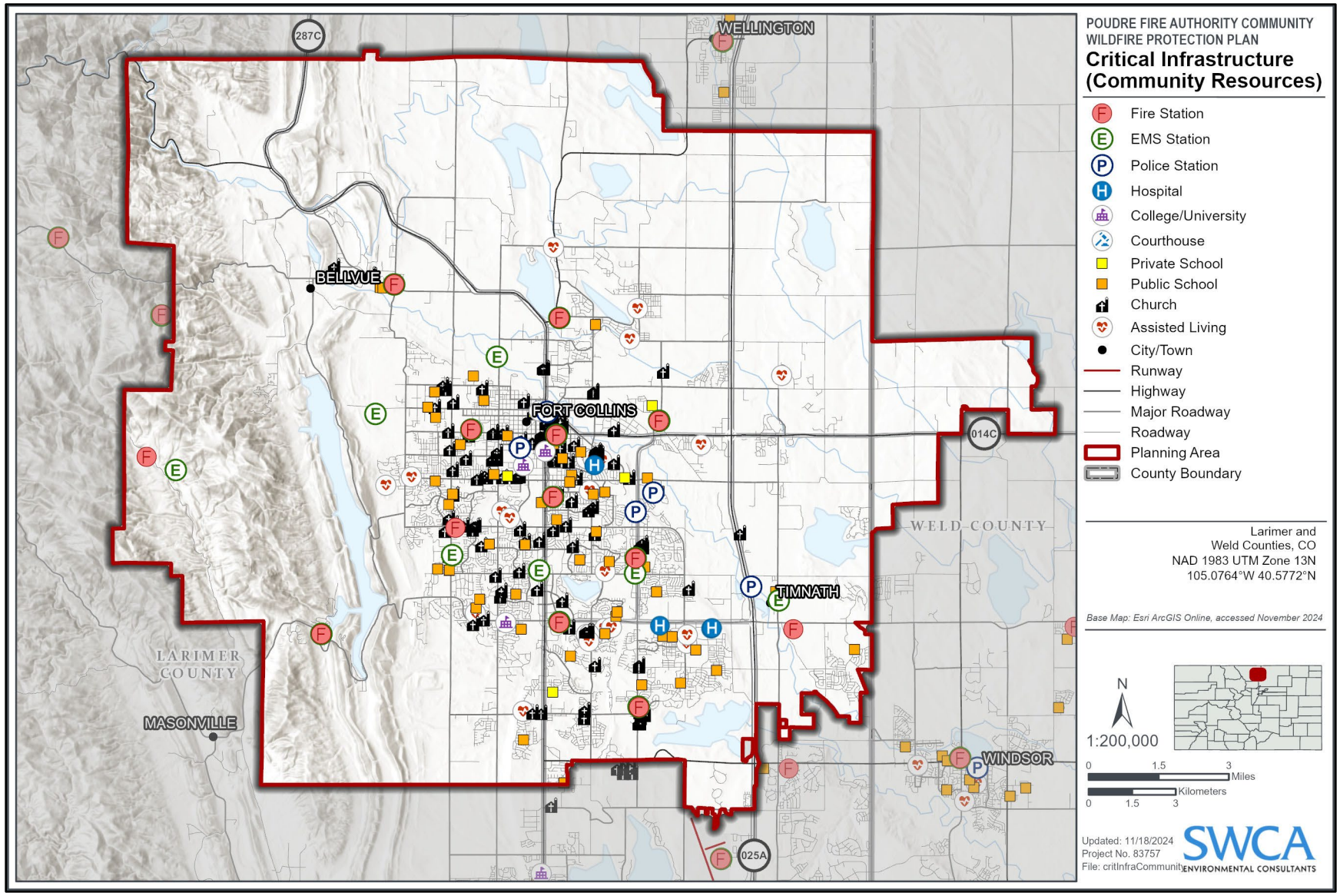

Figure H.7. Critical infrastructure (community resources). Community resources such as fire stations, police stations, and hospitals are critical resources that should be identified and well-known during disaster situations.

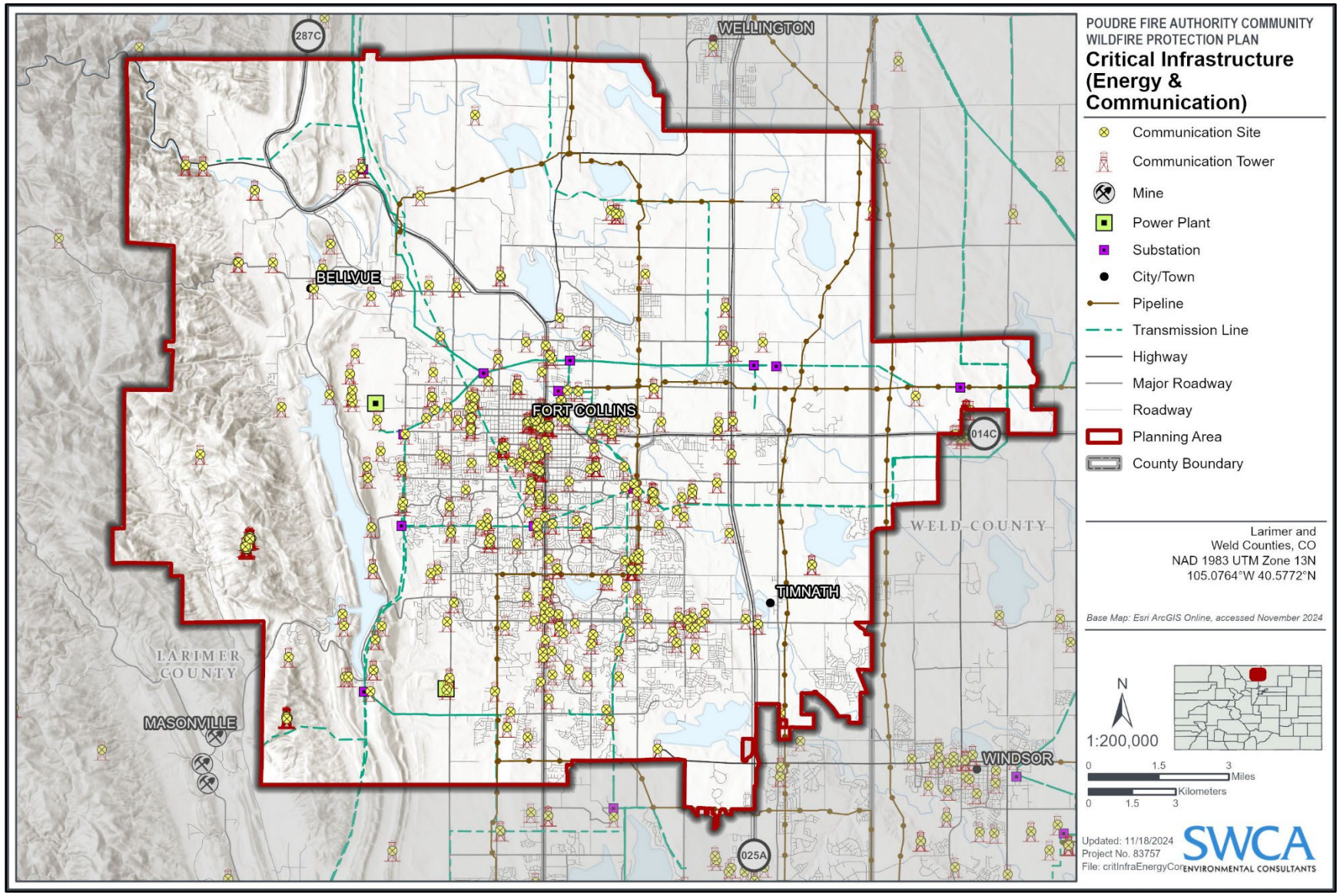

Figure H.8. Critical infrastructure (energy and communication). Energy infrastructure is often responsible for wildfire ignitions and are also key resources to protect in the event of a wildfire.

