

4.0 Wildfire Hazard + Risk Assessment

4.1 WILDFIRE HAZARD ASSESSMENT

Wildfire hazard assessments conducted for this CWPP were completed using data from the State of Colorado's recently updated Colorado Wildfire Risk Assessment (CO-WRA, 2022). The CO-WRA provides a consistent, comparable set of scientific results to be used as a foundation for wildfire mitigation and prevention planning in Colorado. The layers can be found in the applications within the Colorado Forest Atlas, a website that serves the public and partners to access this statewide geospatial data related to forestry and natural resources. The results of the assessment and the theme layers can be used as a decision support tool to respond to community priorities in their wildfire risk reduction efforts and will be updated every 3-5 years.

Different CO-WRA theme layers were used to assess hazards and define higher risk areas for the four priority categories of (1) life safety, (2) critical infrastructure, (3) economic drivers, and (4) property. The theme layers were utilized to inform the risk to each value, aid in the development and definition of the Routt County WUI, and to inform priority fuels treatments. The CO-WRA data used to assess each priority are described in further detail below. Additional details and a link to the full CO-WRA report for Routt County are provided in Appendix B.

4.1.1 Life Safety

The risk assessment of life safety priorities was determined using the CO-WRA Fireline Intensity Scale (FIS) layer. This layer "identifies areas where significant fuel hazards and associated dangerous fire behavior potential exist" (CO-WRA, 2022). Fire intensity scale is a fire behavior output, which is influenced by three environmental factors: fuels, weather and topography - and represents an average fire intensity map at a 20-meter resolution, appropriate for county level planning efforts. This layer was utilized for life safety assessment because fire intensity poses the greatest risk to evacuation and critical transportation routes. When this layer is overlaid with the life safety priorities discussed in Section 3.2, it helps "identify areas where dangerous fire behavior potential exists in relationship to nearby homes or other valued assets" (CO-WRA, 2022). The CO-WRA report identifies over 52% of the Routt County Area as high intensity FIS and over 41% as moderate intensity FIS.

Risk to Transportation Routes **Routt County**

0 10 20 Miles



- Highest Intensity
- High
- Moderate
- Low
- Lowest Intensity
- Routt County
- Colorado City Boundaries
- Routt Evacuation Roads

