

**Community Wildfire Protection Plan:
Selected Areas within the
Burning Mountains Fire Protection District,
Garfield County,
Colorado**

Submitted by:

**Fire Ready of Glenwood Springs
with contributions from
Burning Mountains Fire Protection District
and the
Colorado State Forest Service**

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The New Castle Fire, June 2007

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Community Wildfire Protection Plan Selected Areas within the Burning Mountains Fire Protection District, Garfield County, Colorado

Introduction

Statement of Purpose:

The purpose of this Community Wildfire Protection Plan (CWPP) is to:

- Identify wildfire hazards for selected areas of concern in the wildland/urban interface (WUI) within the fire district,
- Assess levels of risk for residences and other structures in these areas, and
- Provide recommendations for reducing wildfire risk for property owners and response personnel (Garfield County Fire Protection Plan, Section VI, p. 13).

Selected areas of concern include:

- Asgard Subdivision to the north of Silt,
- The combined neighborhoods of Elk Creek, Three Elk, and The Cedars to the north of New Castle, and
- The private properties and ingress/egress within the Garfield Creek drainage to the south of I-70.

The Garfield Community Fire Protection Plan states: “Preparation of site-specific individual Community Wildfire Protection Plans (CWPP’s) is the logical next step after a county-wide fire plan has identified communities-at-risk and set mitigation priorities. A CWPP assesses the wildfire threat to a neighborhood or community and the surrounding landscape. It locates values-at-risk in detail and determines the specific vegetation management, road improvements, water sources, warning systems, evacuation routes, changes to buildings to make them less flammable, fire department preparedness, and other actions needed to reduce the threat of wildfire.” (p. 13). Communities identified as at risk in the County plan are shown in Figure 2.

Study areas included in this plan are shown in Figure 3. These subdivisions were selected for inclusion in this CWPP due to 1) remoteness within the Burning Mountains Fire Protection District (BMFPD), 2) density of fuels in proximity to populated areas, and 3) reduced or limited accessibility on long or winding mountain roads (ingress/egress). BMFPD, along with the Colorado State Forest Service, has been working with members of these subdivisions to educate them about wildfire hazards, fuel reduction needs, and address locations. Funds for research and development of this CWPP were provided by a Colorado State Fire Assistance (SFA) Grant and BMFPD. Guidance and support for the plan were provided by CSFS and the BMFPD.

Research Methods:

This CWPP is intended to supplement the Garfield County Wildfire Protection Plan, which identified conditions in these areas as hazardous to people and property in the event of wildfire. Areas of concern were reviewed in the field to assess overall wildfire risk. Each residence and/or address within each selected area was assigned a low, moderate, or high hazard rating based upon emergency response access, house construction, availability of water for fire suppression, surrounding topography and vegetation type and density. Each community section includes the resulting community databases, as well as an overview, risk assessment, current risk reduction factors, and wildfire risk priorities. Maps for

each area of concern were developed by the CSFS and include aerial photos, parcels, ownership, slope, and fuel hazard maps generated from state data.

House construction, slope, and surrounding fuels were given the highest consideration during hazard ratings. This is due to basic fire principles: fire requires three factors to burn – oxygen, heat, and fuel. Of these three, humans have control over only one factor: fuel. Fuel for the private landowner usually means the structure on the property and the vegetation surrounding it. For this reason fuel mitigation and Firewise construction are the focus of recommendations provided in this CWPP, along with increased collaboration between residents and agency staff.

A copy of CSFS publication no. 6.302, “Creating Wildfire Defensible Zones” is included in Appendix A for information on wildfire risks, as well as additional CSFS resources for landowner use. A glossary of wildfire terms is found on page 42.

Existing Wildfire Issues/Fuel Hazard Reductions:

A combination of factors contributes to the high wildfire risk in these areas. Remote locations, winding roads, and varying topography increase emergency response time and reduce effectiveness. Water resources for fire suppression are limited or entirely lacking in most of the study areas. Many of the newer homes are of fair to excellent fire-resistant materials, with most roofing of composite or Class-A materials; however, a number of residences, outbuildings, or agricultural structures have flammable roofing materials (wood shake or planking), or are built entirely out of flammable materials.

Dense vegetation surrounding subdivisions and structures constitutes one of the most significant fuel hazards in these remote areas. The topography and slopes vary within each area, but overstocked canyon slopes and drainages are common to all three areas. Subdivisions in the BMFPD are built in and adjacent to dense, overstocked stands of pinon pine and juniper forest spreading across steep foothills, mountains, and drainages of both private lands and adjacent BLM lands. Cottonwood is present along drainages, at higher elevations, and on west and north-facing slopes (Garfield County Fire Protection Plan, Section IV, p. 5). Understory vegetation ranges from dense Gambel oak, sagebrush and rabbitbrush to open grasslands. Given the dry climate of the study area, the majority of these plant types are at high to very high risk for ignition from lightning or human activity.

Solutions Summary:

Initial survey of these areas indicates a need for the following actions:

- 1) Public education about wildfire cycles, regional forest health, fuels reduction, Firewise construction and defensible space standards (Garfield County FPP, Section V, p. 10);
- 2) Implementation of fuel breaks and residential defensible space in moderate to high risk areas;
- 3) Ongoing community assessments and meetings within each community area to develop local community awareness:
 - a) Continuing collaboration with representatives of adjacent public lands to identify and implement fuels reduction projects;
 - b) Continuing collaboration between community residents and staff of the BMFPD to clarify hazards, water sources, and changes in residential risk and locations,
 - c) Community efforts to improve the rural water supply system; including continuing efforts to install dry hydrants and water sources for fire suppression within the study areas.

Collaborating Groups

Individuals, community groups, and agencies involved in the development of this CWPP are included in Table 1:

Name	Roles/Responsibilities
Brit McLin, Chief Burning Mountains Fire Department	<ul style="list-style-type: none"> • Obtaining grant funds, • Providing district and community information and expertise, • Assessing hazards and risk, • Making recommendations for fuels reduction projects and methods.
Jim Sears Garfield County Emergency Manager, Garfield County Sheriff's Department	<ul style="list-style-type: none"> • Development of Garfield County Community Fire Protection Plan and county wildfire hazard maps, • Input on hazardous areas and needs, wildfire hazard data
Kelly Rogers, District Forester Colorado State Forest Service, Grand Junction District	<ul style="list-style-type: none"> • Facilitation of CWPP planning, • Providing GIS data, aerial photos and mapping, • Description of the CSFS Fuel Hazard Mapping Project and fire history, • Input and recommendations on wildfire and Firewise principles, • Approval of final CWPP.
Richard and Gloria Edwards Fire Ready of Glenwood Springs	<ul style="list-style-type: none"> • CWPP research and development, • Community and residential risk assessment, • Recommended priorities for risk reduction, • Facilitation of communication between agencies and community members.
Ody Anderson Public representative for BLM	<ul style="list-style-type: none"> • Expertise on current fuel and forestry conditions and potential projects on adjacent BLM lands.
Doug Paul Lindy Gardner Upper Colorado Interagency Fire Team	<ul style="list-style-type: none"> • Input on regional and local fire information and statistics, • Development GIS and fire history maps and information
Buddy McNeel DOW State Wildlife Area Manager Garfield Creek Resident	<ul style="list-style-type: none"> • DOW and resident contact for wildlife and wildfire issues in the Garfield Creek Area
Community/HOA members/Landowners: Bobby Peters , HOA President The Cedars Subdivision Justin Wareham , HOA member Three Elk Subdivision Debbie Con HOA President Linda Carson Elk Creek Resident Elk Creek Subdivision Sherry and Scott Rosette (Domestic Water Board) Tiffany Ottisen (Irrigation Water Board) Asgard Subdivision	<ul style="list-style-type: none"> • Input on local issues, community information and needs, prioritization of neighborhood projects.
John Winsel - Public Works Tim Craig – Code Administrator/Planning Coordinator Kevin Stuben – Parks Department	<ul style="list-style-type: none"> • Hydrant and water resource information for the Town of New Castle

Colorado State Forest Service Fuel Hazard Mapping

The CWPP includes several map types for the purpose of hazard study for each study area: an aerial showing on-the-ground features and parcel lines, property ownership maps, slope maps, and CSFS Fuel Hazard maps. The Fuel Hazard maps are the result of a statewide wildfire risk and hazard assessment completed in 2002 for Colorado by the Colorado State Forest Service. The wildfire risk hazard assessment used geographic information system (GIS) technology to combine data into layers, which could then be combined to produce an overall risk map.

The Fuel Hazard Map layer formed the basis of the statewide wildfire risk assessment. This layer is based on fuel type, slope, aspect, and disturbance regimes of the vegetation. Slope, weighted at 15% of this layer, was determined from USGS digital elevation models (DEM's). Slopes were divided into 4 classes: 0-15% (mild), 6-20% (moderate), 21-40% (steep), and over 41% (extreme). Fuel type, weighted at 40% of this layer, was interpreted from the Colorado Division of Wildlife GAP (Geographic Area Project) vegetation data. Vegetation types were classified as low, moderate, high, or very high hazard. Aspect, weighted at 10%, was also determined from USGS DEM's and classified as higher hazard on south to southwest-facing slopes. Disturbance regime, or the average interval between natural burns within each vegetation type, was weighted at 35% of this layer. Disturbance regimes were also interpreted from the GAP data, and were classified as being from short to very long. Additionally, the Fuel Hazard maps included population densities as represented by well permits or domestic water sources, which represented human and property values that would be threatened in a fire event. These combined data formed a fairly consistent basis for hazard assessment and was verified by field research in the study areas.

The Fuel Hazard Maps show various levels of risk posed by fuel loading within each CWPP area. It is evident from these maps that most of the surveyed areas are composed of high hazard fuels and steep slopes (the darker shades on the maps). This will come as no surprise to anyone familiar with the vegetation and terrain of these areas, where oak brush, pinyon-juniper woodlands, and steep slopes combine to form a significant hazard.

Wildland Fire History in the CWPP Area

Garfield County is a fire-prone area. Statistics show that within the Upper Colorado River (UCR) Interagency Fire Management Unit (of which Garfield County is a part) there are an average of 260 wildfires per year burning about 10,000 acres. During the 2007 fire season, the UCR reported 222 fires for 3,700 acres. Undoubtedly many more fires occur that are unaccounted for through the federal/state reporting system. While the majority of these fires are relatively insignificant in terms of size and fire intensity, periodic stand replacement events typically burn at high fire intensity levels, can be several thousand acres in size, and can pose significant threats to structures or other human developments.

Burning Mountains FPD is located in an area where fuels and topography combine to form a significant wildfire hazard. Figure 4 illustrates the number of fires recorded on federal land in the BMFPD region from 1980 to 2007. A cursory count shows over 350 fires in the last 28 years, not including fires on private lands. Typically, the primary fuel types of sagebrush, Gambel oak, and pinyon-juniper woodlands become very dry and capable of supporting a large fire relatively early in the spring. This early and usually long fire season is also complicated by the prolific invasion of cheatgrass (*Bromus tectorum*), which grows extensively throughout the fire district. Cheatgrass is an annual grass that germinates in the fall or early spring, then grows to maturity and cures very early in summer, adding a layer of fine fuels to the already highly flammable overstory of brush and timber. Catastrophic wildfire events pose an additional

hazard for the brittle soils in the BMFPD region. Arid soils can develop a water-resistant surface after intense fires, causing subsequent flooding and erosion.

The fuels and topography of this area have combined at times to produce intense fires during periods of hot, dry weather. Historically, Garfield County has had 15 fires that have made use of the state's Emergency Fire Fund (EFF), a fund that counties contribute to annually in order to defray some of the costs of large fire suppression. Only large fires that exceed the capabilities of local firefighting resources qualify as EFF fires; Garfield County has had more of these EFF fires than any other county in Colorado. Most of these large fires in the county quickly cross ownership lines, and become multi-jurisdictional.

Of particular note historically in this area are: the Battlement Creek Fire (1976: 3 firefighter fatalities); Battlement Mesa Fire (1987); the South Canyon Fire (1994: 14 firefighter fatalities); and the Coal Seam Fire (2002) which burned into the town limits of Glenwood Springs and eventually covered over 12,000 acres. Most recently, the New Castle Fire in June of 2007 burned over 1,200 acres and threatened nearby homes.

Figure 2 : Garfield County Communities at Risk :
(adapted from the Garfield County Fire Protection Plan)