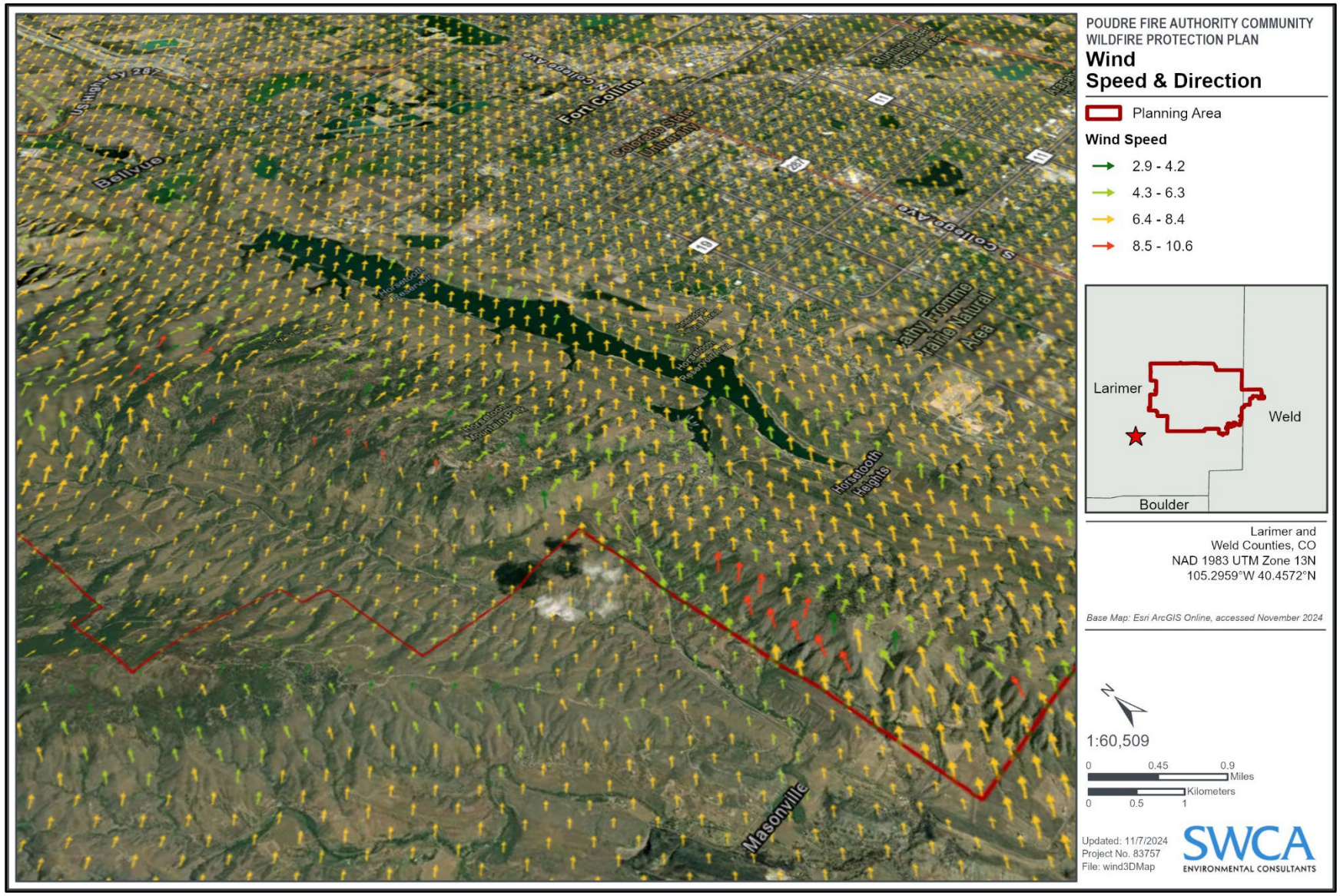

Figure H.9. View of the PFA service area, focusing on wind patterns across Fort Collins and the surrounding region to the northwest.

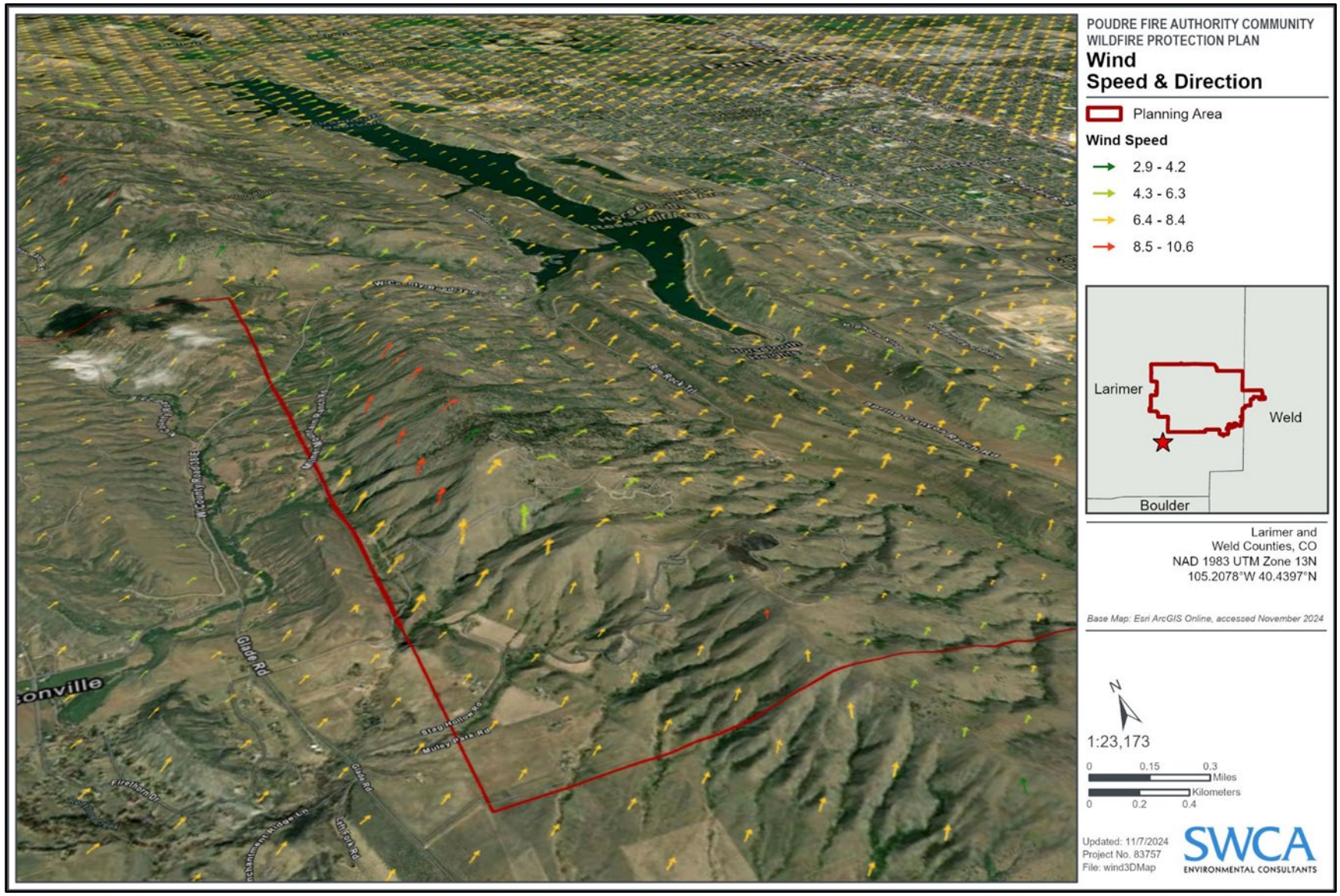

Figure H.10. Perspective of the PFA service area, illustrating wind flow near Masonville and the foothills in the southern portion of the service area.