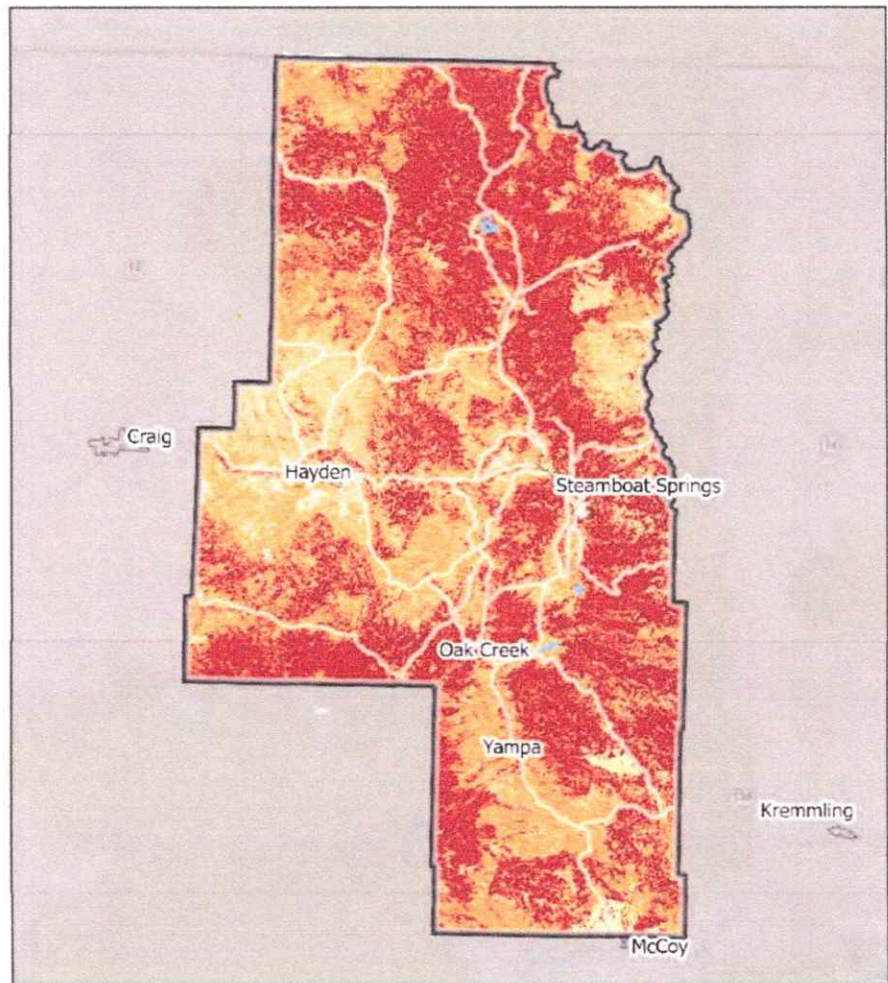


Figure 19: Risk to Transportation Routes

4.1.2 Critical Infrastructure

The risk assessment of critical infrastructure was determined using the CO-WRA Watershed Protection Risk layer. This layer identifies risk to watersheds based on potential negative impacts from wildfire. This is important because “in landscapes subjected to high, or even moderate-burn severity, the post-fire threats to public safety and natural resources can be extreme” (CO-WRA, 2022). All of the critical infrastructure within Routt County, including drinking water infrastructure, hospitals and assisted living facilities, transmission lines, communications towers, dams, and shelters, are contained within watershed protection areas. Protection of watersheds, and the critical infrastructure contained within, is critical for the health and sustainability of the community. The risk index shown below identifies areas with the highest negative impact (-9) representing areas where critical infrastructure is within high potential fire intensity and high importance for ecosystem services. Areas with the lowest negative impact (-1) represent areas where critical infrastructure is within low potential fire intensity and a low importance for ecosystem services. High and moderate risk areas make up about 30% of the County's total area.