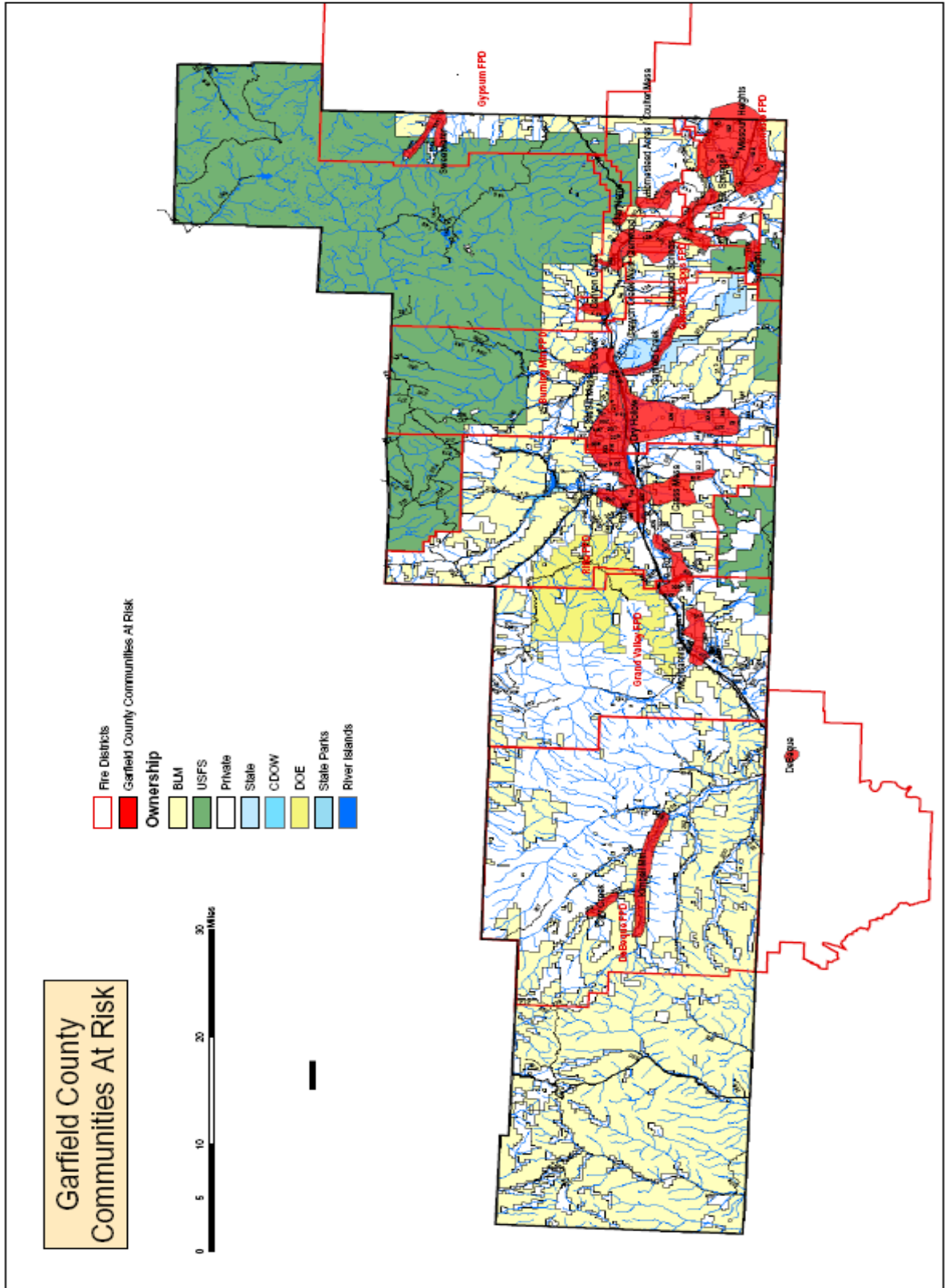


Figure 3: CWPP Areas: Burning Mountains FPD

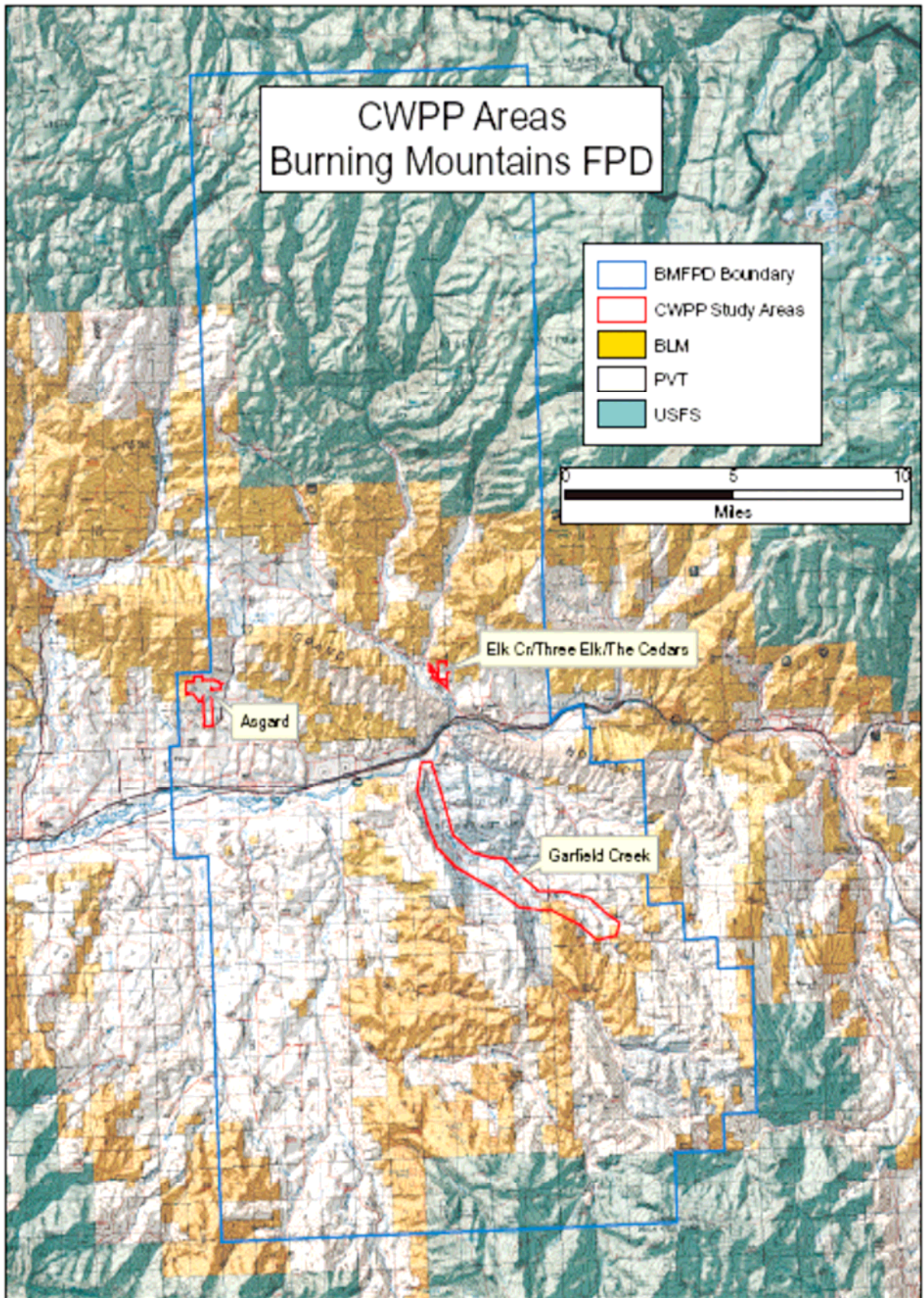
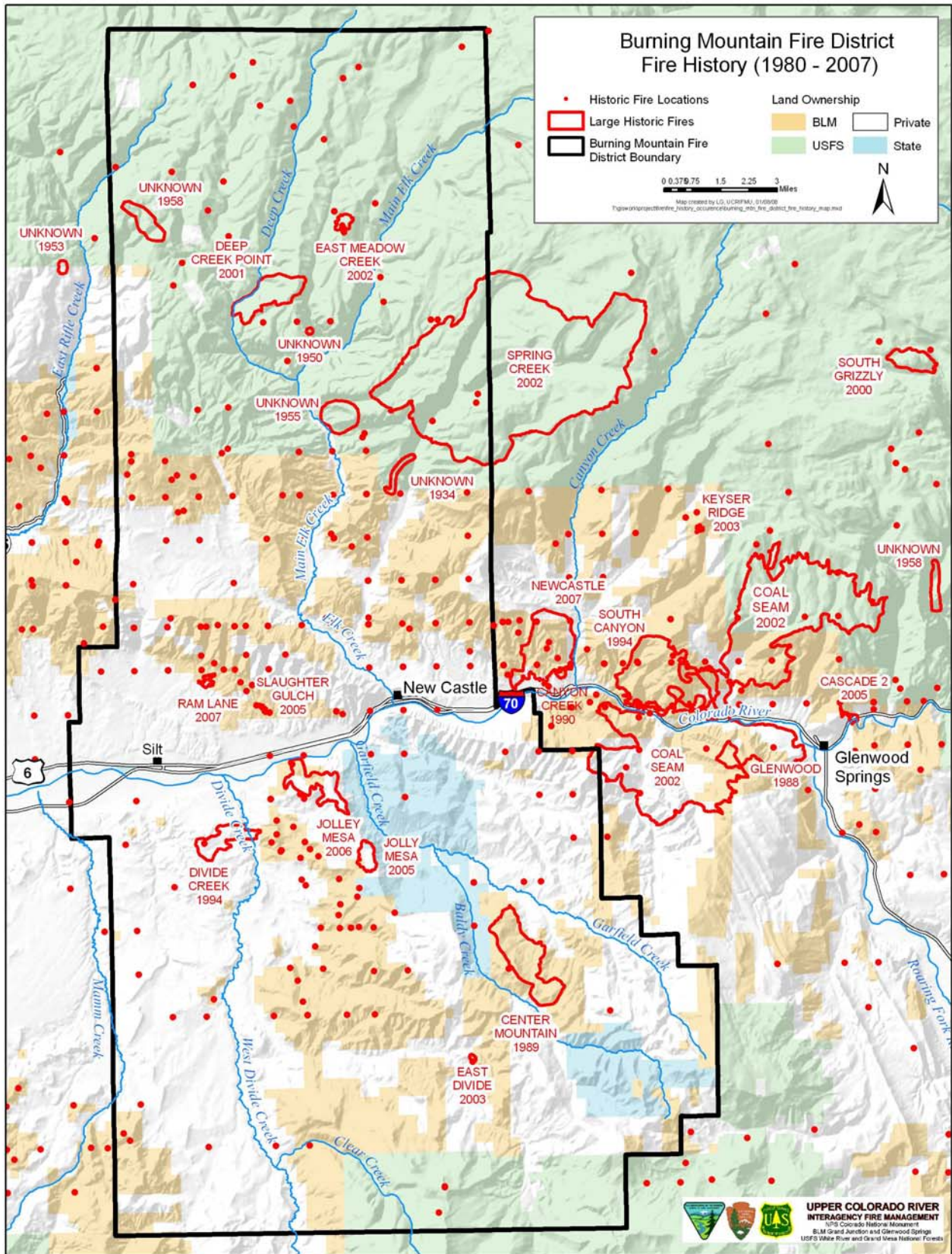


Figure 4: Burning Mountains Federal Fire History 1980-2007



Overview Asgard Subdivision

Introduction

Asgard subdivision is located approximately 1 mile north of the town of Silt, and includes approximately 396 acres divided into 57 lots. Climate is characterized by hot, dry summers and moderate winters with low snowfall moisture. Soils vary from poorly sorted rocky silt loams to fine silt clay loams in the southern portion. The northern third of the subdivision is located in the southern foothills of the Grand Hogback, characterized by dry, steep drainages flowing to the south. Vegetation in this area includes dense pinon pine/juniper forest with varying densities of sagebrush, rabbitbrush, and grasses in the understory. The lower two-thirds is characterized by gently sloping topography created by colluvial soils from drainages to the north. Vegetation includes dense to scattered sagebrush, rabbitbrush, and cool and warm season grasses. A gently sloping drainage cuts through the northwest portion of Asgard about 1 mile in length, and is also densely vegetated with pinon pine, juniper, sagebrush, rabbitbrush, and grasses.

These features are significant in increasing wildfire risk in the northern portion of the subdivision since dry drainages have accumulated dead and down fuels, understory vegetation, and overstocked pinon pine/juniper forest. These steep drainages can act as “chimneys” in the event of fire from below: as the fire heats the air at higher elevations, heated air rises up into the drainage and pre-heats fuels above. Hydrants and above-ground water sources that can be used for fire suppression are minimal or lacking entirely.

Risk Assessment:

Field surveys of Asgard subdivision were conducted on September 26 and October 16, 2007. Each residence was assessed from the road and was assigned a low, moderate, or high wildfire risk (Table 2). The northern third of the subdivision includes 41 lots at moderate to high risk for wildfire hazards. High risk factors for Asgard include:

- Potential ignition from the roadside of Odin Drive;
- Lightning ignitions in the Grand Hogback foothills to the north;
- Potential fires from recreation on adjacent BLM land to the west;
- Potential ignition in dry grasses from agricultural or construction activities.

Current Hazard/Risk Reduction

Conversations with several residents indicate that a small but growing number of residents in Asgard undertake fuels mitigation efforts. The community has a Domestic Water Board, which can serve as a communication vehicle for wildfire awareness. Although the subdivision does not have any fire hydrants, there is a large (10,000) water storage tank with a dry hydrant on the property of Sean Mello in the southern portion of the subdivision. Two water tanks also exist at the northern edge of the subdivision (see Figure 5), one for irrigation water (about 30,000 gallons) and one for domestic water (about 20,000 gallons). At this time there is no way to access this water for fire suppression; however, several residents are discussing installing a gravity-fed hydrant where the irrigation line meets Odin Drive. The West Lateral Ditch winds through the center of the subdivision, but may run intermittently and accessing water from the ditch for fire suppression may be time-consuming.

Asgards' wildfire risk priorities are as follows:

- Landowners assess homes and structures for Firewise standards, communicate with local fire department for recommended changes;
- Defensible space thinning on all private properties assigned moderate or high risk where the landowner has agreed to participate;
- Construct fuel breaks or thinning in extremely dense fuel areas to the north of residences on the north side of Odin Drive near the northern boundary of the subdivision;
- Form an HOA Wildfire Awareness committee to meet on a regular basis to facilitate wildfire education, assess local priorities, and potentially apply for grants for further projects;
- Collaborate with BLM staff regarding fuel management and potential projects on adjacent BLM lands; and
- Collaborate with CSFS for defensible space or firebreak design.