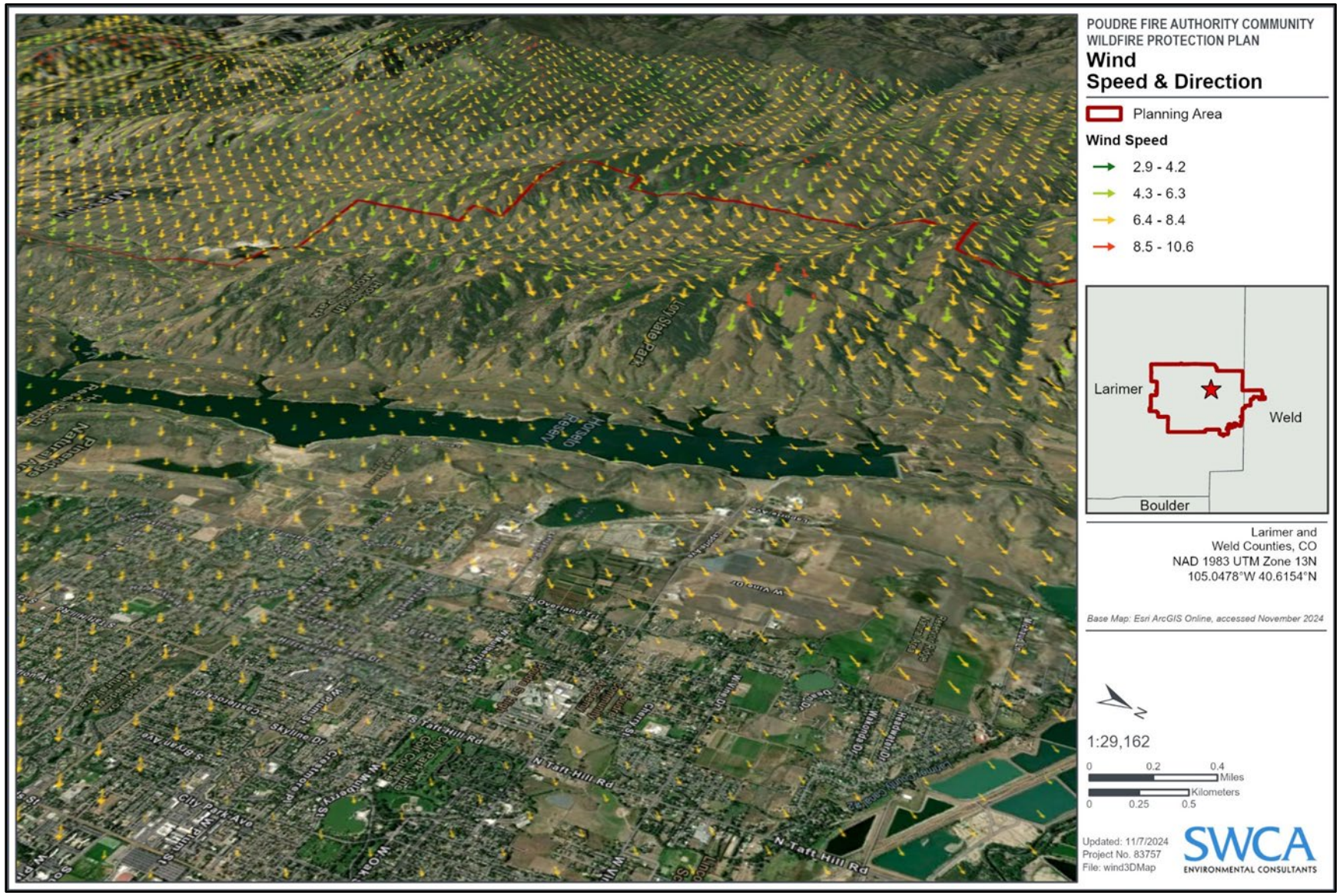

Figure H.11. Overview of the PFA service area, showcasing wind patterns around Horsetooth Reservoir and nearby urban and rural areas.

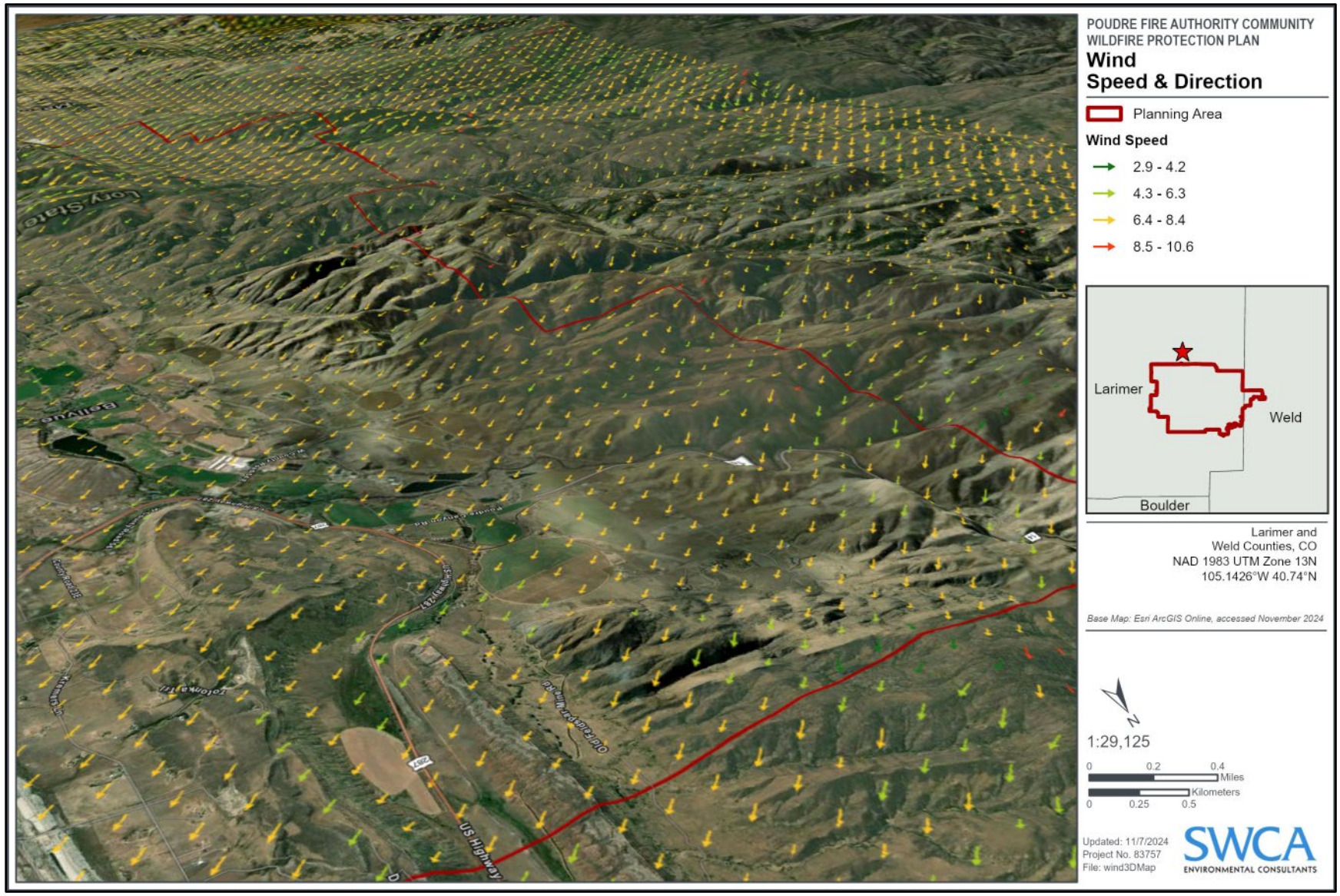

Figure H.12. Perspective of PFA service area, highlighting wind flow along the ridgelines and valleys near the foothills in the southeast.