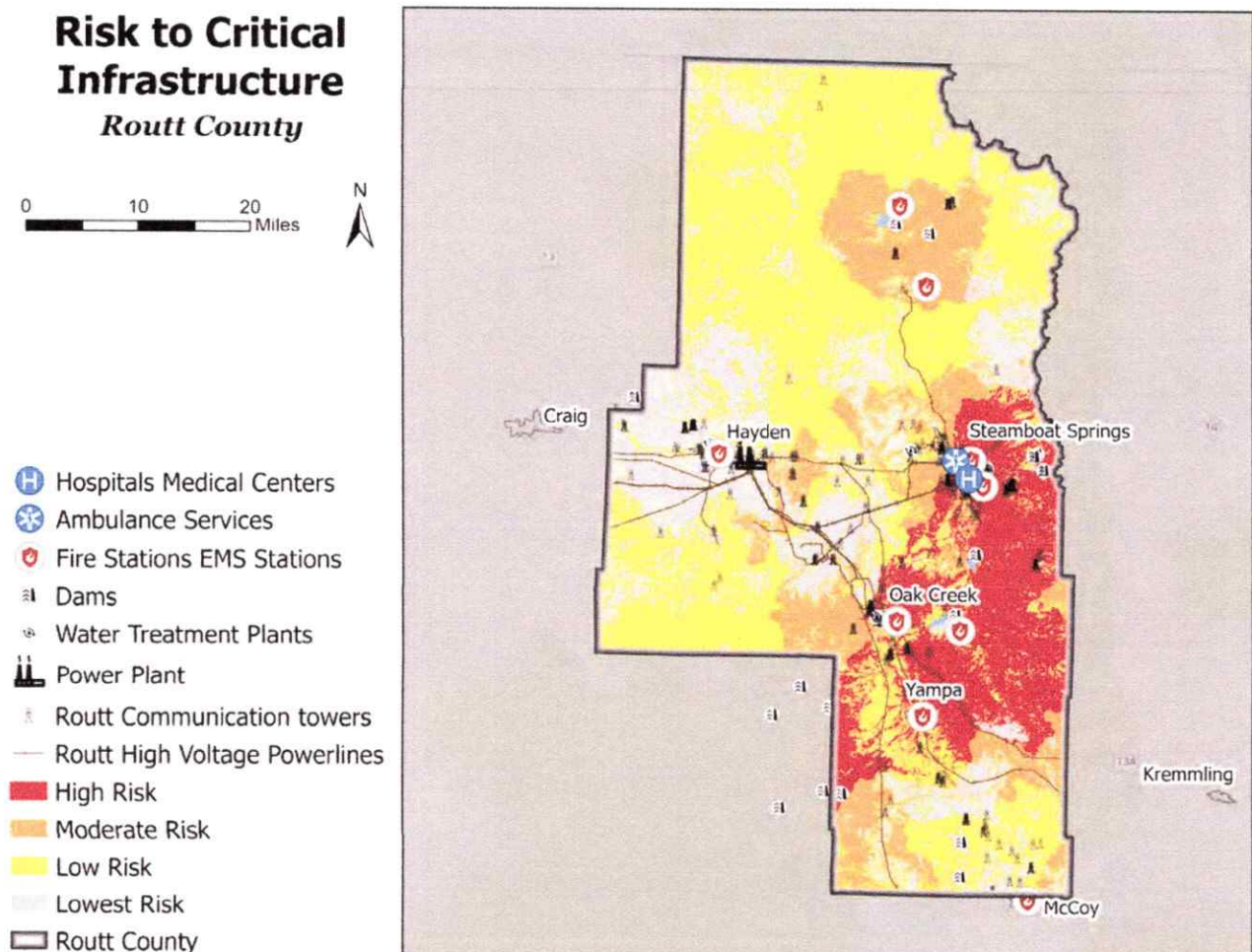


Figure 20: Risk to Critical Infrastructure

4.1.3 Economic Drivers

The risk assessment of economic drivers was determined using the CO-WRA Values at Risk Rating layer. This layer “is an overall rating that combines the risk ratings for the wildland urban interface (WUI), Forest Assets, Riparian Assets, and Watershed Protection Areas into a single measure of values-at-risk” (CO-WRA, 2022). Different weightings are used for each of the input layers with the highest priority placed on protection of people and structures (i.e., WUI). The weightings represent the value associated with those assets. By using this theme layer together with the County’s self-defined WUI boundary, human development and community values most susceptible to damage from wildfires can be identified and prioritized.

Risk to Economic Drivers Routt County

0 10 20 Miles



- ✈ Airports
- ⛺ Campgrounds
- 🏠 Trailheads
- Trails
- Highest Risk
- High Risk
- Moderate Risk
- Low Risk
- Lowest Risk
- ▭ Routt County
- ▭ Steamboat Mountain Resort
- ▭ Colorado City Boundaries