Table 1: Asgard Subdivision Wildfire Hazard Risk Assessments

1	Address	Low	Medium	High	Notes
2	0047 Odin	X			maintain low grasses
3	0132 Odin	X			maintain low grasses
4	0188 Rainbow	X			maintain sagebrush
5	0198 Odin	X			maintain low grasses
6	0235 Odin	X			maintain low grasses
7	0248 Rainbow		X		maintain dense sagebrush
8	0316 Odin	X			maintain low grasses
9	0350 Rainbow			X	change shake shingles, maintain sage/grasses
10	0435 Odin	X			maintain low grasses
11	0446 Odin	X			maintain sage/grasses near structures
12	0536 Odin	X			maintain low grasses
13	0646 Odin		X		maintain sage/grasses
14	0699 Odin		X		maintain sage/grasses, check roof
15	0787 Odin	X			maintain low grasses
16	0861 Odin	X			maintain low grasses
17	0868 Odin		X		recommend thinning/clearing adjacent sage to north and east
18	1209 Odin		X		thin sage and P/J in Zone 3
19	1431 Odin		X		thin P/J/sage/grasses in zones 2 & 3
20	1456 Odin		X		separate P/J crowns, prune up lower branches
21	1473 Odin		X	X	assess zone 1, mitigate zones 2 and 3, maintain sagebrush, separate crowns
22	1521 Odin		X		assess zone 1, mitigate zones 2 and 3, maintain sagebrush/grasses, separate crowns
23	1545 Odin			X	thin zone 1, mitigate zones 2 & 3 fully, maintain sagebrush/grasses
24	1587 Odin			X	assess zone 1, mitigate zones 2 & 3, separate crowns * House is at the base of largest canyon
25	1588 Odin		X		maintain sagebrush/grasses in zones 2 & 3
26	1647 Odin		X		maintain sagebrush and grasses in zones 2 and 3
27	1696 Odin		X		thin sagebrush and grasses in zone 1, mitigate zones 2 & 3, esp. sage
28	1721 Odin			X	assess zone 1, mitigate zones 2 & 3, esp. above drainage to north
29	1799 Odin		X		assess zone 1, mitigate zones 2 & 3, separate crowns
30	1808 Odin			X	mitigate all zones, thin shrubs, separate crowns
31	2009 Odin			X	mitigate all zones towards north side
32	2573 Odin		X		thin mitigation zones
33	2584 Odin		X		thin mitigation zones
34	2655 Odin			X	mitigate all zones
35	2658 Odin			X	mitigate all zones
36	3820 Odin			X	mitigate all zones
37	1849 Odin			X	assess zone 1, mitigate zones 2 & 3, separate crowns * House is at the base of largest canyon

Table 1 cont'd: Asgard Subdivision Wildfire Hazard Risk Assessments

38	1901 Odin				X	mitigate all zones, maintain shrubs
39	1952 Odin				X	mitigate all zones to the south and west of the house
40	1998 Odin				X	mitigate all zones to south above drainage
41	2056 Odin	X				maintain sagebrush and grasses in zones 2 and 3
42	2055 Odin	X				maintain zone 3
43	2113 Odin				X	assess zone 1, mitigate zones 2 & 3, thin sagebrush in zone 3
44	2132 Odin	X				thin sagebrush in zone 3
45	2208 Odin				X	mitigate all zones, reduce fuels near outbuildings
46	2244 Odin	X				assess zones 2 & 3 at drainage, thin p/j and shrubs
47	2287 Odin				X	mitigate all zones
48	2326 Odin				X	mitigate all zones
49	2375 Odin				X	mitigate all zones
50	2386 Odin				X	thin zone 1, mitigate zones 2 & 3 fully, maintain sagebrush/grasses
51	2450 Odin				X	mitigate all zones
52	2461 Odin				X	mitigate all zones
53	2584 Odin				X	mitigate all zones
54	2573 Odin				X	assess zone 1, mitigate zones 2 & 3
55	2658 Odin				X	mitigate all zones
56	2655 Odin				X	mitigate all zones
57	3820 Odin		X			maintain zone 1, mitigate zones 2 & 3, maintain grasses
58						
59	1401 Harvey Gap Rd.	X				Not sure if this is included in subdivision, maintain low grasses and ladder fuels
60						
61						
62						
63						

Figure 5: Asgard Subdivision aerial photo and parcels

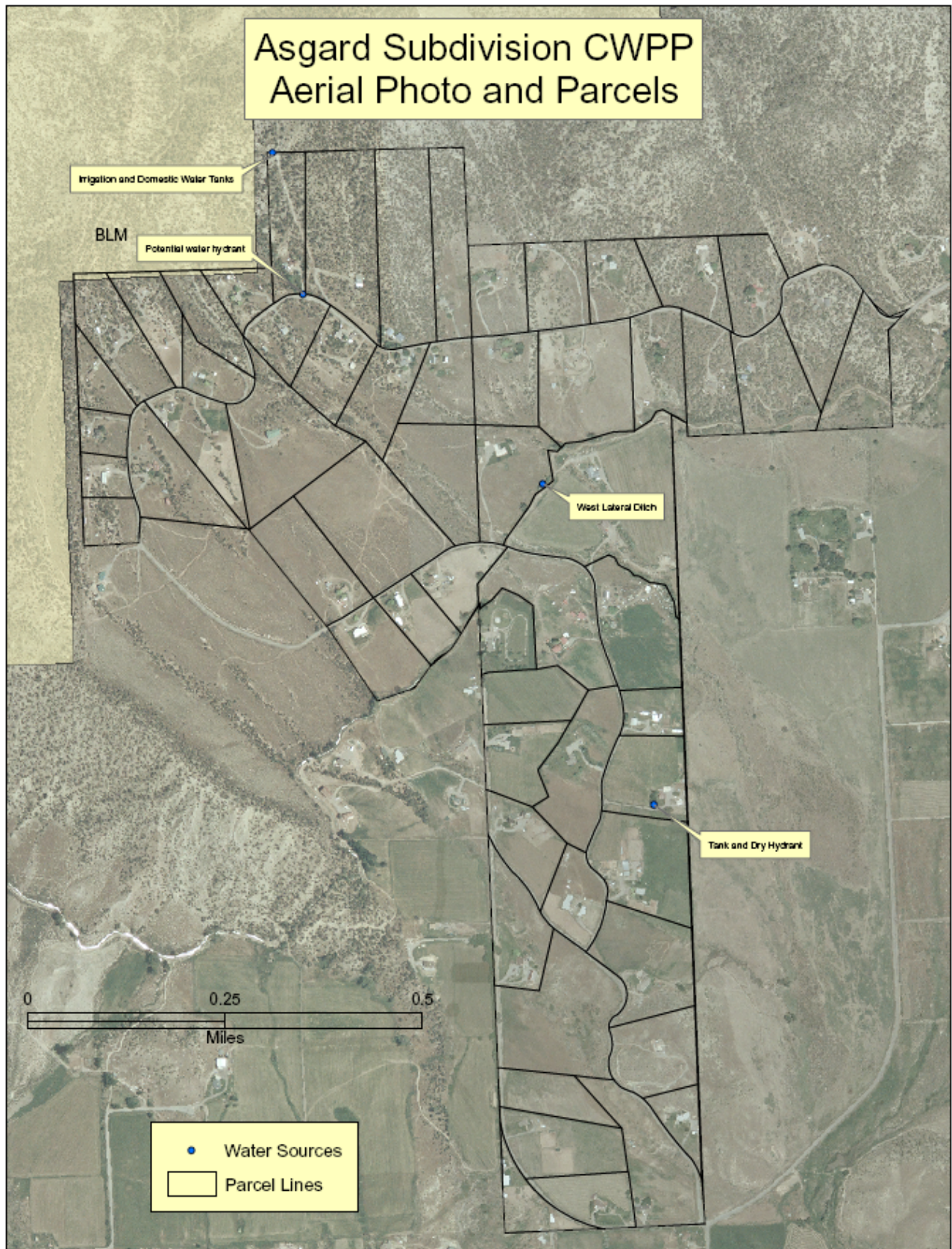


Figure 6: Asgard Subdivision CWPP Ownership Map

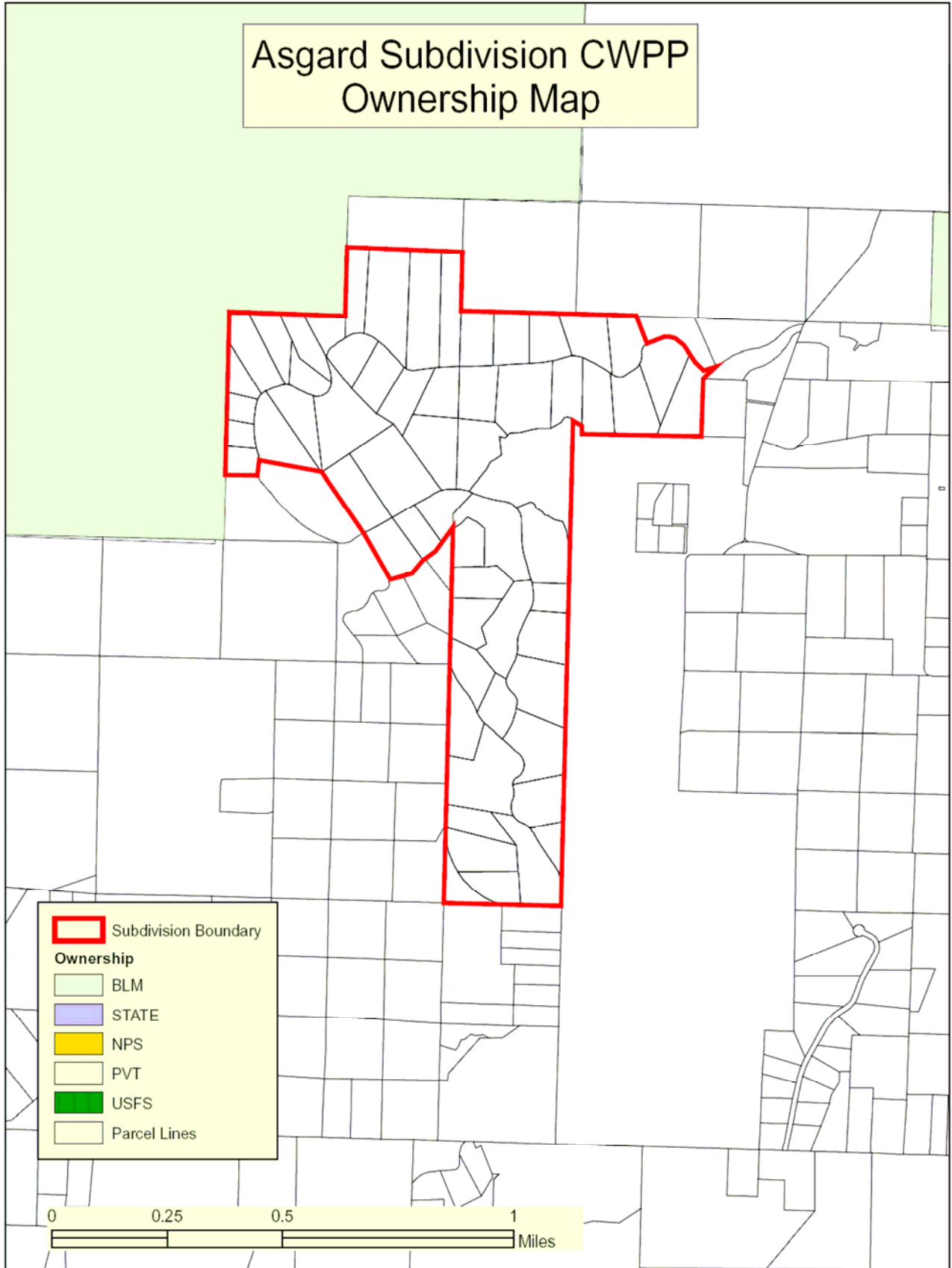


Figure 7: Asgard Subdivision CWPP Slope Map

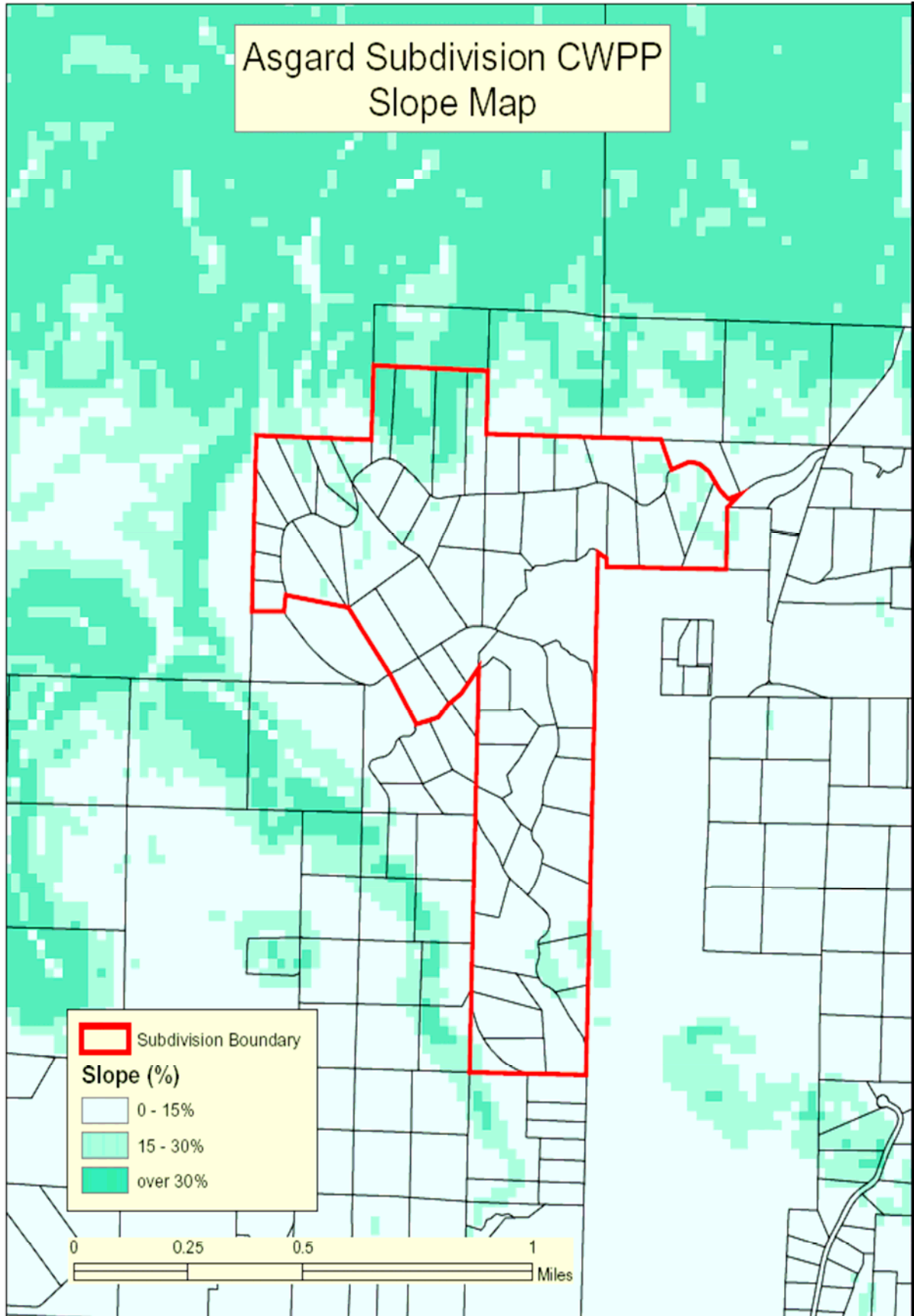
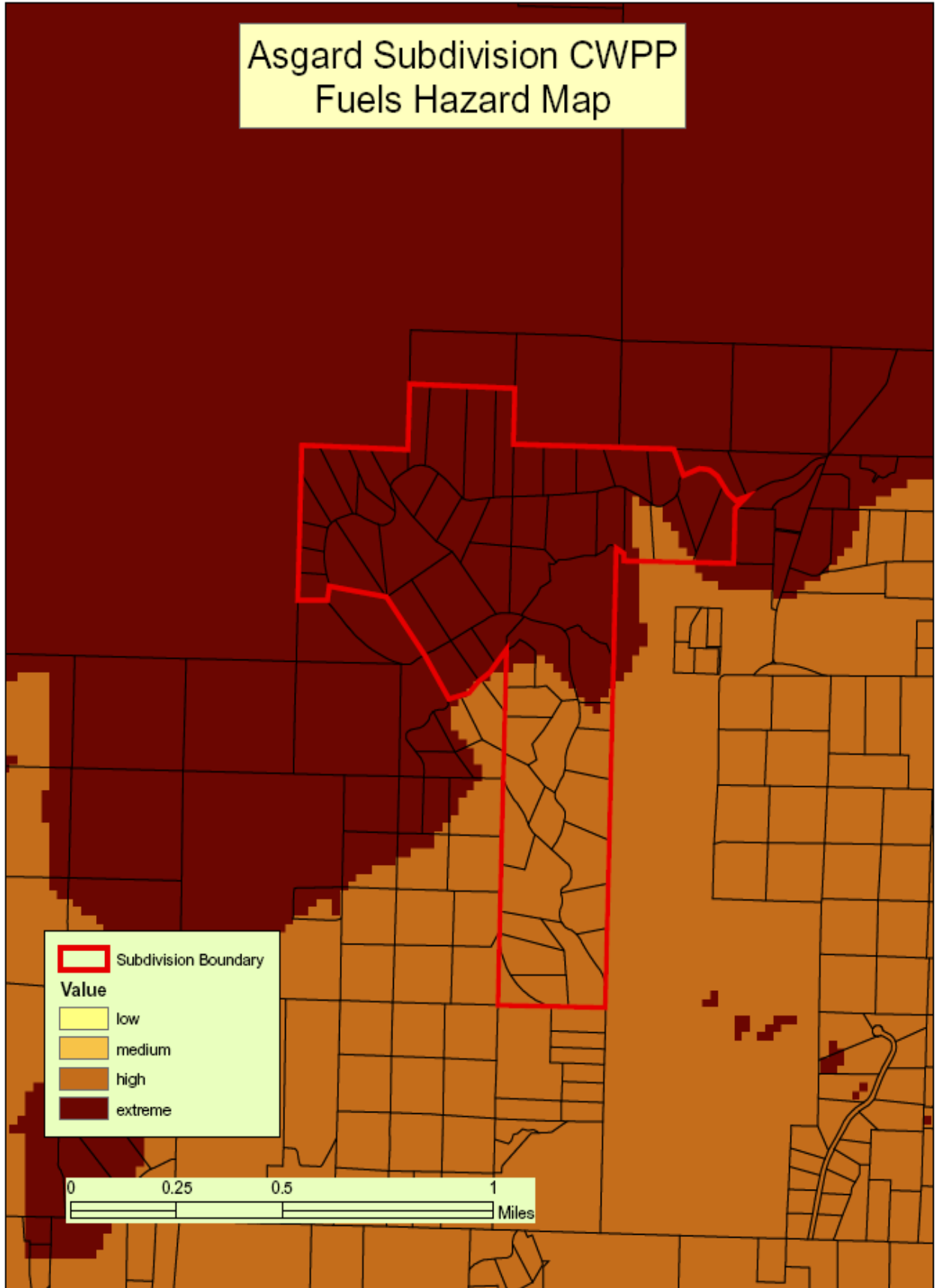