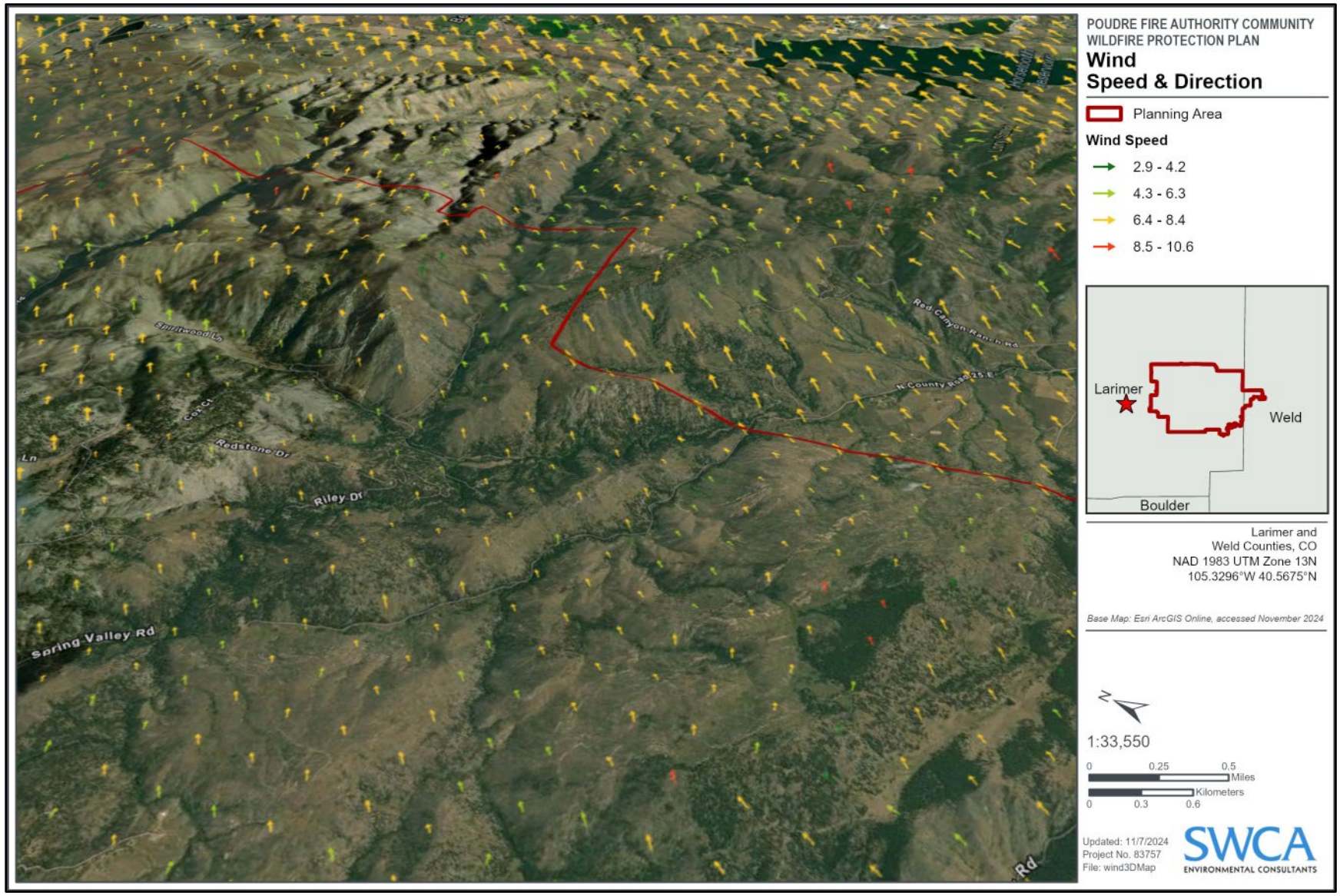

Figure H.13. View of the northern portion of the PFA service area, showing terrain-influenced wind patterns across northern Larimer County.

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APPENDIX I:

Funding Sources

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FUNDING SOURCES

The following section provides information on federal, state, and private funding opportunities for conducting wildfire mitigation, community and landscape resilience building, response capacity, and restoration and recovery projects. It should be noted that matched funding is a requirement of many funding programs, specifically federal opportunities and can be attained through matching funds as well as in-kind contributions. It is important to review and consider each funding program's funding priorities, eligibility, and other criteria when developing a project proposal as these details may change from year to year.

LOCAL AND PRIVATE FUNDING INFORMATION

Source: **National Forest Foundation:** NFF is a federally chartered organization that supports forest stewardship, conservation, and community engagement related to national forest land. Their primary goal is the continued health of national forest and grasslands achieved through uniting communities around protection, restoration, and thoughtful recreation on public lands. As part of this mission, the NFF manages multiple grant programs derived from federal dollars. Listed below are relevant NFF program details.

Agency: National Forest Foundation

Website: https://www.nationalforests.org/grant-programs

The Matching Awards Program is the NFF flagship funding program which is intended to support community engagement and local stewardship efforts. Engaging the community is a primary focus of the program and should center around volunteering events, trainings and workshops, and community science projects. The objective of submitted projects should be to involve the public in National Forest stewardship or restoration activities such as trail maintenance, clean up events, invasive control, and forest and watershed restoration, among other eligible activities.

The Collaborative Capacity Program for Forests & Communities Program supports efforts by collaborative teams to improve forests and grasslands managed by the Forest Service. Efforts funded through this program must show thought and planning toward long-term stewardship with clearly defined outcomes. Funds may be used to support capacity building, skill development and technical services, planning, team development and engagement.

Source: **Patagonia Environmental Grants and Support**

Website: https://www.patagonia.com/how-we-fund/

Description: Patagonia supports innovative work that addresses the root causes of the environmental crisis and seeks to protect both the environment and affected communities. Patagonia focuses on places where they have built connections through outdoor recreation and through their network of retail stores, nationally and internationally.

Source: **State Farm Good Neighbor Citizenship (GNC) Grants**

Agency: State Farm

Website: https://www.statefarm.com/about-us/corporate-responsibility/community-grants/good-neighbor-citizenship-grants

Description: State Farm funding is directed at:

- Auto and roadway safety
- Teen Driver Education
- Home safety and fire prevention
- Disaster preparedness
- Disaster recovery

Source: **Leonardo DiCaprio Foundation Grants**

Agency: Leonardo DiCaprio Foundation

Website: https://www.rewild.org/

Description: The foundation supports projects around the world that build climate resiliency, protect vulnerable wildlife, and restore balance to threatened ecosystems and communities.

Source: **The Urban Land Institute (ULI)**

Website: http://www.uli.org

Description: ULI is a 501(c)(3) nonprofit research and education organization supported by its members. The institute has more than 22,000 members worldwide, representing the entire spectrum of land use and real estate development disciplines, working in private enterprise and public service. The mission of the ULI is to provide responsible leadership in the use of land to enhance the total environment. ULI and the ULI Foundation have instituted Community Action Grants that could be used for Firewise Communities activities. Applicants must be ULI members or part of a ULI District Council. Contact actiongrants@uli.org or review the web page to find your District Council and the application information.

Source: **Environmental Systems Research Institute (ESRI)**

Website: https://www.esri.com/en-us/home

Description: ESRI is a privately held firm and the world's largest research and development organization dedicated to geographic information systems. ESRI provides free software, hardware, and training bundles under ESRI-sponsored Grants that include such activities as conservation, education, and sustainable development, and posts related non-ESRI grant opportunities under such categories as agriculture, education, environment, fire, public safety, and more. You can register on the website to receive updates on grant opportunities.

Source: **U.S. Endowment for Forestry and Communities**

Agency: EPA, NRCS, USFS, U.S. Department of Defense, U.S. Economic Development Agency

Website: https://www.usendowment.org/

Description: As the nation's largest public charity dedicated to keeping our working forests working and ensuring their bounty for current and future generations, the Endowment deploys the creativity and power of markets to advance their mission: The Endowment works collaboratively with partners in the public and private sectors to advance systemic, transformative and sustainable change for the health and vitality of the nation's working forests and forest-reliant communities.

Source: **State Foresters Appropriations**

Agency: National Association of State Foresters

Website: https://www.stateforesters.org/appropriations/

Description: The National Association of State Foresters supports both federal (USDA) and State and Private Forestry programs. Funding allocations and points of contact are clearly displayed in the program fact sheets created by the National Association of State Foresters. Programs supported by NASF range across federal agencies including the EPA, USFS, and NRCS. Individual state Forest Action Plans provide guidance for how each state will prioritize funding allocation of these programs. Programs supported by NASF in 2024 include:

The Forest Stewardship Program specifically targets private landowners with forested lands. The program provides technical assistance and active management efforts to improve the health of forested lands that are privately held.

The State Fire Assistance and Volunteer Fire Assistance Programs provides financial and technical assistance to state and local fire departments to improve wildfire mitigation and response capabilities. The program will fund hazardous fuel management or technical capacity building to complete on-the-ground mitigation efforts.

The Urban and Community Forestry Program funds management of forests and trees within communities and urban settings. The program helps communities and cities maintain healthy green infrastructure through active management and research as well as disaster planning and recovery.

The Landscape Scale Restoration Program is intended to aid state foresters in implementing priority collaborative restoration and conservation efforts across boundaries and jurisdictions. The program aims to improve cooperative forest management and increase the scale of restoration and forest health projects.

The Forest Health Management on Cooperative Lands Program funds efforts to improve the management and resilience of forest lands, specifically targeting invasive species, pests, and disease. The desired outcome is a reduction in tree mortality and improved forest resilience to protect against intense forest fires and the long-term impacts.