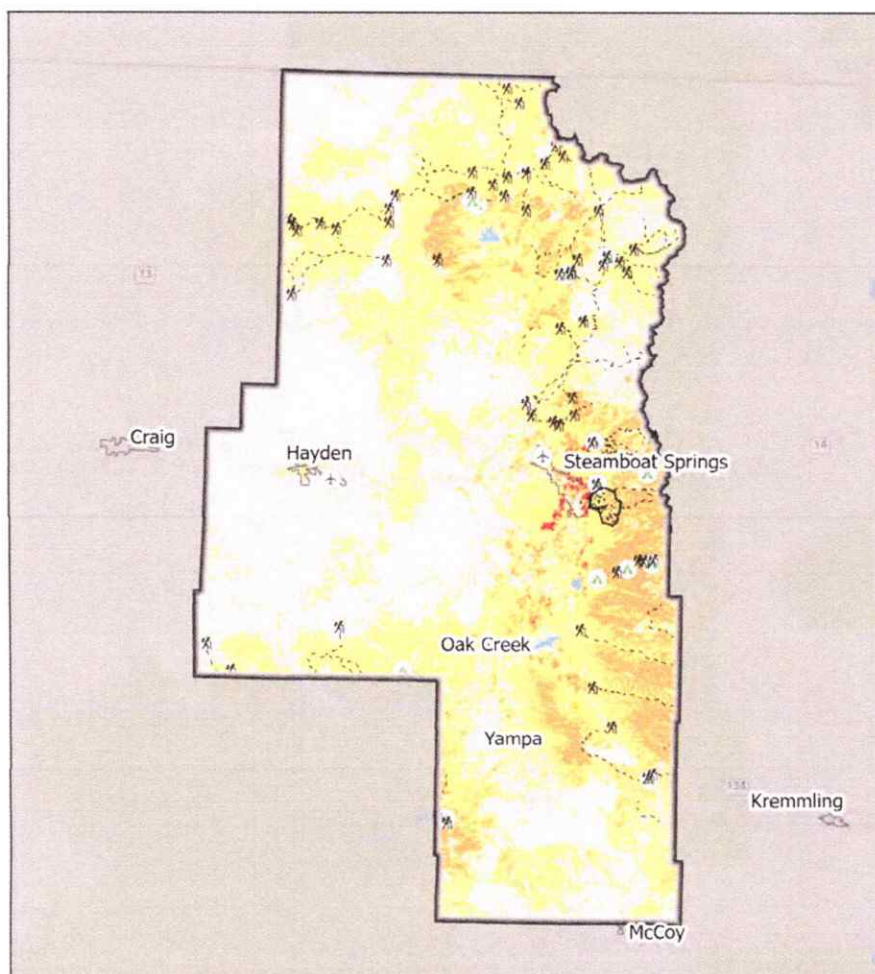


Figure 21: Risk to Economic Drivers

4.1.4 Property

The risk assessment of property was determined using the CO-WRA Building Damage Potential layer. This layer provides “a measure of the number of potential buildings lost based on the number of buildings threatened by fires in the specific area” (CO-WRA, 2022). This metric has been used by other agencies for risk forecasting, and the CO-WRA report identifies that over 1/3 of the buildings in Routt County have a High or Very High potential for building loss due to wildfire.