Figure 8: Asgard Subdivision CWPP Fuels Hazard Map



Overview

Elk Creek/Three Elk/ The Cedars Subdivisions

Introduction

This area is composed of three adjacent separate subdivisions located within a span of ½ to 1 mile traveling north on the Buford Road (County Road 467): The Cedars, Three Elk, and Elk Creek. All three are on the north side of C.R. 467. The terrain is characterized by southwest-trending slopes and foothills below the mesas and ridges of BLM and White River National Forest Lands farther north. Soils range from shallow, rocky, silt clay loams to deeper silt clay loams in more level areas. Most slope aspects are southerly-facing, creating dry, rocky slopes supporting pinon and juniper woodland and dissected by dry and seasonal drainages flowing to the south/southwest. Brief field survey of trees in these areas has shown a moderate infestation of Ips beetle, and a more widespread infestation of twig beetle, indicating that pinon pine will be experiencing increased mortality from pests and subsequent fungal disease. Juniper also appears to be in decline in some areas, although the cause was not immediately determined.

Surveys were conducted in late November and early December 2007. A total of 96 residences were assessed during field survey; of these, 73 (76%) were assessed at moderate to high risk for wildfire due to remote location, and restricted ingress/egress, steep slopes, and the abundance of structures in dense forest fuels. Following is a discussion of each subdivision's risks, current hazard mitigation, and recommendations.

The Cedars:

This subdivision of about 20 acres is the first one located on the Buford Road traveling north. It consists of 10 properties located on the top and south side of a low mesa. A 3.2-acre strip of subdivision open space runs between the county road and the private lots. The Coryell Ditch runs through the open space and the southern portion of 5 easternmost lots before turning north and out of The Cedars (see Figure 9 for fire suppression resources). Flammable material along the ditch is thick, including dead standing cottonwoods, understory shrubs and vines, and abundant ladder fuels, tree fall and down and dead material left from ditch maintenance.

Pinon juniper forest is overstocked with almost 100% crown closure extending from the road embankment through the subdivision. Areas of greatest risk include 1) the forested area between the Buford road and the irrigation ditch (abundant dead standing, dead and down, slash from ditch maintenance), 2) the drainage located at the intersection of the Buford Road and the subdivision access (dead standing, ladder fuels, dead and down), and 3) the drainage located to the west and north of The Cedars with a north-facing aspect and 100% crown closure of pinon/juniper. Additionally, many private lots contain dense pinon/juniper stands. Low-growing shrubs and grasses characterize the understory, becoming denser in the north portion of the subdivision.

In summary, The Cedars is located at the top of concentrated fuel areas, and can benefit from mitigation and structure assessment on private property and common areas.

Risk Assessment:

- Potential ignition from the roadside to the south/southwest;
- Lightning ignitions in the foothills to the north, or within the subdivisions;
- Potential fires from recreation on adjacent BLM/National Forestland to the north.

Current Hazard/Risk Reduction:

- Most homes appear to be built to Firewise standards; roofing is composite or Class-A materials and all houses are well marked;
- Several residents have made efforts to thin and prune trees and otherwise reduce fuels within their properties, and the HOA has begun to address wildfire risk issues and has solicited bids from contractors for fuels reduction;
- Three fire hydrants are located on Cedar Way Road, with one at the center of the cul-de-sac at the end of Cedar Way;
- The Coryell Ditch provides an intermittent above-ground water resource for fire suppression during summer months.

The Cedars Wildfire Risk Priorities are as follows:

- Landowners assess homes and structures for Firewise standards, communicate with local fire department for recommended changes;
- Defensible space thinning on all private properties assigned moderate or high where the landowner has agreed to participate;
- Reduce fuels along the Coryell Ditch and in the drainages between the ditch and the county road; continue to reduce fuels in the open space as time and funds allow;
- Construct fuel breaks or thinning in extremely dense fuel areas to the north of residences along the adjacent drainage;
- Form an HOA Wildfire Awareness committee to meet on a regular basis to facilitate wildfire education, assess local priorities, and potentially apply for grants for further projects; assess possibility of a community water source (cistern or well with pump);

Three Elk:

This subdivision is immediately north of The Cedars and includes 86 acres characterized by steep slopes and steep seasonal drainages. Most drainages contain abundant amounts of dead and down riparian material, particularly the southernmost drainage. The entrance to Three Elk becomes congested with cottonwood and shrub growth near the loop intersection. Continuous pinon/juniper forest covers these steep slopes with 75 to 100% crown closure, abundant dead and down material, and an understory of cool and warm season grasses and sagebrush. Oak and cottonwood plant associations appear on the south-facing slopes of southwest portion of the subdivision. The residential lots in Three Elk appear to range between 5 and 20 acres supporting larger amounts of dense pinon/juniper stands within all three mitigation zones. Due to these factors, all structures within the Three Elk subdivision were assigned a moderate to high wildfire risk rating. The Red Rock irrigation ditch also runs through the subdivision. Most homes were set back from the road, but those that could be observed appeared to be of Firewise construction with composite or Class-A roofing.

Risk Assessment:

- Potential ignition from the roadside to the south/southwest;
- Lightning ignitions in the foothills to the north, or within the subdivisions;
- Potential fires from recreation on adjacent BLM/National Forestland to the north.
- Potential ignition from construction or agricultural activities.

Current Hazard/Risk Reduction:

- Four fire hydrants were observed: one at the top of Elk Run Road, one in front of address # 391, another hydrant observed next to #0723, and one at the intersection with C.R. 467. Above-ground water may be available for fire suppression from the Red Rock Ditch.
- Large cistern/water tank was observed to the north of subdivision that contains Elk Creek water pumped up and stored for gravity-fed fire hydrants in Elk Creek, The Cedars, and Three Elk subdivisions.
- Houses observed appeared to have Class-A fire resistant roofing.

Three Elk Wildfire Risk Priorities are as follows:

- Landowners assess homes and structures for Firewise standards, communicate with local fire department for recommended changes;
- Defensible space thinning on all private properties assigned moderate or high where the landowner has agreed to participate;
- Reduce fuels along the Red Rock Ditch and in the drainages between the ditch and the county road; continue to reduce fuels in the open space as time and funds allow;
- Consider constructing fuel breaks or thinning in extremely dense fuel areas to the north and east of residences towards adjacent BLM land;
- Assess tree health and juniper decline with state foresters;
- Form an HOA Wildfire Awareness committee to meet on a regular basis to facilitate wildfire education, assess local priorities, and potentially apply for grants for further projects;
- Collaborate with BLM staff regarding fuel management and potential projects on adjacent BLM lands;
- Collaborate with CSFS for defensible space or firebreak design, possible assessment of diseases and decline in the juniper population
- Collaborate with BMFPD to obtain a grant to install a dry hydrant to fire department specifications

Elk Creek:

Elk Creek is the northernmost subdivision in this study area with the most residences. A total of 70 residences exist on 30 acres. Additional residences and farms are adjacent to the north and west of the subdivision, but have not been assessed in the field survey. The environment is similar to Three Elk: south-trending slopes dissected by seasonal drainages supporting dense pinon/juniper forest. The distinctive features of the Elk Creek area that increase its wildfire risk are 1) it is a densely populated area on south-trending slopes amid thick pinon/juniper forest, 2) surrounding fuels are often dense within all three zones and may have increasing risk with beetle mortality, and 3) remote access from BMFPD, narrow winding roads, and limited emergency vehicle access for emergency responders.

The majority of lots in the north and western portions (Apache Drive, South Comanchero Trail, and Navajo Trail) include at least one structure surrounded by pinon and juniper. Drainages flow through these areas at about 20-45% slope, with abundant pinon pine, juniper, cottonwood, and oak. These areas are collectively at the highest risk in a wildfire event. Residences were also found to the northeast of the northernmost border of Elk Creek on unmarked roads with no addresses. These are located adjacent to BLM lands and are surrounded to the north by dense pinon/pine forest and ladder fuels. The main entrance to the subdivision was treated several years ago to reduce vegetation near the road and increase visibility – however, most of the treatment has re-grown.

Risk Assessment:

- Potential ignition from the roadside to the south/southwest;
- Lightning ignitions in the foothills to the north, or within the subdivisions;
- Potential fires from recreation on adjacent BLM/National Forestland to the north;
- Rapid expansion of structure fires due to density of homes and fuels;
- Potential ignition from construction or agricultural activities.

Current Hazard/Risk Reduction:

- Most roofing material on structures appears to be composite material;
- Hydrant at intersection of Apache and S. Comanchero;
- Hydrant located at Comanchero/Shoshone Trail intersection;
- Hydrants located at the Comanchero/Ute, and Ute/Navajo intersections;
- Hydrant located south of the subdivision across the street at the Buford Road/Shoshone intersection;
- The Red Rock Ditch runs parallel to Comanchero and the Coryell Ditch runs parallel to the Buford Road; these ditches may provide above-ground water in a wildfire event;
- The Elk Creek HOA has discussed wildfire risk and issues surrounding reducing risk (the HOA implemented a vegetation reduction project at the main entrance in 2003).

Elk Creek Wildfire Risk Priorities are as follows:

- Landowners assess homes and structures for Firewise construction standards, communicate with local fire department for recommended changes;
- Defensible space thinning on all private properties assigned moderate or high where the landowner has agreed to participate;
- Thin slope below subdivision (towards C.R.467) or create a fuel break between residences and C.R. 467;
- Consider removing low-growing common juniper (horticultural juniper) near all structures;
- Replace any shingle or flammable roofing;
- Assess tree health and juniper decline with state foresters;
- Keep vegetation thinned along the ditch;
- Form an HOA Wildfire Awareness committee to meet on a regular basis to facilitate wildfire education, assess local priorities, collaborate with agencies, and potentially apply for grants for further projects;
- Reduce/eliminate vegetation at roadside areas where dense oak or shrubs restrict ingress/egress (within 15-30 feet of the roadside) – improving emergency vehicle access and visibility;
- Collaborate with CSFS for a grant to reduce ladder fuels and vegetation along the Coryell ditch;
- Create above-ground water storage resources (tanks, cisterns) where possible for wildfire suppression;
- Make sure all residences and house locations are clearly marked with accurate addresses, and the BMFPD is informed of changes to these addresses;
- Collaborate with staff from the BLM and BMFPD to keep them informed of wildfire risks and risk reduction efforts, including mitigation, removal of high-risk structures, or water facilities.

Additional properties were found immediately outside of the Elk Creek subdivision to the west/northwest – characterized by pastures, high grasses and shrubs. Structures are not as crowded here; however, residents are advised to keep grasses low around structures and prune up trees to CSFS

guidelines. Residents at unmarked properties to the north and northwest of Elk Creek are advised to collaborate with BMFPD to clarify locations and emergency ingress/egress.