The Forest Legacy Program assists private landowners, state agencies, and conservation groups in acquiring land for conservation and implementing easements to protect and restore diverse forest lands.

The Section 319 Non-point Source Grant Program provides funds to implement best management practices during and after silviculture operations to protect water resources.

STATE FUNDING INFORMATION

Source: **Colorado State Forest Service Grants & Funding Assistance**

Agency: Colorado State Forest Service

Website: https://csfs.colostate.edu/grants/

Description: The Colorado State Forest Service manages multiple funding programs to assist private and public landowners in managing forested lands to mitigate the risk of wildfire and steward forests for ecological, economic, and social value. A list of current programs is provided here with links to respective program sites:

Public Programs

- Forest Restoration & Wildfire Risk Mitigation: https://csfs.colostate.edu/grants/forest-restoration-wildfire-risk-mitigation/
- Colorado IRA Urban and Community Forestry: https://csfs.colostate.edu/grants/ira-ucf/
- Wildfire Mitigation Incentives for Local Government: https://csfs.colostate.edu/grants/wildfire-mitigation-incentives-for-local-government/
- Wildfire Mitigation Outreach Grant Program: https://csfs.colostate.edu/grants/wildfire-mitigation-resources-best-practices-grant-program/

Private Landowner Programs

- Forest Ag Program: https://csfs.colostate.edu/forest-ag-program/
- Forest Legacy Program: https://csfs.colostate.edu/forest-legacy-program/
- Forest Stewardship Program: https://csfs.colostate.edu/forest-stewardship-program/
- Tree Farm Program: https://csfs.colostate.edu/tree-farm/

Business Programs

- Timber, Forest Health &Wildfire Mitigation Industries Workforce Development Program: https://csfs.colostate.edu/cowood/workforce-development/
- Wildfire risk Mitigation Loan Fund: https://csfs.colostate.edu/cowood/wildfire-risk-mitigation-loan-fund/

Source: **Colorado Strategic Wildfire Action Program**

Agency: Colorado Department of Natural Resources

Website: https://dnr.colorado.gov/divisions/forestry/co-strategic-wildfire-action-program

Description: In 2021, Senate Bill 21-258 was signed into law and established the Colorado Strategic Wildfire Action Program. This program is intended to bolster wildland firefighter capabilities by expanding workforce development, providing additional funds to hire more crew members, and helping SWIFT, find long-term employment post-incarceration. This funding opportunity is intended to strategically address focal landscapes and concern areas through expanded mitigation and response capacity.

Source: **Various Funding Sources**

Agency: DFPC

Website: https://dfpc.colorado.gov/sections/grants

Description: The DFPC manages three funding programs: HB 22-1194 funding, Firefighter Safety Disease Prevention Grant, and the Volunteer Fire Assistance Grant. HB 22-1194 provides funds to structural and wildland crews to purchase personal protective equipment such as breathing apparatuses and line packs. The FFSDP grant similarly provides funding for any firefighter equipment that improves safety and prevents occupation-related diseases. The VFA Program supports rural fire stations with volunteer crews that serve communities with 10,000 people or fewer.

Source: **Northern Colorado Fireshed Fund**

Agency: Northern Colorado Fireshed Collaborative/National Forest Foundation

Website: https://nocofireshed.org/round-2-fireshed-capacity-funding-now-open/

Description: NCFC developed the Fireshed fund in collaboration with the National Forest Foundation and Arapahoe Roosevelt National Forests with the intention of achieving landscape scale improvements to fuel reduction, prescribed burning, and strategic wildland fire management. Applicants must work with NCFC to ensure their project aligns with the mission and priorities of NCFC and the National Forest Foundation. Funding requests can include collaborative planning, capacity building, education, and treatment implementation.

Source: **Non-motorized Trails Grants**

Agency: Colorado Parks and Wildlife (CPW)

Website: https://cpw.state.co.us/non-motorized-trails-grants

Description: The non-motorized Trails Grants program is funded by Great Outdoors Colorado and the Federal Recreational Trail Program and administered by CPW. The program is intended to fund outdoor recreation opportunity improvements while protecting wildlife, habitat and cultural resources Trail-related projects can include construction, maintenance, planning, and support. Planning applications can include design, inventory, use studies, and feasibility studies.

Source: **GOCO Planning and Capacity**

Agency: Great Outdoors Colorado

Website: https://goco.org/programs-projects/grant-programs/planning-and-capacity

Description: The Planning and Capacity grant program will fund projects related to planning, capacity building, research, and opportunity pathway development in the areas of outdoor recreation, access, stewardship, and conservation. Capacity building and education related projects should improve the ability of the applicant to make informed, actionable decisions. Research and information sharing is also fundable through this opportunity. Potential applicants should consult with their region program officer to discuss project relevance and scope.

Additional funding programs are available through GOCO such as the stewardship impact program and the RESTORE Colorado program, which is jointly managed by GOCO and NFWF, discussed below in federal funding.

Source: **Wildfire Mitigation Outreach Grant Program**

Agency: Colorado State Forest Service

Website: https://csfs.colostate.edu/grants/wildfire-mitigation-outreach/

Description: This grant opportunity provides funding for wildfire mitigation outreach efforts for landowners in high wildfire hazard zones. Applicants must consult the Colorado Forest Atlas for hazard designations. Projects may include outreach material development, conducting outreach events, educational programs or campaigns, and other education related activities.

Source: **Colorado Watershed Restoration Program**

Agency: Colorado Water Conservation Board

Website: https://cwcb.colorado.gov/watershed-grants

Description: This funding program is specifically targeted to produce Wildfire Ready Action Plans and implement projects intended to mitigate post-fire watershed impacts. Funding can be used for planning, engineering designs, and implementing projects that protects values from the potential impacts of post-wildfire watershed impacts.

Source: **Colorado Water Plans Grant**

Agency: Colorado Water Conservation Board

Website: https://cwcb.colorado.gov/watershed-grants

Description: The Water Plan Grant Program was created to support the implementation of goals and objectives of the 2023 Colorado Water Plan. Each potential project team must contact the local Colorado Water Conservation Board staff member that is responsible for the watershed in which work is planned. Efforts funded by this program can include water storage and sharing, conservation and land use planning, public engagement and innovation, agricultural improvements, and watershed health. Projects may involve planning, design, and implementation.

Source: **Project bill Grants**

Agency: Colorado Water Conservation Board

Website: https://cwcb.colorado.gov/watershed-grants

Description: The Project Bill Grants is a general investment fund that can be invested in watershed projects that may not fall within other CWCB funding programs. Projects are assessed and approved on a case-by-case basis depending on current geographic needs. Notably, the program will fund river and floodplain restoration and management. Projects must have an economic nexus and improve or maintain a valuable industry in the state such as agriculture.

Source: **Colorado Healthy Rivers Fund**

Agency: Colorado Watershed Assembly

Website: https://www.coloradowater.org/colorado-healthy-rivers-fund-1

Description: The Healthy River Fund is dedicated to supporting collaborative efforts in watersheds that protect and restore watershed health and function. The program will fund planning and project implementation. This can include implementing TMLs, best management practices, channel stability and riparian restoration, flood prevention, habitat improvements, and monitoring activities.

> **Other Colorado Watershed Assembly Funding Programs:** The Colorado Watershed Assembly regularly updates its website with funding opportunities from agencies and private entities. The objective and eligibility of these listings varies so please visit the below link for the latest information on watershed funding opportunities: https://www.coloradowater.org/funding-opportunities

FEDERAL FUNDING INFORMATION

Source: **2022 Infrastructure Investments and Jobs Act**

Agency: Multiple

Website: https://www.whitehouse.gov/build/guidebook/

Description: The Infrastructure Investments and Jobs act allocated funding through various departments for infrastructure projects including, but not limited to roads, bridges, and major projects; passenger and freight rail; highway and pedestrian safety; public transit; broadband; ports and waterways; airports; water infrastructure; power and grid reliability and resiliency; resiliency, including funding for coastal resiliency, ecosystem restoration, and weatherization; clean school buses and ferries; electric vehicle charging; addressing legacy pollution by cleaning up Brownfield and Superfund sites and reclaiming abandoned mines; and Western Water Infrastructure.

Specifically, the **Community Wildfire Defense Grant Program** is a $1 billion program through the Department of Agriculture which provides grants to communities at risk from wildfire to develop or revise their community wildfire protection plans and carry out projects described within those plans. It will include a mix of formula and competitive funds.