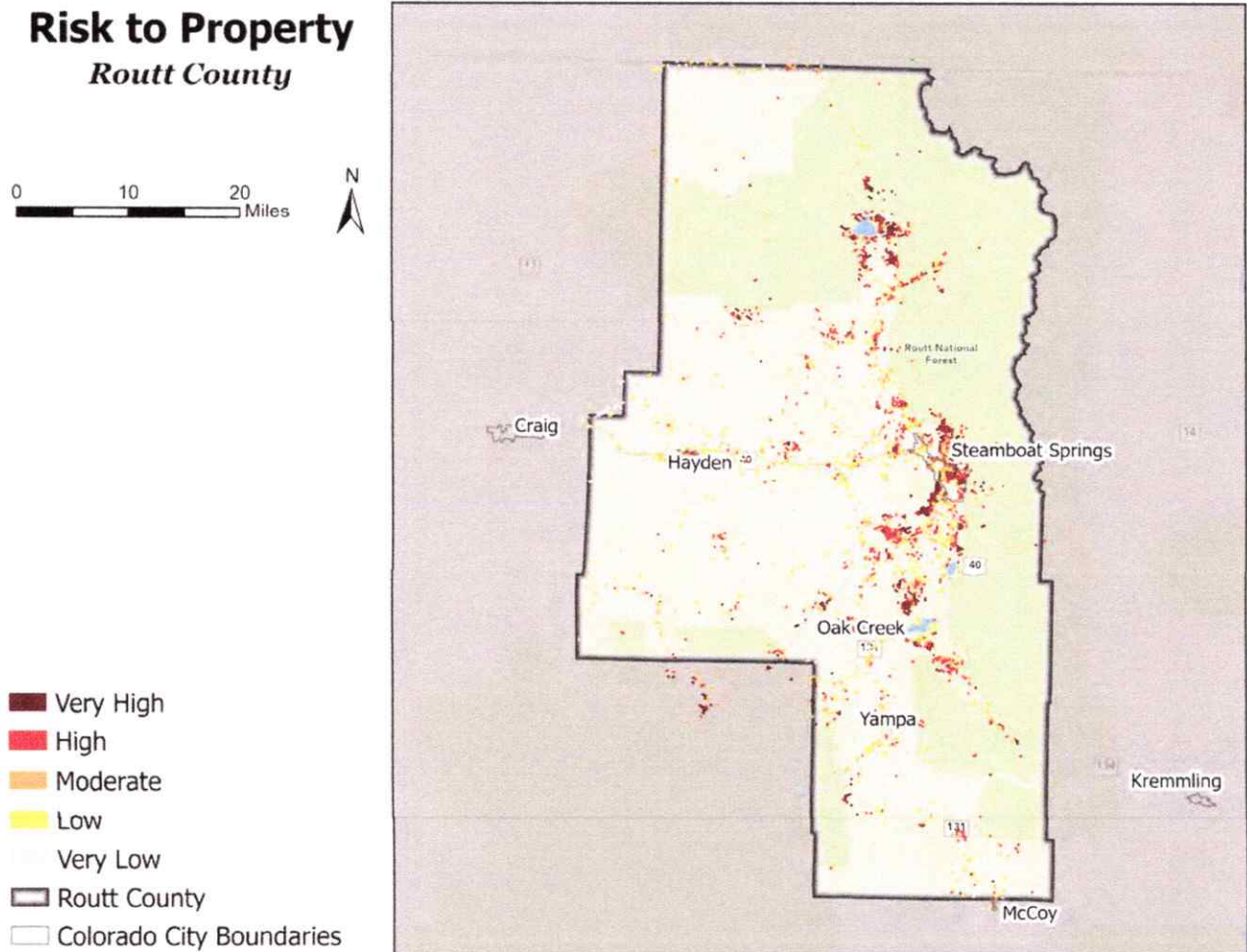


Figure 22: Risk to Property

4.2 OTHER FACTORS IMPACTING RISK

4.2.1 Spotting/Embers

The National Wildfire Coordinating Group (NWCG) defines spotting as the “behavior of fire producing sparks or embers that are carried by the wind and which start new fires beyond the zone of direct ignition by the main fire” (NWCG).

✚ A major cause of structure loss are embers. Thousands of burning embers, or “firebrands”, can be carried by the wind and can rain down on a structure. These embers can be parts of twigs or branches, pinecones, or wood shingles torn from burning roofs. While any vegetation can create embers, trees are the most problematic since they travel the furthest distance. Spotting potential is dictated by several factors described in Figure 23 and below:

- The source, size, and number of firebrands.
- The distance the firebrand is carried downwind.
- The probability of igniting a new fire at the downwind location.

The risk of structural ignition associated with ember cast was considered in the creation of the Routt County WUI map. The one-mile buffer leaves a cushion around the prioritized community values in the event of a wildfire.