Table 3: Elk Creek Wildfire Hazard Risk Assessments

1	ADDRESS	Low	Moderate	High	Notes
2	1288 County Road 245			X	Mitigate all zones north of house
3	0015 Apache Dr			X	Mitigate forest to northwest
4	0040 Apache Dr			X	Mitigate forest to southeast
5	0046 Apache Dr			X	Mitigate areas to north and northeast of house
6	0058 Apache Dr			X	Mitigate trees to northeast and southwest, densely wooded drainage to west
7	0071 Apache Dr			X	Mitigate forest to north and northeast of house
8	0076 Apache Dr.			X	Mitigate any possible zones surrounding house
9	0081 Apache Dr			X	Mitigate all zones
10	0087 Apache Dr.			X	Mitigate all zones to east of house, prune other trees from eaves
11	0096 Apache Dr.			X	Mitigate all zones, maintain mitigation in drainage to west
12	0113 Apache Dr.		X		Mitigate shrubs and trees as necessary on slope to east
13	0140 Apache Dr.			X	Mitigate all zones
14	0149 Apache Dr.			X	Mitigate all zones on slope to west of structures
15	0162 Apache Dr.			X	Mitigate all zones
16	0185 Apache Dr.			X	Mitigate all zones on slope to south
17	0002 S. Comanchero			X	Mitigate all zones to south and west
18	0008 S. Comanchero			X	Mitigate all zones to west/southwest
19	0011 S. Comanchero			X	Mitigate all zones
20	0016 S. Comanchero			X	Mitigate all possible zones
21	0017 S. Comanchero			X	Mitigate drainage to east, trees in front yard
22	0019 S. Comanchero			X	Mitigate all zones to east/southeast
23	0039 S. Comanchero			X	Mitigate all zones
24	0051 S. Comanchero			X	Mitigate all zones
25	0083 S. Comanchero			X	Mitigate all zones
26	0085 S. Comanchero			X	Mitigate all zones to southeast
27	0088 S. Comanchero		X		Zone 1 partially complete, mitigate all zones to west and south, prune trees
28	0100 S. Comanchero			X	Mitigate all zones
29	0122 N. Comanchero		X		Maintain low grasses, keep trees pruned
30	0156 N. Comanchero			X	Mitigate all zones to north/northeast
31	0169 N. Comanchero		X		Prune up trees surrounding house, maintain low grasses
32	0170 N. Comanchero			X	Mitigate all zones to east and north of house
33	0191 N. Comanchero	X			Maintain low grasses and shrubs, keep trees pruned
34	0198 N. Comanchero			X	Mitigate all zones to east near drainage
35	0206 N. Comanchero			X	Mitigate all zones, keep branches away from roof, check roof material
36	0215 N. Comanchero	X			Maintain low grasses and shrubs, keep trees pruned away from house
37	0218 N. Comanchero			X	Mitigate all zones to east, prune trees near house

Table 3 cont'd: Elk Creek Wildfire Hazard Assessments

	ADDRESS	Low	Moderate	High	Notes
38					
39	0232 N. Comanchero			X	Mitigate all zones
40	0258 N. Comanchero			X	Mitigate all zones
41	0261 N. Comanchero	X			Maintain low grasses, keep trees pruned
42	0271 N. Comanchero	X			Maintain low grasses, keep trees pruned
43	0285 N. Comanchero			X	Mitigate all zones to north and east
44	0002 Ute	X			Maintain low grasses, keep trees pruned
45	0005 Ute	X			Maintain low grasses, keep trees pruned
46	0057 Ute		X		Maintain low grasses, keep trees pruned
47	0007 Navajo	X			Maintain low grasses, keep trees pruned
48	0008 Navajo	X			Maintain low grasses, keep trees pruned
49	0020 Navajo	X			Maintain low grasses, keep trees pruned
50	0033 Navajo	X			Maintain low grasses, keep trees pruned
51	0034 Navajo	X			Maintain low grasses, keep trees pruned
52	0037 Navajo	X			Maintain low grasses, keep trees pruned
53	0043 Navajo	X			Maintain low grasses, keep trees pruned
54	0044 Navajo	X			Maintain low grasses, keep trees pruned
55	0055 Navajo	X			Maintain low grasses, keep trees pruned
56	0056 Navajo	X			Prune up trees surrounding house, maintain low grasses
57	0096 Navajo		X		Prune up trees surrounding house, maintain low grasses
58	0105 Navajo	X			Prune up trees surrounding house, maintain low grasses
59	0112 Navajo	X			Maintain low grasses, keep trees pruned
60	0125 Navajo			X	Maintain grasses, keep trees pruned, at risk from slope to west
61	0128 Navajo	X			Maintain low grasses, keep trees pruned
62	0143 Navajo		X		Maintain low grasses, at risk from slope to west
63	0153 Navajo			X	Maintain low grasses, at risk from slope to west
64	0162 Navajo			X	Mitigate all zones to north
65	0163 Navajo			X	Maintain low grasses, at risk from slope to west
66	0165 Navajo			X	Mitigate all zones to north
67	0082 Shoshone			X	Mitigate all zones
68	0114 Shoshone		X		Prune trees on west side, mitigate zone 3 to northeast
69	0116 Shoshone			X	Partially mitigated, continue to mitigate all zones
70	0120 Shoshone			X	Mitigate all zones
71	0160 Shoshone			X	Mitigate all zones
72	End of Shoshone - east (no address noted)			X	Mitigate all zones
73	End of Shoshone - west (no address noted)			X	Mitigate all zones
74					

Table 4: Three Elk Wildfire Hazard Risk Assessments

1	ADDRESS	Low	Moderate	High	Notes
2	830 Elk Run		X		Fire hydrant next to driveway, mitigate all zones to south, east, and west of house
3	826 Elk Run			X	Mitigate all zones, assess driveway access
4	680 Elk Run			X	Signs of lightning strike, mitigate all zones
5	723 Elk Run			X	Zone 1 partially complete, continue to mitigate all zones
6	586 Elk Run			X	Mitigate all zones, assess driveway access
7	621 Elk Run			X	Fire hydrant next to property, mitigate all zones,
8	520 Elk Run			X	Mitigate all zones, assess driveway access
9	480 Elk Run			X	Zone 1 partially complete, continue to mitigate all zones, assess driveway access
10	448 Elk Run			X	Mitigate all zones, assess driveway access
11	449 Elk Run			X	Zone 1 partially complete, mitigate all zones
12	391 Elk Run			X	Fire hydrant next to road at this address, zone 1 partially complete, mitigate all zones
13	396 Elk Run			X	Mitigate all zones, assess driveway access
14	322 Elk Run			X	Mitigate all zones, assess driveway access
15	280 Elk Run			X	Mitigate all zones, assess driveway access
16	203 Elk Run			X	Mitigate all zones, assess driveway access
17	038 Elk Run		X		Mitigate hillside to west for zones 1, 2, & 3, prune trees in yard to north, maintain low grasses/shrubs
18					
19					
20					
21					
22					

Table 5: The Cedars Wildfire Hazard Risk Assessments:

1	Address	Low	Moderate	High	Notes
2	0094 Cedar Way			X	Mitigate all zones
3	0097 Cedar Way			X	Mitigate all zones - especially towards road, east and west of house
4	0172 Cedar Way				Mitigate all zones to north and west
5	0173 Cedar Way		X		Mitigate zones to east and south of house - zone 1 already completed by landowner
6	0206 Cedar Way			X	Mitigate all zones - especially to northwest of house
7	0232 Cedar Way		X		Mitigate zones 2 and 3 to north of house, maintain low grasses
8	0274 Cedar Way			X	Mitigate all zones
9	0280 Cedar Way			X	Mitigate all zones
10	0277 Cedar Way			X	Zone 1 partially complete, mitigate zones 2 and 3 to west, east, and south of house
11	0261 Cedar Way			X	Mitigate all zones,
12	Coyell Ditch			X	Remove dead and down material along ditch, remove dead standing cottonwood, thin pinon/juniper forest to uphill and downhill from ditch
13					
14					
15					
16					
17					
18					
19					