Source: **Innovative Finance for National forests**

Agency: U.S. Department of Agriculture

Website: https://www.usendowment.org/ifnf/

Description: The Innovative Finance for National Forests Grant Program aims to bring in non-USFS funds to increase forest resilience. There are three main topics for funding: wildfire resilience and recovery, sustainable recreation access and infrastructure, and watershed health. In addition, three types of projects are funded: pilot programs with on-the-ground implementation, scaling projects to deliver backlogs of unfunded work, and research and development to provide to new forest information.

Source: **Building Resilient Infrastructure and Communities (BRIC) Grant Program**

Agency: FEMA

Website: https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities

Description: BRIC will support states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. The BRIC program guiding principles are supporting communities through capability and capacity building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency. FEMA's BRIC program does require that the state or tribe applying has received a disaster declaration within 7 years of applying.

Source: **Hazard Mitigation Grant Program (HMGP)**

Agency: FEMA

Website: https://www.fema.gov/grants/mitigation/hazard-mitigation

Description: The HMGP provides funding to state, local, tribal, or territorial governments (and individuals or businesses if the community applies on their behalf) to rebuild with the intentions to

mitigate future losses due to potential disasters. This grant program is available after a presidentially declared disaster. HMGP funds are only available following a Presidential Major Disaster Declaration. This means the program is activated in response to specific declared disasters, and funding is allocated based on the level of damages and needs identified during the disaster recovery process.

Source: **Hazard Mitigation Grant Program (HMGP) – Post Fire**

Agency: FEMA

Website: https://www.fema.gov/grants/mitigation/post-fire

Description: The HMGP Post Fire grant program provides assistance to communities for the purpose of implementing hazard mitigation measures following a wildfire. Mitigation measures may include:

- Soil stabilization
- Flood diversion
- Reforestation

The program is intended to reduce the potential impacts of flooding, erosion, and sedimentation that may occur on post-fire landscapes and directly impact infrastructure, watersheds, and recovery efforts. HMGP Post Fire funds are available after a Fire Management Assistance Grant (FMAG) is declared by FEMA for a wildfire. This declaration triggers the availability of post-fire mitigation funds. The amount of funding available is generally based on a percentage of the total estimated federal assistance provided under the FMAG declaration. Typically, HMGP grants cover up to 75% of the eligible project costs, with the remaining 25% to be covered by non-federal sources.

Source: **Joint Chiefs' Landscape Restoration Partnerships**

Agency: USDA

Website: https://www.nrcs.usda.gov/programs-initiatives/joint-chiefs-landscape-restoration-partnership?mc_cid=1d3c9a2a34&mc_eid=60081c6896#assistance

Description: The Joint Chiefs' Landscape Restoration Partnership allows the NRCS and Forest Service to work collaboratively with diverse land managers including those on private forest lands, agricultural lands, tribal lands, and publicly owned lands to implement forest health and resilience efforts at landscape scale. The program requires collaborative pre-planning to bring together partners and identify large-scale conservation and restoration efforts. Once partnerships have been identified, project groups will work with USDA experts to implement identified actions. The program prioritizes funding for projects that mitigate wildfire risk, improve water quality, and restore forest ecosystems.

Source: **Flood Mitigation Assistance (FMA) Grant**

Agency: FEMA

Website: https://www.fema.gov/grants/mitigation/floods

Description: The Flood Mitigation Assistance Program is a competitive grant program that provides funding to states, local communities, federally recognized tribes, and territories. Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program. FEMA chooses recipients based on the applicant's ranking of the project and the eligibility and cost-effectiveness of the project. The FMA Grant Program does not require a disaster declaration for eligibility. This program is designed to be proactive, providing

funding for flood mitigation projects and planning on an annual basis, regardless of whether a specific disaster has been declared.

Source: **Emergency Management Performance Grant (EMPG)**

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/emergency-management-performance

Description: The EMPG program provides funding to state, local, tribal, and territorial emergency management agencies with the overall goal of creating a safe and resilient nation. The two main objectives of the program are 1) closing capability gaps that are identified in the state or territory's most recent Stakeholder Preparedness Review (SPR); and 2) building or sustaining those capabilities that are identified as high priority through the Threat and Hazard Identification and Risk Assessment (THIRA)/SPR process and other relevant information sources. The grant recipient and Regional Administrator must come to an agreement on program priorities, which are crafted based on national, state, and regional priorities. The EMPG program does not require a disaster declaration for eligibility. It is a pre-disaster grant program aimed at enhancing and sustaining state and local emergency management capabilities.

Source: **Regional Catastrophic Preparedness (RCP) Grants**

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/regional-catastrophic

Description: The Regional Catastrophic Preparedness Grant program provides funding to increase collaboration and capacity in regard to catastrophic incident response and preparation. The program will fund planning, capacity building, outreach and education campaigns, and local studies.
The objective of proposed project must be to improve community resilience to natural disasters in regard to housing and community safety, response and recovery, and long-term sustainability and preparedness. The RCPGP does not necessitate a disaster declaration for the allocation of funds. This program is proactive, designed to enhance regional preparedness and resilience to potential catastrophic events before they occur.

Source: **Fire Management Assistance Grant (FMAG)**

Agency: FEMA

Website: https://www.fema.gov/assistance/public/fire-management-assistance

Description: Fire Management Assistance is available to state, local, and tribal governments for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands, which threaten such destruction as would constitute a major disaster. The Fire Management Assistance declaration process is initiated when a state submits a request for assistance to the FEMA Regional Director at the time a "threat of major disaster" exists. The entire process is accomplished on an expedited basis and a FEMA decision is rendered in a matter of hours. Before a grant can be awarded, a state must demonstrate that total eligible costs for the declared fire meet or exceed either the individual fire cost threshold, which applies to single fires, or the cumulative fire cost threshold, which recognizes numerous smaller fires burning throughout a state. To receive FMAG funding, there must be a Fire Management Assistance declaration by FEMA. This declaration can be requested by a state, local, tribal, or territorial government during an ongoing wildfire that threatens to cause major destruction and meets the criteria for FMAG assistance.

Source: **Emergency Forest Restoration Program (EFRP)**

Agency: USDA Farm Service Agency (FSA)

Website: https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/emergency-forest-restoration/indexprogram/emergency-forest-restoration/index

Description: The EFRP helps the owners of nonindustrial private forests restore forest health damaged by natural disasters. The EFRP does this by authorizing payments to owners of private forests to restore disaster damaged forests. The local FSA County Committee implements EFRP for all disasters with the exceptions of drought and insect infestations. Eligible practices may include debris removal, such as down or damaged trees; site preparation, planting materials, and labor to replant forest stand; restoration of forestland roads, fire lanes, fuel breaks, or erosion-control structures; fencing, tree shelters; wildlife enhancement. To be eligible for EFRP, the land must have existing tree cover; and be owned by any nonindustrial private individual, group, association, corporation, or other private legal entity.

Source: **Emergency Conservation Program (ECP)**

Agency: FSA

Website: https://www.fsa.usda.gov/programs-and-services/conservation-programs/emergency-conservation/indexconservation/index

Description: The ECP helps farmers and ranchers to repair damage to farmlands caused by natural disasters and to help put in place methods for water conservation during severe drought. The ECP does this by giving ranchers and farmers funding and assistance to repair the damaged farmland or to install methods for water conservation. The grant could be used for restoring conservation structures (waterways, diversion ditches, buried irrigation mainlines, and permanently installed ditching system).

Source: **Environmental Quality Incentives Program (EQIP)**

Agency: NRCS

Website: https://www.nrcs.usda.gov/programs-initiatives/eqip-environmental-quality-incentives

Description: EQIP is a voluntary program authorized under the Agricultural Act of 2014 (2014 Farm Bill) that helps producers install measures to protect soil, water, plant, wildlife, and other natural resources while ensuring sustainable production on their farms, ranches, and forest lands. Funds can be used to improve water quality and system function, reduce erosion and sedimentation, and mitigate against volatile weather amongst other activities. Forest and wildlife resource focused lands are eligible for funding in addition to traditional agricultural operations.

Source: **Emergency Watershed Protection (EWP) Program**

Agency: National Resource Conservation Service (NRCS)

Website: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/

Description: The program offers technical and financial assistance to help local communities relieve imminent threats to life and property caused by floods, fires, windstorms, and other natural disasters that impair a watershed. The program requires that a local watershed emergency be declared by the state NRCS conservationist and that activities are supported by a local sponsor.