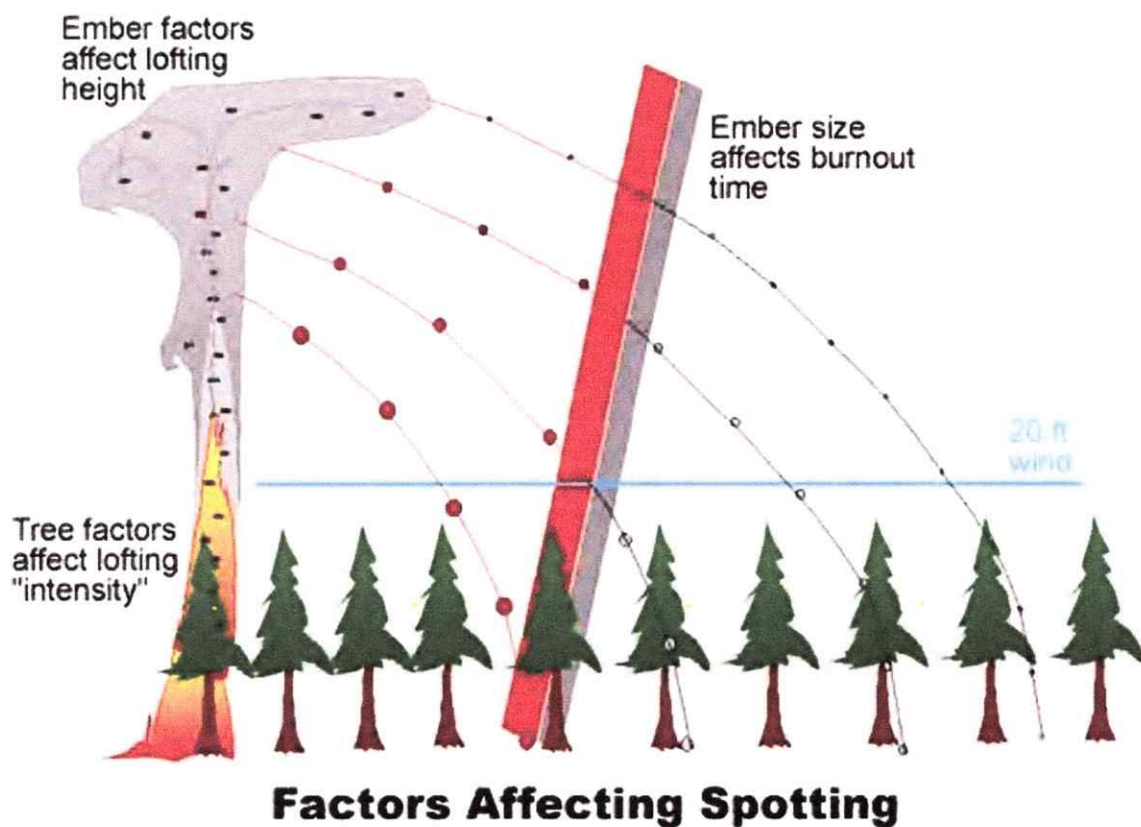


Figure 23: Factors Affecting Spotting (NWCG)

4.2.2 Wildfire Structure Defensibility

Research studies of structure loss during wildfires have shown that one of the key determinants influencing structural defensibility is whether firefighters are able to have sufficient operational space to safely defend a structure for wildfire (e.g., direct flaming, embers, or flying debris). Defining the degree to which a structure might be defensible is highly complex and typically requires an on-site inspection of an individual property. The assessment includes a range of factors that can influence risk (e.g., site layout, local topography, proximate vegetation, building materials and construction, local landscaping, outbuildings, access, water supplies). The Incident Response Pocket Guide by the NWCG provides a list of broader tactical challenges of fighting fire in the WUI, almost all of which occur in the County (NWCG, 2014). Below is a list of some of these challenges:

- + Narrow roads, unknown bridge limits, and septic tank locations
- + Ornamental plants and combustible debris next to structures
- + Poor driveway access and low clearances
- + Lack of home and street address signage; limited visibility of address signage
- + Limited opportunities to observe the main fire
- + Wooden siding and/or wooden roof materials
- + Structural components, such as open vents, eaves, decks, and other ember traps
- + Fuel tanks, propane tanks, and hazardous materials
- + Power lines
- + Limited water sources or low water flow rates
- + Civilians at risk

For the purpose of this plan, a more generalized approach to defensibility has been adopted to help identify areas of the county where structure defensibility may be challenging. Defensibility has been defined as a function of both flame length and fireline production rate criteria. Fireline production rate is based on how quickly firefighters can establish a fireline given various vegetative fuel types. Generally, grass and low brush have faster fireline production rates than do heavy brush or timber-based fuel models.

4.2.3 Structure Vulnerability

From 2004 to 2019, the National Interagency Fire Center (NIFC) estimates that on average, approximately 2,593 structures per year are lost due to wildfires across the United States, with more than half of these losses as primary residences (NIFC, 2020).

Research has shown repeatedly that the main reason for structure loss during a wildfire is due to the ignitability of the structure itself, which is not always associated with large, high intensity fires. Low intensity fires can destroy structures that are highly ignitable while structures with low ignitability can survive high intensity fires (Cohen, 2000).

Wildfires can ignite structures in numerous pathways. These pathways depend on a variety of characteristics found in the WUI; examples include:



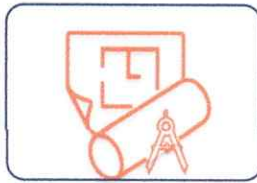
Adjacent Wildland Open Space

- Fuels
- Terrain
- Weather
- Fires influence on itself



Community

- Housing density
- Zoning
- Separate distance
- Physical barriers



Structure

- Exterior structure construction material
- Structural design
- Site location (e.g., mid-slope, hilltop)
- Structure maintenance
- Heat sources (e.g., landscaping, flammable exposures) within 100 to 200 feet

The risk of a structure's ignition is a direct result of the thermal exposure by wildfire, and the vulnerability or ignitability of the structure (i.e., building materials and construction).