Figure 9: Elk Creek/Three Elk/The Cedars Aerial photo and parcel lines

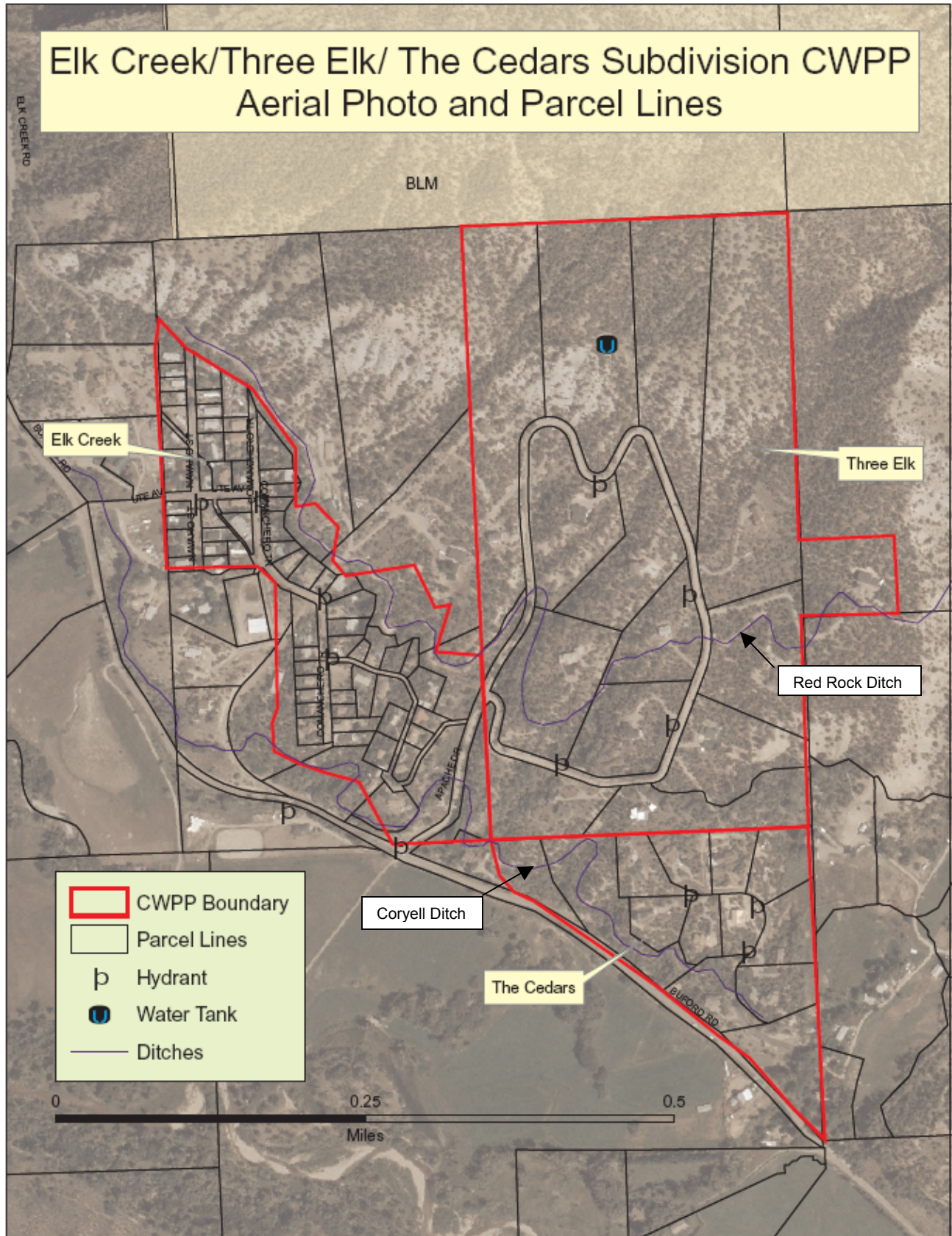


Figure 10: Elk Creek/Three Elk/The Cedars Ownership Map

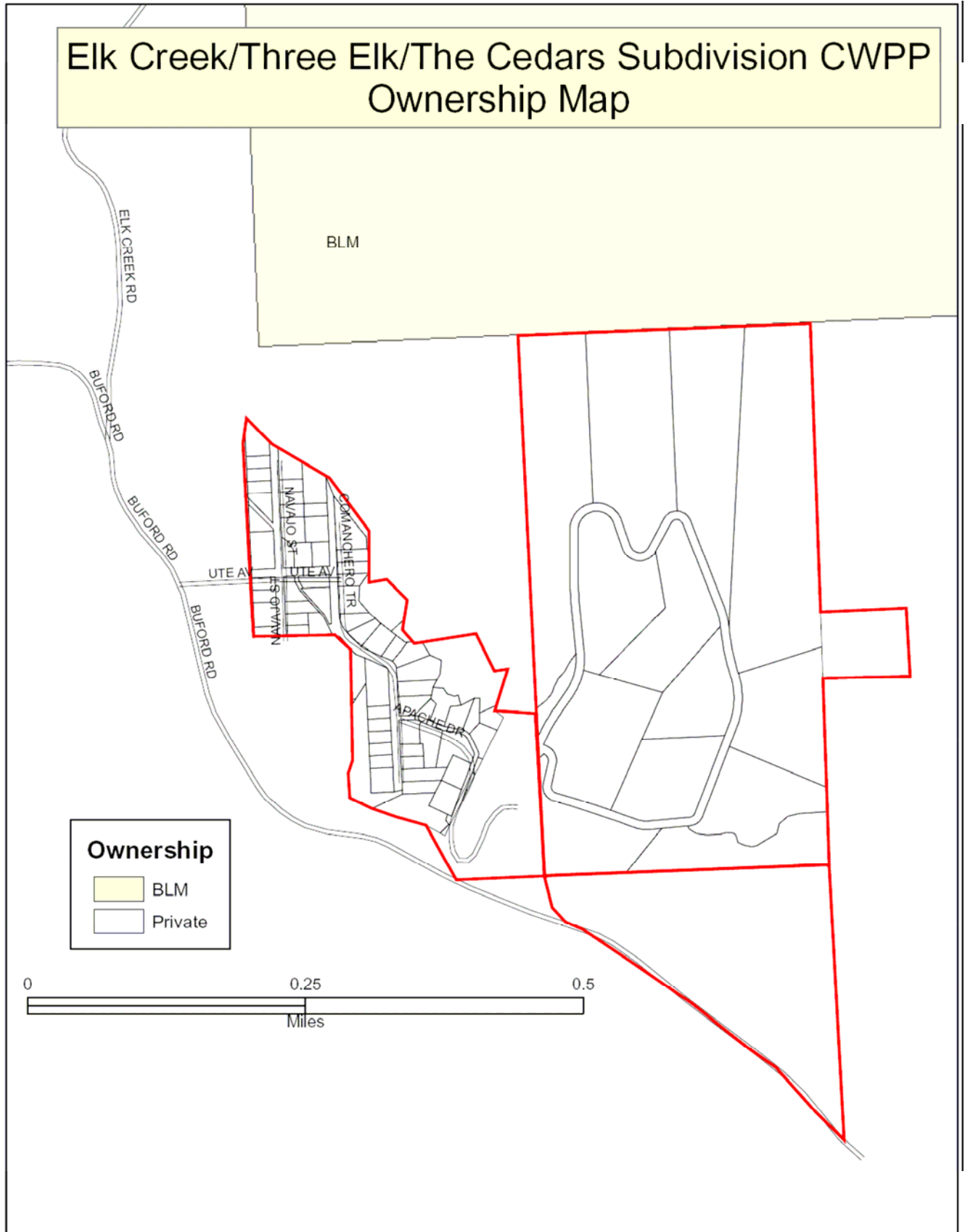


Figure 11: Elk Creek/Three Elk/The Cedars Slope Map

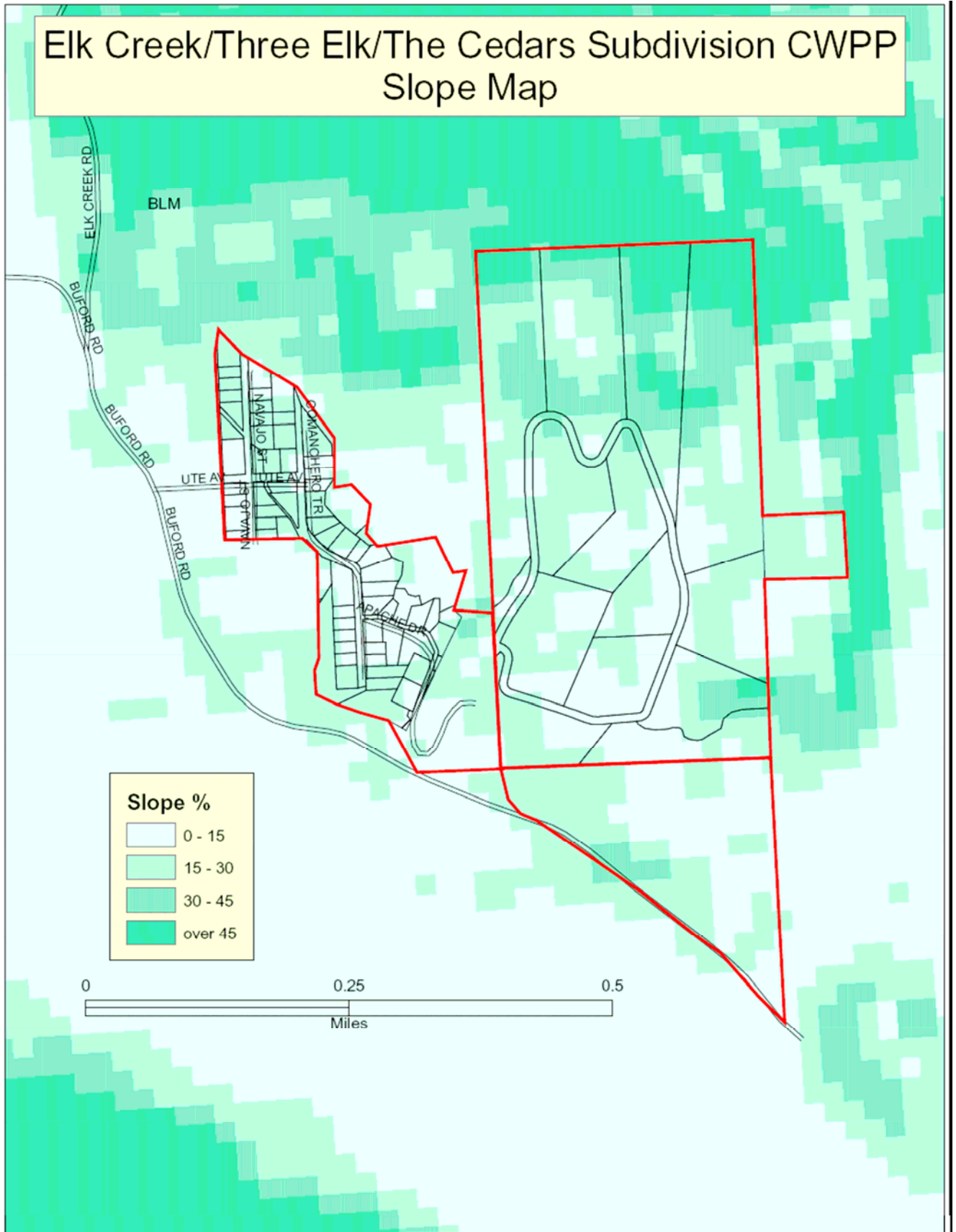
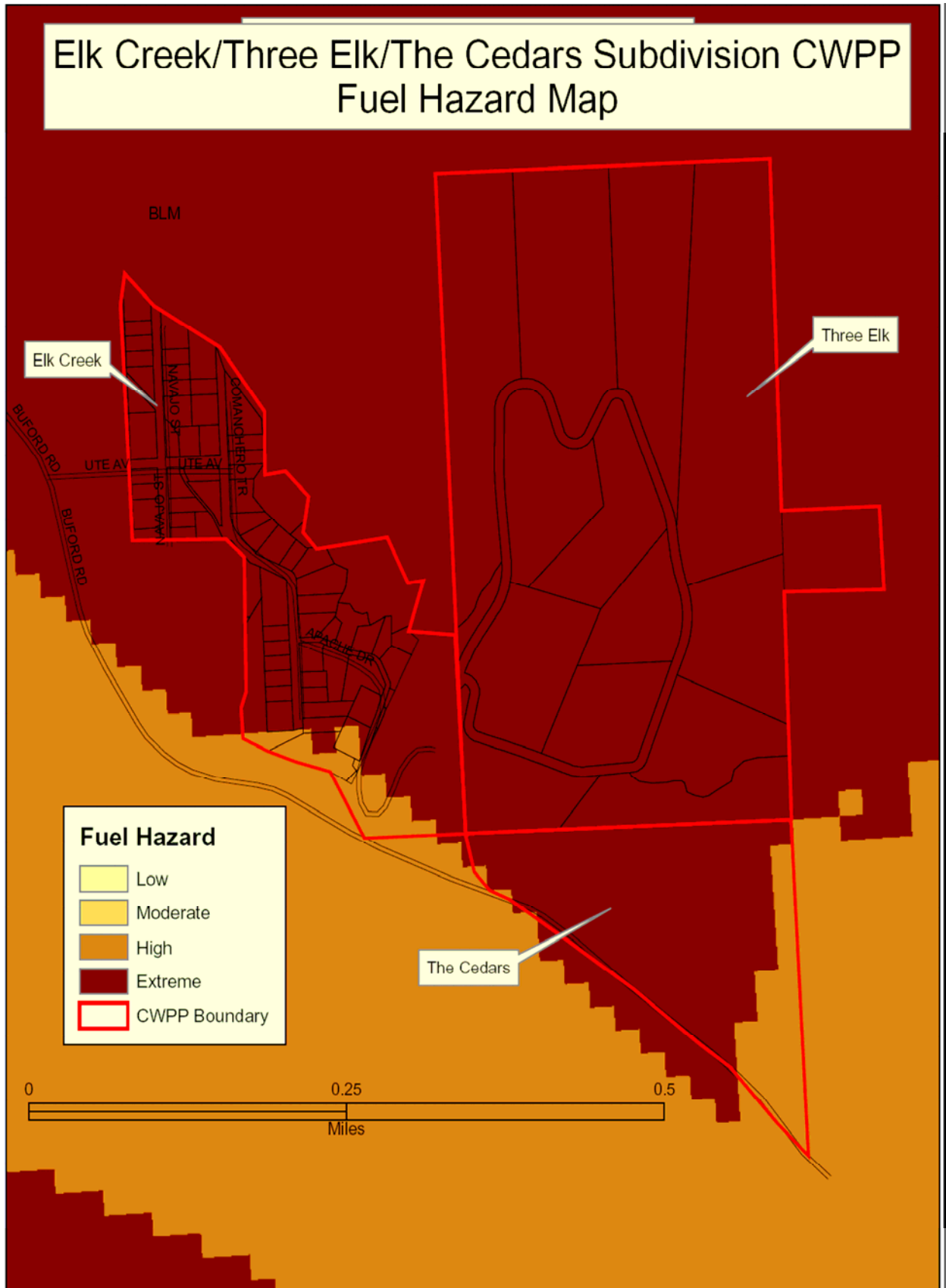


Figure 12: Elk Creek/Three Elk/The Cedars Fuels Hazard Map



Overview Garfield Creek

Introduction

The Garfield Creek area is located approximately 6 miles east of Silt and 3 miles south and west of New Castle, encompassing private property and adjacent Bureau of Land Management and Garfield Creek State Wildlife Area. Garfield Creek flows north from headwaters in White River National Forest land through a broad valley bordered by low mountains to the east and west and dissected by tributary drainages. Within the designated assessment area, 2,079 acres are State Wildlife area, 270 acres are BLM, and 960 acres are privately owned. The climate is characterized by hot, dry summers and moderate winters with moderate snowfall moisture. Soils vary from poorly sorted rocky silt loams on the slopes of the surrounding mountains to fine silt clay loams of the valley floor. The vegetation of Garfield Creek differs markedly from the other study areas: cool and warm season grasses cover the valley floor interspersed with large forests of Gambel oak, sagebrush and rabbitbrush. Forests of pinon/juniper are found at higher elevations on the slopes of the surrounding mountains. Dense cottonwood and riparian forest habitat line the Garfield Creek drainage. Garfield and Baldy Creeks contain at least 21 residences; additional structures were noted at 7000 C.R. 312 but were not directly observed due to road privacy signage.

Baldy Creek and its access road, C.R. 328, intersect with Garfield Creek drainage at about 5 miles down Garfield Creek Road. Baldy Creek is a narrower canyon. Vegetation in this area ranges from open grass/brush meadow at the confluence to steep slopes (15-65%) densely vegetated with almost 95% Gambel oak. Riparian forest habitat lines Baldy Creek. Forest habitat changes to include aspen and mixed conifer about 1 mile up Baldy Creek.

While Garfield Creek drainage itself is not characterized by dense pinon/juniper forest, the grass/shrub/oak plant associations are highly flammable in dry conditions and provide for high wildfire risk. Dense, high grasses provide quick-burning ladder fuels in a wildfire event for sagebrush, rabbitbrush, and Gambel oak. The drainage itself also includes dried dead and down materials, dense undergrowth, and standing dead cottonwood trees. Dense oak in Baldy Creek drainage can sustain a more intense fire event in the absence of meadows. Wildfire risk increases towards the end of the growing season as abundant warm season grasses mature and dry. These factors contribute to an overall high wildfire risk in the Garfield Creek and Baldy Creek drainages. As previously stated, densely vegetated drainages on the east and west sides of the valley can act as “chimneys” in the event of fire from below – as the fire heats the air from below, heated air rises up into the drainage and quickly pre-heats fuels above.

Access in and out of Garfield Creek and Baldy Creek (ingress/egress) poses several safety issues. Dense vegetation overhanging the road at the northern end of Garfield Creek (C.R. 312), about ½ mile into Baldy Creek, and at intervals along the road can prohibit emergency vehicle access in a wildfire event. Wildfire burning through dense stands of trees on both sides of the road poses a serious threat for residents and emergency vehicles to pass through – either to enter the valley for fire suppression, or for residents evacuating the valley. Additionally, if passage through these forested areas is blocked (by emergency staging, equipment, or vehicle accident) residents and emergency responders may become trapped within the valley.

The overall geographic location of Garfield Creek in the southern portion of BMFPD also adds to its significance as a county wildfire hazard area. The southern end of Garfield Creek forms a confluence

with Alkali Creek, which shares a ridge with South Canyon Creek to the east. This system of canyons drains the Bald Mountain area of the adjacent White River National Forest to the south. This grouping of drainages forms a steep and remote system of dense forest fuels that, when ignited in high risk conditions, can pose a serious and difficult-to-access wildfire threat to Glenwood Springs, 6 to 7 miles east of the confluence. Wildfire risk management of the areas to the west and east of this confluence must take into account the enormity of hazards to residents of Glenwood Springs in the event of an out-of-control wildfire event in this area.

Risk Assessment and Mitigation

Field survey of the Garfield Creek drainage was conducted on November 2, 2007. At least 20 addresses were assessed; however, additional residences at 7700 C.R. 312 were not directly assessed due to the observance of “No Trespassing “ signs, and general inferences were made from the surrounding area. Each residence or address was assigned to low, moderate, or high wildfire risk (refer to Table 6). Nineteen residences and addresses were directly assessed as moderate to high risk. High risk factors include:

- Potential ignition from motorists on C.R. 312/328;
- Limited ingress/egress: restricted residential and emergency vehicle access in and out of the valley in a wildfire event;
- Lightning ignitions on Jolley Mesa immediately to the west (an ionic discharge location within the BMFPD), or in the mountains surrounding the valley;
- Ignitions in dry grasses from agricultural or construction activities;
- Potential fires from recreational use/hunters within the Garfield Creek State Wildlife Area;
- Potential fires from recreational use of adjacent or nearby BLM or USFS land.

Hazard/Risk Reduction:

The risks listed above are mitigated by the following factors:

- Garfield Creek is a perennial stream and may be an above ground water source in a wildfire event;
- The Department of Wildlife may be able to provide some fuels reduction projects and be a vehicle for communication regarding wildfire education for adjacent state lands;

Garfield Creek Risk Priorities

In summary, the location, fuel density, climate, and lack of above-ground water resources combine to make Garfield/Baldy Creeks area a high wildfire risk. Residents of the Garfield Creek area are encouraged to manage their home materials and surrounding fuels with utmost fire safety in mind:

- Landowners assess homes and structures for Firewise construction standards, communicate with local fire department for recommended changes;
- Defensible space thinning on all private properties assigned moderate or high where the landowner has agreed to participate;
- Form an HOA Wildfire Awareness committee to meet on a regular basis to facilitate wildfire education, assess local priorities, and potentially apply for grants for further projects; (including management staff from the BLM and DOW agencies)
- Reduce/eliminate vegetation at roadside areas where dense oak or shrubs restrict ingress/egress (within 15-30 feet of the roadside at 2 miles, 4 miles, and 6 miles) – improving emergency vehicle access and visibility;
- Create above-ground water storage resources (tanks, cisterns) where possible for wildfire suppression;

- Make sure all residences and house locations are clearly marked with accurate addresses;
- Collaborate with staff from the BLM, DOW and BMFPD to keep them informed of wildfire risks and risk reduction efforts, including mitigation, removal of high-risk structures, or water facilities.