Eligible sponsors include cities, counties, towns, conservation districts, or any federally recognized Native American tribe or tribal organization. Interested public and private landowners can apply for EWP Program recovery assistance through one of those sponsors.

EWP Program covers the following activities.

- Debris removal from stream channels, road culverts, and bridges
- Reshape and protect eroded streambanks
- Correct damaged drainage facilities
- Establish vegetative cover on critically eroded lands
- Repair levees and structures
- Repair conservation practices

Source: **Specific EPA Grant Programs**

Agency: EPA

Website: https://www.epa.gov/grants/region-8-grants-information

Description: Various grant programs are listed under this site. Listed below are examples of grants offered:

- Multipurpose Grants to States and Tribes: https://www.epa.gov/grants/multipurpose-grants-states-and-tribes
- Environmental Education Grants: https://www.epa.gov/education/grants
- Environmental Justice Grants: https://www.epa.gov/environmentaljustice/environmental-justice-grants-funding-and-technical-assistance

Source: **Conservation Innovation Grants (CIG)**

Agency: National Resource Conservation Service

Website: https://www.nrcs.usda.gov/programs-initiatives/cig-conservation-innovation-grants

Description: CIG is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging federal investment in environmental enhancement and protection, in conjunction with agricultural production. Under CIG, EQIP funds are used to award competitive grants to non-federal governmental or nongovernmental organizations, tribes, or individuals. CIG enables the NRCS to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the nation's most pressing natural resource concerns. CIG will benefit agricultural producers by providing more options for environmental enhancement and compliance with federal, state, and local regulations. The NRCS administers the CIG program. The CIG requires a 50/50 match between the agency and the applicant. The CIG has two funding components: national and state. Funding sources are available for water resources, soil resources, atmospheric resources, and grazing land and forest health.

Source: **Urban and Community Forestry Program, National Urban and Community Forestry Challenge Cost Share Grant Program**

Agency: U.S. Forest Service

Website: https://www.fs.usda.gov/managing-land/urban-forests/ucf

Description: U.S. Forest Service funding will provide for Urban and Community Forestry Programs that work with local communities to establish climate-resilient tree species to promote long-term forest health. The other initiative behind this program is to promote and carry out disaster risk mitigation activities, with priority given to environmental justice communities. The primary goals of the program change annually and are based on the National Ten Year Urban and Community Forestry Action Plan. The current cycles goals are to 1) increase biodiversity, health, and resilience of community forests, and 2) support the use of more locally grown, regionally adapted, insect- and pest-resistant, and diverse native or site-appropriate species.

Source: **Catalog of Federal Funding Sources; Land Resources**

Agency: Multiple

Website: https://ofmpub.epa.gov/apex/wfc/f?p=165:512:6483383318137:::512::

Description: The Land Finance Clearing House is a catalog of federal funding sources for all things land related.

Examples of the types of grants found at this site are:

- Forest and Woodlands Resource Management Grant: https://sam.gov/fal/3258dad2c3d247a9a8fcdedb398e3195/view
- Environmental Education Grant: https://www.epa.gov/education/grants
- Public Assistance Grant Program: https://www.fema.gov/assistance/public
- Hazard Mitigation Grant: https://www.fema.gov/grants/mitigation/hazard-mitigation

Source: **Catalog of Federal Funding Sources; Water Resources**

Agency: Multiple

Website: https://ofmpub.epa.gov/apex/wfc/f?p=165:12:6483383318137:::12::

Description: The Water Finance Clearing House is a catalog of federal funding sources for all things water related. One example is the WaterSMART Water and Energy Efficiency Grant: https://www.usbr.gov/watersmart/weeg/.

Source: **The National Fire Plan (NFP)**

Agency: DOI and USDA

Website: https://www.forestsandrangelands.gov/resources/communities/index.shtml

Description: Many states use funds from the NFP to provide funds through a cost-share with residents to help them reduce the wildfire risk to their private property. These actions are usually in the form of thinning or pruning trees, shrubs, and other vegetation and/or clearing the slash and debris from this kind of work. Opportunities are available for rural, state, and volunteer fire assistance.

Source: **Staffing for Adequate Fire and Emergency Response (SAFER)**

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/firefighters/safer

Description: The purpose of SAFER grants is to help fire departments increase the number of frontline firefighters. The goal is for fire departments to increase their staffing and deployment capabilities and ultimately attain 24-hour staffing, thus ensuring that their communities have adequate protection from fire and fire-related hazards. The SAFER grants support two specific activities: (1) hiring of firefighters and (2) recruitment and retention of volunteer firefighters. The hiring of firefighters activity provides grants to pay for part of the salaries of newly hired firefighters over the five-year program.

Source: **Funding for Fire Departments and First Responders**

Agency: DHS, U.S. Fire Administration

Website: https://www.fema.gov/grants/preparedness/firefighters/assistance-grants

Description: Includes grants and general information on financial assistance for fire departments and first responders. Programs include the Assistance to Firefighters Grant (AFG) Program, Reimbursement for Firefighting on Federal Property, State Fire Training Systems Grants, and National Fire Academy Training Assistance.

Source: **The Fire Prevention and Safety Grants (FP&S)**

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/firefighters/safety-awards

Description: FP&S offers support to projects that enhance the safety of the public and firefighters who may be exposed to fire and related hazards. The primary goal is to target high-risk populations and mitigate high incidences of death and injury. Examples of the types of projects supported by FP&S include fire-prevention and public-safety education campaigns, juvenile fire-setter interventions, media campaigns, and arson prevention and awareness programs. In fiscal year 2005, Congress reauthorized funding for FP&S and expanded the eligible uses of funds to include firefighter safety research and development.

Source: **GSA-Federal Excess Property Auctions**

Agency: USFS

Website: https://gsaauctions.gov/auctions/home

Description: The Federal Excess Property Auction is a way for federally owned equipment to be auctioned to public owners. Most of the property originally belonged to the Department of Defense (DoD). The platforms allows for online bidding on equipment ranging from fire trucks, boats, heavy equipment, and other items.

Source: **Inflation Reduction Act (IRA): Landowner Assistance Programs**

Agency: USDA

Website: https://www.fs.usda.gov/about-agency/state-private-forestry/coop-forestry/ira-forest-landowner-support

Description: The IRA Forest Landowner Support Programs, operating under the Cooperative Forestry Assistance Act of 1978 and aligning with the Landscape Scale Restoration (LSR) program guidelines, provide crucial financial support to underserved and small-acreage forest landowners. Launched formally on August 22, 2023, this initiative welcomes proposals from diverse entities, including tribes, nonprofits, and governments. It specifically targets nonindustrial private land in rural areas, extending support to a range of underserved landowners, including beginners, those in poverty areas, tribes, limited resource producers, and veterans. The identification of geographic locations utilizes tools such as the Climate and Economic Justice Screening Tool and USDA Economic Research Service measures. By fostering climate solutions, the IRA Landowner Assistance Programs play a pivotal role in overcoming historical barriers to the participation of underserved communities in climate mitigation and forest resilience efforts.

Source: **Landscape Scale Restoration (LSR)**

Agency: USFS

Website: https://www.fs.usda.gov/managing-land/private-land/landscape-scale-restoration

Description: The LSR program is a competitive grant initiative promoting collaborative, science-based restoration of priority forest landscapes. It allocates funds to projects across multiple jurisdictions, addressing issues like wildfire risk, watershed protection, and invasive species. Projects result in on-the-ground impacts through stakeholder collaboration. Eligibility is extended to state forestry agencies, local government units, Tribes, nonprofits, universities, and Alaska Native Corporations. They can request funds between $25,000 and $300,000 with a 3-year project life. Funds are dedicated to rural nonindustrial private forest or state forest land outside urbanized areas. The program operates with a 1:1 match requirement, awarding funds through competitive grants and cooperative agreements. For non-Tribal applications, states can submit up to five proposals annually through forestrygrants.org. The Western Forestry Leadership Coalition manages the process, with a review team evaluating submissions in western states and Pacific Island territories.