The latest publication from the CSFS on the Home Ignition Zone goes into great detail about how to mitigate some of these vulnerabilities (see Appendix E). For example, structure ignitability is tied to the amount of receptive fuel beds immediately around the structure, and can include ornamental landscaping, dead vegetation, litter, debris build up in rain gutters, mulch beds, etc. Enclaves, islands, riparian corridors of wildland vegetation, and ornamental vegetation are also interspersed with structures and subdivisions throughout the County. These create significant opportunities for wildfires to ignite, establish, and destroy structures.

Wildfire will continue to threaten the communities within Routt County despite all efforts to prevent it from occurring by addressing the natural environment. However, stakeholders can and should take proactive measures to mitigate this threat within the built environment through home hardening known best practices.

4.2.4 Land Use / Zoning

The Routt County Zoning and Subdivision Regulations control the use, development, and subdivision of land within unincorporated Routt County. They are important resources for implementation of Master Plan goals and policies. Planning staff maintains, updates, and administers these regulations. These community plans address land use designations, distributions, locations, and extent, as well as specific goals, policies, and actions relating to community development. These land use designations are intended to preserve the existing rural character of the community, protect natural resources, and minimize the overburdening of local infrastructure, while also allowing for reasonable residential and commercial development where within the local geological (e.g., steep hillsides, unstable soil and subsurface conditions, extreme fire hazards) and land use density constraints. These land use and development codes provide for some wildfire hazard mitigation activities within the implementation activities these codes establish.

4.2.5 Hazardous Materials

Facilities storing or producing hazardous materials are prone to unintentional release during wildfire events. These facilities can create environmental challenges in addition to the damage from the wildfire. Hazardous materials facilities should be identified for preplanning consideration.

4.2.6 Fire Protection Responsibility

A focus and concern of the CWPP is the many values at risk in a large geographical area and the number of resources to adequately respond during a wildland fire event. Response agencies, including local fire protection districts and State and Federal agencies, have recognized that they are co-dependent and force multipliers for each other. These capabilities must be maintained and improved upon.

The majority of these agencies have routinely provided each other support during wildland fire suppression activities in the form of mutual aid. The overarching goal has been the timely suppression of wildland fire in order to protect life and property. As part of the Routt County Fire Plan, the local Fire Protection Districts in Routt County adopted standardized wildland fire fighting training (beginning with basics taught in S-130/190), to acquire and use wildland fire personal protective equipment, to acquire appropriate wildland fire apparatus (when afforded the opportunity), and to use the Incident Command System in an ever-increasing fashion.

All five (5) local fire protection districts provide structural and wildland fire protection within their districts and response areas, as well as mutual aid to surrounding areas. Additionally, the USFS has responsibility for wildland fire suppression within the Routt National Forest, and similarly, the BLM with suppression on BLM lands.

4.2.7 Safe, Effective, Risk-Based Wildfire Response

4.2.7.1 Suppression Capabilities

Routt County, because of its unique population (residents, transient residents, tourism), interface, size, topography, fuels, access, and egress, presents a challenging scenario for wildfire response. The county depends on multijurisdictional services for firefighting and EMS response. There are nine (9) agencies, including USFS Medicine Bow-Routt National Forest, US BLM Little Snake Field Office, Colorado Department of Fire Prevention and Control Northwest District, North Routt Fire Protection District, West Routt Fire Protection District, Steamboat Fire Rescue, Oak Creek Fire Protection District and Yampa Fire Protection District, responsible for wildfire management and fire suppression. All agencies are well trained to NWCG and the National Fire Protection Association (NFPA) industry standards for fighting wildland fires. However, each agency is co-dependent upon the other, particularly if a fire escapes initial attack or there is an immediate need to evacuate residents. Because of the number of occluded interfaces and public exposure, it is a realistic possibility that all first arriving fire suppression resources will be engaged in evacuations instead of fire suppression.

Additional information about agency-specific suppression resources is available in Appendix C.