Table 6: Garfield Creek Wildfire Hazard Risk Assessments

1	Address	Low	Medium	High	Notes
2	3000 C.R. 312		X		Mature oak groves and high grasses interspersed with structures; recommend mitigation around hay sheds
3	3321 C.R. 312		X		Structures close to densely vegetated canyon to west, maintain Class A roofs, low grasses
4	3400 C.R. 312		X		Mitigate nearby cottonwoods, maintain low grasses in defensible space
5	3584 C.R. 312			X	Full mitigation of zones 1,2 and 3 to east
6	4784 C.R. 312		X		Good defensible space - should mitigate along the driveway for emergency access
7	6642 C.R. 312		X		Recommended mitigation of oak in zones 2 and 3, maintain low grasses
8	7000 C.R. 312			X	Unmarked residence to east, high grasses, oak and cottonwood, mitigate all necessary zones, and reduce ladder fuels
9	7129 C.R. 312	X			Good -defensible space, monitor grasses and ladder fuels
10	7192 C.R. 312				Reduce ladder fuels and grasses, mitigate zones 1, 2, and 3
11	7225 C.R. 312				Maintain low grasses, mitigate zones 1 and 2 to the southeast
12	7342 C.R. 312			X	Mitigate zones 1, 2, and 3, check roof
13	7398 C.R. 312			X	Maintain low grasses, mitigate zones 1, 2, and 3 around buildings
14	7518 C.R. 312				Mitigate zones 1, 2, and 3 around buildings, check roof
15	7550 C.R. 312			X	Mitigate zones 1, 2, and 3 around buildings, check roof
16	7700 C.R. 312		X		Group of residences - most defensible space is good, mitigate zones 1,2, and 3 if oak and ladder fuels are present, check roofs
17	8000 C.R. 312			X	Dense oak and ladder fuels around home, mitigate zones 1, 2, 3, and driveway
18	8149 C.R. 312			X	Mitigate zones 1, 2, 3 on north and NW side of house
19	8051 C.R. 312			X?	Marked with no trespassing - not assessed - mitigate oak in zones 1, 2, 3 and ladder fuels if present
20	8100? C.R. 312		X		Beige log home - no address observed, maintain low grasses
21	8186 C.R. 312			X?	Gated - no access, surrounding topography and aerials indicate mitigation needed on slopes
22	Sout Residence, end of C.R. 328			X	Marked with no trespassing - not assessed - mitigate fuels in zones 1, 2, 3, with special attention to oak thickets, aerials indicate hay fields

Figure 13: Garfield Creek CWPP Aerial Photo and Parcels

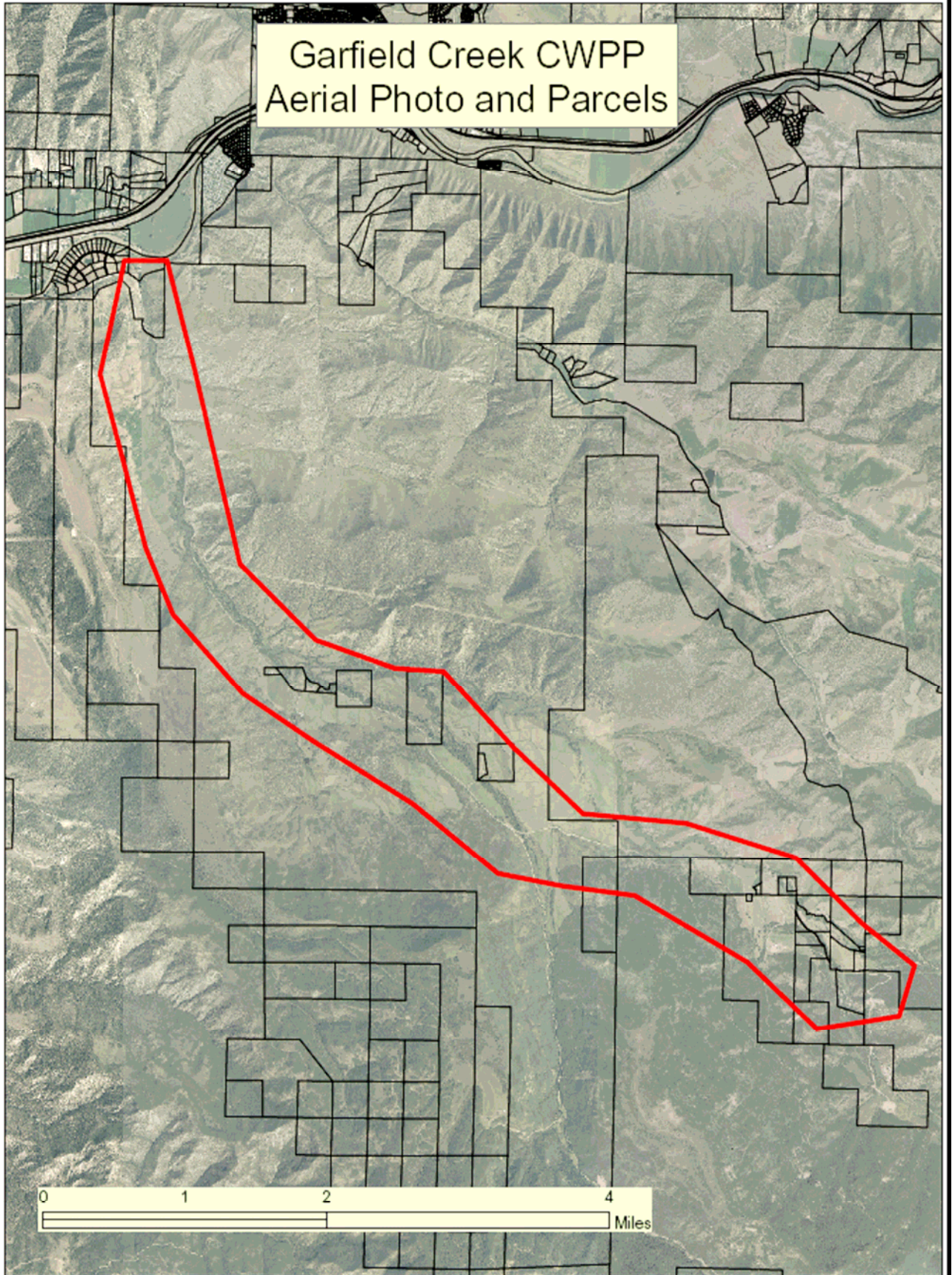


Figure 14: Garfield Creek CWPP Ownership Map

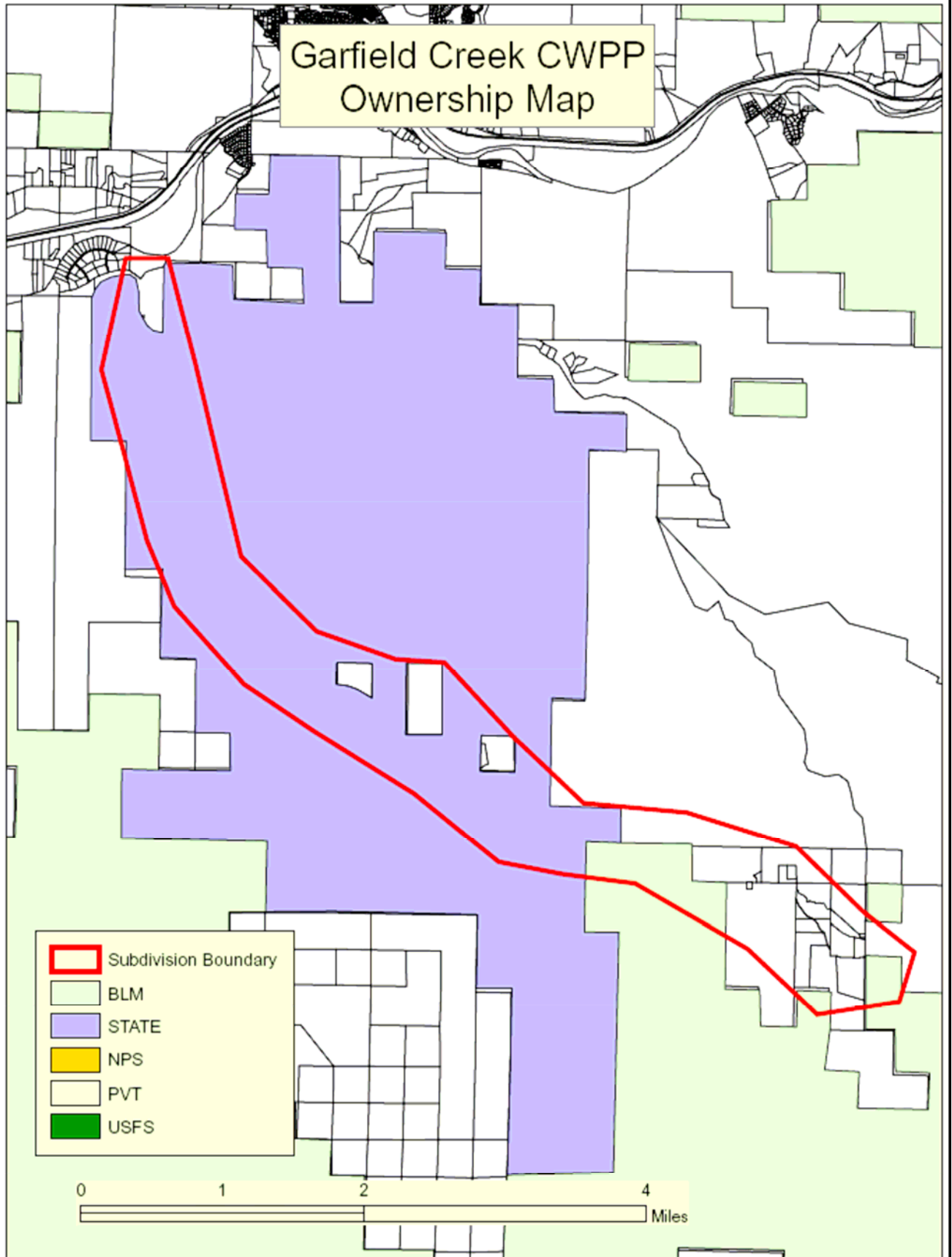


Figure 15: Garfield Creek CWPP Slope Map

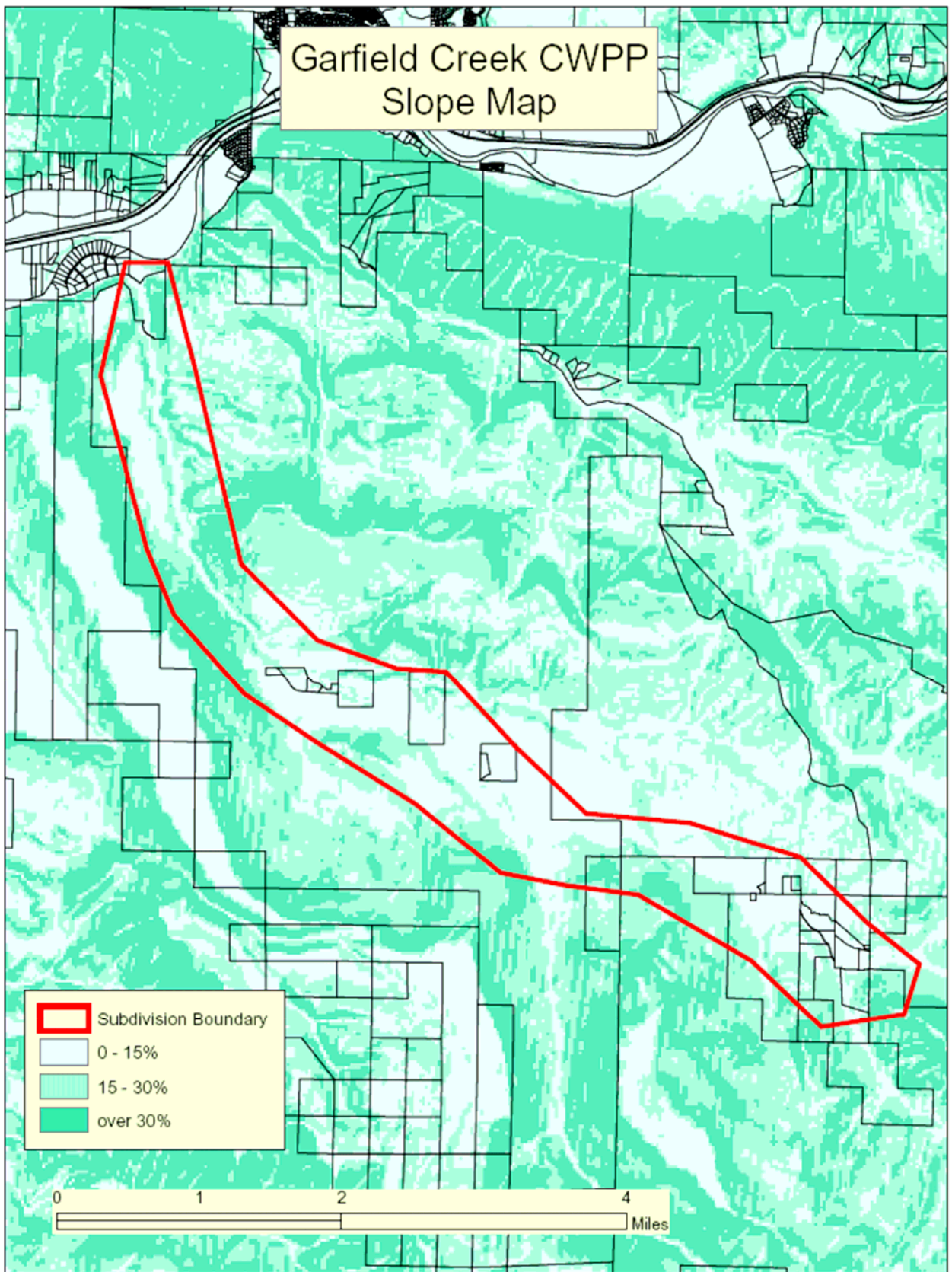
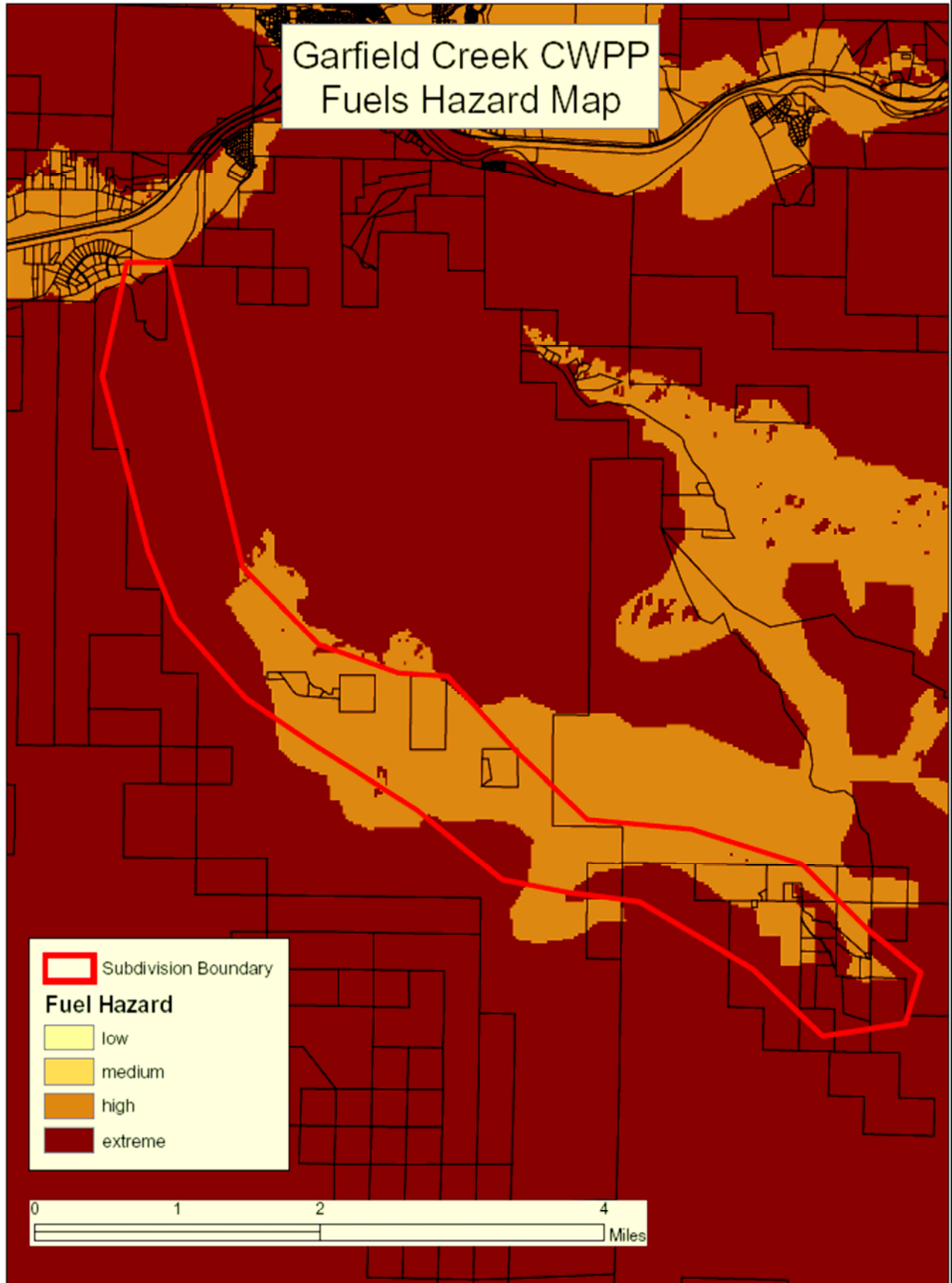