Source: **Forest Stewardship Program (FSP)**

Agency: USFS

Website: https://www.fs.usda.gov/managing-land/private-land/forest-stewardship

Description: The FSP collaborates with state forestry agencies, cooperative extension, and conservation districts to equip private landowners with tools for effective forest management. Actively managed private forests provide timber, fuel wood, wildlife habitat, watershed protection, and recreational opportunities, benefiting both landowners and adjacent National Forest System lands. Through the capacity grants to state forestry agencies, the FSP supports private forest landowners in maintaining the productivity and health of their forests. These grants aim to enhance economic and environmental benefits, ensuring the sustainability of privately owned forests.

Source: **Wood Innovations Funding Opportunity Program/Wood Innovations Grant Program**

Agency: USDA

Website: https://www.fs.usda.gov/science-technology/energy-forest-products/wood-innovation

Description: The Wood Innovations Grant Program, under the Bipartisan Infrastructure Law and IRA, allocates $20 million to support projects expanding traditional wood use. The program aims to reduce hazardous fuels, enhance forest health, lower forest management costs, and foster economically and environmentally healthy communities. Eligible applicants include for-profit and nonprofit entities, government bodies, tribes, educational institutions, communities, and special purpose districts. Priority is given to proposals creating or expanding markets for wood from forest health projects, supporting domestic timber development, involving wood industry partnerships, promoting innovative wood products in commercial building markets, addressing wood energy projects, and projects benefiting underserved communities.

Source: **Habitat Restoration and Enhancement Funding**

Agency: National Fish and wildlife Foundation

Website: https://www.nfwf.org/apply-grant

Description: The National Fish and Wildlife Foundation is a congressionally chartered private conservation foundation that works on public and private lands to protect fish, wildlife, and plant species and restore requisite habitats for specific species or to accomplish broader ecosystem specific objectives. Funds are provided through federal allotments and corporate contributions. Below are some of the current NFWF programs that fund work related to forest management, wildfire mitigation, stream restoration, and forest rehabilitation:

> **The America The Beautiful Challenge** began as a result of funds from the Infrastructure Investment and Jobs Act to broadly address the need for ecosystem restoration across the country. The program prioritizes efforts from collaborative project teams working across large landscapes or improving conditions in historically underserved areas. Fundable projects are those that conserve or restore rivers, coasts, wetlands, forests, grasslands, and other systems, improving habitat connectivity, improving community resilience to climate related threats, and expanding outdoor access.
>
> **The RESTORE Colorado Program** is intended to fund large-scale habitat restoration and stewardship efforts on public and private lands. Projects must benefit wildlife and or local community resilience. Work through this program can be completed in river corridors, wetlands, forested lands, grasslands, and sagebrush habitats.

Source: **Community Wildfire Defense Grant**

Agency: USFS

Website: https://www.fs.usda.gov/managing-land/fire/grants

Description: The Community Wildfire Defense Grant is intended to help communities with a high wildfire risk plan and implement the goals of the National Cohesive Wildland Fire Management Strategy. These goals include restoring and maintaining landscapes, creating fire-adapted communities, and improving wildfire response. Funds are available to develop or update community wildfire protection plans and to implement projects listed in CWPPs that are less than 10 years old. At risk communities are those positioned in fire-prone areas, low-income communities, and those that have been impacted by a severe disaster.

Source: **Forest Legacy Program (FLP)**

Agency: USDA Forest Service

Website: https://www.fs.usda.gov/managing-land/private-land/forest-legacy

Description: The FLP is a conservation initiative administered by the USDA Forest Service in collaboration with state agencies. Operating since 1990, FLP aims to identify and conserve environmentally and economically significant forested areas facing the threat of conversion to non-forest uses. FLP incentivizes landowners to maintain their forests, securing public benefits such as water quality, fish and wildlife habitat, and supporting forest product industries. Funded by the Land and Water Conservation Fund (LWCF), which receives earnings from offshore oil and gas leasing, FLP plays a crucial role in protecting privately owned managed forest lands. This is achieved through conservation easements (CEs) or land purchases, allowing landowners to either sell their property outright or retain ownership while selling development rights. The perpetual legal agreement of a CE ensures private ownership while preserving environmental values.

Source: **Wildland Urban Interface Grant Program**

Agency: Council of Western State Foresters/USFS

Website: https://www.westernforesters.org/wui-grants

Description: The Wildland Urban Interface Grant Program is intended to address hazardous fuels in the WUI, information and education, assessment and planning, and monitoring activities. With funds from the USFS, the Council of Western State Foresters administers the WUI program to prioritize actions that directly reduce hazardous fuels in the interface, improve community preparedness knowledge, and develop or update a CWPP. Interested applicants must contact their state forester to discuss the project and funding needs. Projects that emphasis cross boundary or landscape scale work will be prioritized. Hazardous fuel reduction projects will receive 70% of funding. Fundable projects include defensible space improvements, thinning and fuel breaks, education material development and events, Firewise or other programs, CWPP planning, and other similar projects.

Source: **Action, Implementation, and Mitigation Grant**

Agency: Coalitions and Collaboratives/ USFS

Website: https://co-co.org/aim-grant/

Description: The program is intended to increase community resilience, restore fire-adapted ecosystems, and create safer conditions for residents and fire fighters. A variety of projects are funded that support wildfire risk reduction to communities with an existing or planned CWPP. Projects can include planning and or implementation in communities with moderate to high wildfire risk. Projects must demonstrate multi-agency coordination and efforts toward landscape scale resilience.

FUNDING SOURCES FOR HOMEOWNERS

Source: **Colorado Wildfire Resilient Home Grant**

Agency: Colorado Division of Fire Prevention and Control

Website: https://nocofireshed.org/colorado-wildfire-resilient-homes-grant-program-now-accepting-applications/

The Wildfire Resilient Home Grant was developed in 2023 through House Bill 23-1273 and allocate $100,000 annually to fund retrofitting of homes to reduce structural ignitability. The grant will fund materials replacement (roofing, fencing, windows, etc.), landscaping improvements, and other defensible space and home ignition retrofits that reduce the likelihood of home ignition and spread. Homeowners must apply individually and submit a home ignition zone survey as part of the application. Funds are issued as reimbursements once work is completed.

Source: **Forest Legacy Program**

Agency: Colorado State Forest Service

Website: https://csfs.colostate.edu/forest-legacy-program/

The Forest Legacy Program is a federally funded initiative to assist in the acquisition or designation of conservation easements on privately owned forest land. The program was established to permanently protect portions of Colorado's forests that contribute to the state's ecological and scenic value while maintaining sustainable uses of forest resources such as recreation. Funds are primarily provided by the federal government with matching funds required by state funders or conservation organizations to purchase or secure forested lands. Conserved lands can be kept under private ownership or opened to public access through this easement program.

Source: **Wildfire Mitigation Resources & Best Practices Grant Program**

Agency: Colorado State Forest Service

Website: https://csfs.colostate.edu/grants/wildfire-mitigation-resources-best-practices-grant-program/

The Colorado Legislature established the Wildfire Mitigation Resources & Best Practices Grant Program in 2022. This program provides state support to conduct outreach among landowners in high wildfire hazard areas. To be eligible, a recipient must be an agency of local government, a county, municipality, special district, a tribal agency or program, or a nonprofit organization. The Colorado State Forest Service has $300,000 available for grant awards through this program.

Source: **Homesite Assessments**

Agency: Colorado State Forest Service

Website: https://csfs.colostate.edu/homeowners-landowners/homesite-assessments/

CSFS foresters are available to assist homeowners and landowners through homesite assessments. A forester will visit your land and examine your trees for disease, wildland fire defensible space, and overall health. They can make recommendations for disposing of diseased trees, safeguarding your trees, keeping your trees healthy and reducing their risk of disease, and mitigating the risk of catastrophic wildfire. For more information or to schedule a homesite assessment, contact a local CSFS Field Office.

OTHER FUNDING INFORMATION

The following resources may also provide helpful information for funding opportunities:

- Western Forestry Leadership Coalition: https://www.thewflc.org/
- USDA Information Center: https://www.nal.usda.gov/main/information-centers

- Forest Service Fire Management website: https://www.fs.usda.gov/science-technology/fire
- Insurance Services Office Mitigation Online (town fire ratings): http://www.isomitigation.com/
- National Fire Protection Association: http://www.nfpa.org
- National Interagency Fire Center, Wildland Fire Prevention/Education: https://www.nifc.gov/fire-information/fire-prevention-education-mitigation
- Department of Homeland Security U.S. Fire Administration: https://www.usfa.fema.gov/index.html