Figure 15: Garfield Creek CWPP Fuels Hazard Map:



Overall Recommendations:

Recommendations for each study area include several consistent actions: that landowners assess homes and structures for Firewise construction, increase communication with BMFPD, BLM, and DOW regarding recommended changes, form Wildfire Awareness committees, conduct defensible space thinning in high risk areas around structures and roadsides, create additional water resources for fire suppression, and clearly mark all roads and addresses. As previously stated: fuel reduction and Firewise construction are the two most significant factors a private landowner can control when managing wildfire risk. Cost-share grant funds are available through the CSFS and BMFPD for landowner use to address these costs (see Appendix B, and contact Kelly Rogers, District Forester, or Brit McLin, chief, BMFPD).

Community Preparedness

The BMFPD covers approx 440 square miles and response times can vary widely depending on the location and access of the event. BMFPD currently operates three stations – one in downtown Silt, one is at 731 Main Street in New Castle, and one in the Apple Tree community. Another station is proposed for the Castle Valley/Lakota Ranch area in New Castle. BMFPD can respond to a fire incident with up to 45 volunteer firefighters. Mutual aid agreements are in place with surrounding agencies, including the Upper Colorado Interagency Fire Central Zone, USFS, and adjacent fire districts (see the Garfield County Fire Protection Plan for more extensive discussion of county-wide agreements and response capabilities). Figure 17 illustrates areas of management for combined interagency responses.

BMFPD equipment capability includes:

- The potential to move over 7,000 gallons of water in a water tender shuttle,
- 5 quick-response type-6 engines,
- Multiple structural firefighting engines, including two four wheel-drive CAFS (compressed air foam systems).

Hydrant Grant Program

Funds are currently available to encourage public involvement in developing a rural water supply system. BMFPD has implemented a cost-share program that can reimburse a landowner up to 50% of the cost to install a dry hydrant to provide above-ground water resources for rural fire suppression in the wildland/urban interface. Please contact Brit McLin at the BMFPD to discuss these cost-share funds. These dry hydrants improve the district's response capability, particularly in areas such as Asgard that has few water resources. One dry hydrant is present in Asgard subdivision – others are unknown in the other study areas.

Elk Creek/Three Elk/Cedars subdivisions maintain 13 fire hydrants that are gravity-fed from a 225,000 gallon water tank located uphill from Three Elk subdivisions (see Figure 9). Water is pumped to this tank from Elk Creek. The tank and hydrants are maintained and tested by the Town of New Castle (except for the hydrants in Elk Creek, which are privately owned and managed). Water Resources for Garfield and Baldy Creeks are limited to perennial creeks or stock tanks, no dry hydrants or tanks were noted in the area.

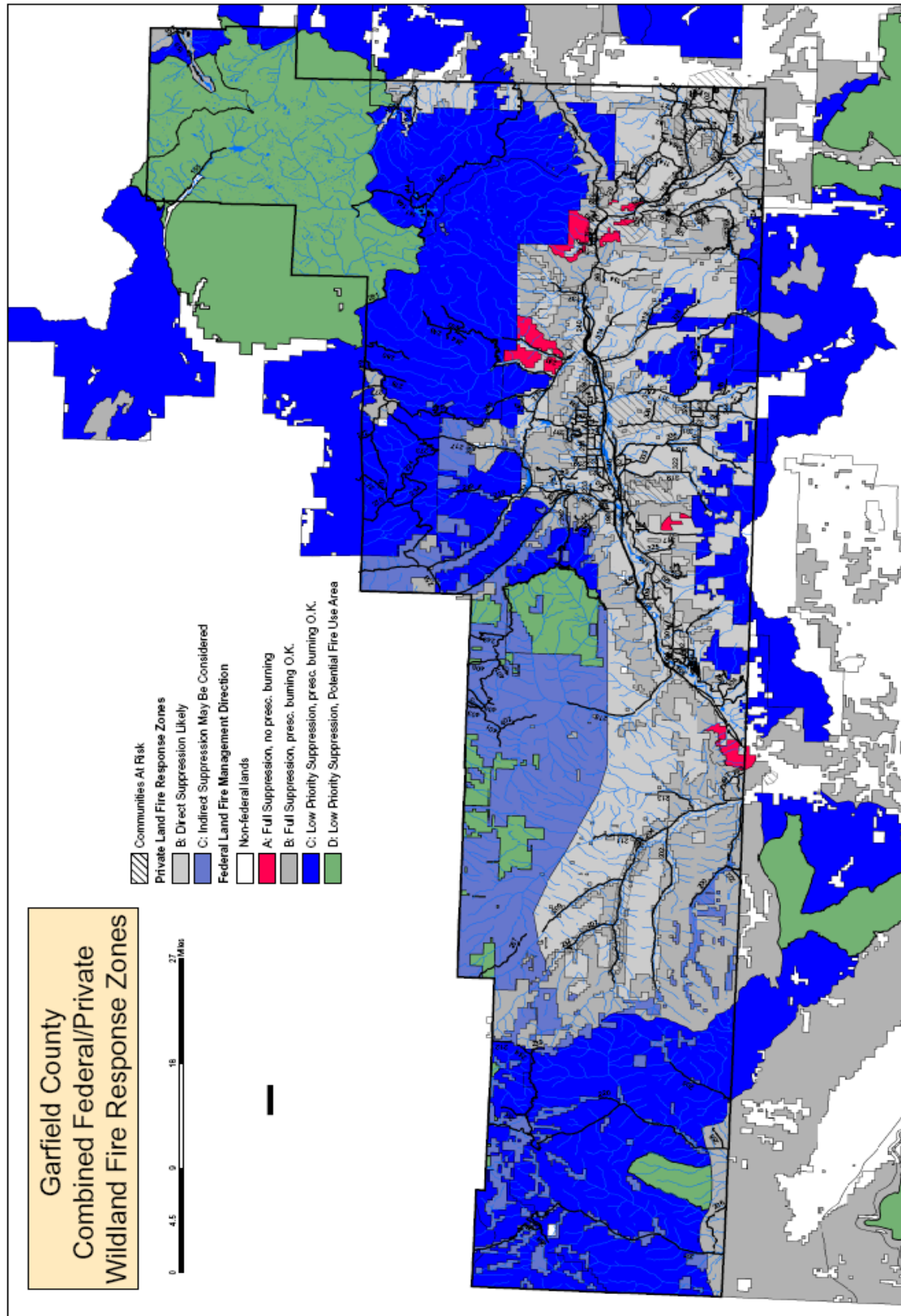
Response Concerns and Recommendations

Most fire departments, during wildland events, assess individual properties 1) for firefighter safety and 2) to determine if the property can be saved with available firefighter efforts and equipment. Firefighting resources are then assigned to those area with the highest likelihood of saving the property. Properties that are deemed too dangerous or high risk are marked as not defensible, and firefighting resources are set up in safer or more defensible areas.

In light of these priorities, it is essential to note that although water resources may exist in subdivisions, a larger picture needs to be emphasized. Fuel densities, steep slopes, and ladder fuels create conditions for a crown fire to travel rapidly through these areas. While the district and additional agencies may respond quickly with both ground and air suppression equipment, fire personnel will not attempt to enter subdivisions to access hydrants or other water resources and place personnel at risk. Fire hydrants are essential tools in fire suppression, but should not be relied upon in a catastrophic wildfire event. Additionally, if upcoming fire seasons are very active throughout the west, local firefighting resources may be stretched, and adequate response personnel limited. The BMFPD urges all residents in these areas to follow the CWPP recommendations: embrace Firewise construction principles, reduce ladder and crown fuels, and maintain communication with district and agency personnel regarding changes and needs.

This CWPP begins a community and agency dialog to enhance the safety, environment, and quality of life for the residents of these areas, the emergency personnel that respond to them, and the surrounding community in which they live. Through continued local, regional, and state participation, the recommendations set forth in this CWPP can assist in protecting the people and resources of these study areas.

Figure 17: Garfield County Combined Response Zones:
(adapted from the Garfield County Community Fire Protection Plan)



Glossary

Defensible space:

Defensible space is an area around a structure where fuels and vegetation are treated, cleared or reduced to slow the spread of wildfire towards the structure. It also reduces the chance of a structure fire moving from the building to the surrounding forest. Defensible space provides room for firefighters to work.

Fire Risk:

The probability or chance of fire starting, determined by the presence and activities of causative agents.

Firewise construction

The use of materials and systems in the design and construction of a building or structure to safeguard against the spread of fire within a building or structure, and the spread of fire to or from buildings or structures to or from the wildland/urban interface area.

Firewise landscaping

Vegetative management that removes flammable fuels from around a structure to reduce exposure to radiant heat. The flammable fuels may be replaced with green lawn, gardens, certain individually spaced green, ornamental shrubs, individually spaced and pruned trees, decorative stone or other non-flammable or flame-resistant materials.

Fuelbreak

An area, strategically located for fighting anticipated fires, where the native vegetation has been permanently modified or replaced so that fires burning into it can be more easily controlled. Fuel breaks divide fire-prone areas into smaller areas for easier fire control and to provide access for firefighting.

Fuels

All combustible material within the wildland/urban interface or intermix, including vegetation and structures.

Home Ignition Zone

This area includes a house and its immediate surroundings within 100 to 150 feet. The condition of the home ignition zone determines the potential for home ignitions during a wildfire. A house burns because of its interrelationship with everything in its surrounding home ignition zone. To avoid a home ignition, the homeowner must eliminate a wildfire's potential relationship with his/her house. This can be accomplished by interrupting the natural path a fire takes---a relatively simple task. Flammable items such as dead vegetation must be removed from the area immediately around the house to prevent flames from contacting it. Also, reducing the volume of live vegetation will affect the intensity of the wildfire as it enters the home ignition zone.

Ladder fuels

Vegetation located below the crown level of forest trees that can carry fire from the forest floor to tree crowns. Ladder fuels may be low-growing tree branches, shrubs, or smaller trees. Practice of fire suppression over the last 100 years has resulted in a dangerous accumulation of ladder fuels.

Wildfire Behavior

Manner in which a fire reacts to fuel, weather and topography.

Wildfire Mitigation

Actions taken that result in reducing the damaging effects of wildfire.

Wildland/urban interface:

An area where buildings are bounded by wild or natural areas, which are a particular concern in regions where wild fires are a concern.

Retrieved from http://www.firewisewiki.org/main/index.php/Firewise_construction;
www.borealforest.org/nwgloss4.htm; www.umpqua-watersheds.org/glossary/gloss_l.html; and
www.starlinewindows.com/starline/glossary/glossary.html

Appendix A



Quick Facts...

Wildfire will find the weakest links in the defense measures you have taken on your property.

The primary determinants of a home's ability to survive wildfire are its roofing material and the quality of the "defensible space" surrounding it.

Even small steps to protect your home and property will make them more able to withstand fire.

Consider these measures for all areas of your property, not just the immediate vicinity of the house.



Putting Knowledge to Work

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NATURAL RESOURCES SERIES

FORESTRY

Creating Wildfire-Defensible Zones no. 6.302

by F.C. Dennis¹

Fire is capricious. It can find the weak link in your home's fire protection scheme and gain the upper hand because of a small, overlooked or seemingly inconsequential factor. While you may not be able to accomplish all measures below (and there are no guarantees), each will increase your home's, and possibly your family's, safety and survival during a wildfire.

Start with the easiest and least expensive actions. Begin your work closest to your house and move outward. Keep working on the more difficult items until you have completed your entire project.

Defensible Space

Two factors have emerged as the primary determinants of a home's ability to survive wildfire. These are the home's roofing material and the quality of the "defensible space" surrounding it.

Use fire-resistant materials (Class C or better rating), not wood or shake shingles, to roof homes in or near forests and grasslands. When your roof needs significant repairs or replacement, do so with a fire-resistant roofing material. Check with your county building department. Some counties now restrict wood roofs or require specific classifications of roofing material.

Defensible space is an area around a structure where fuels and vegetation are treated, cleared or reduced to slow the spread of wildfire towards the structure. It also reduces the chance of a structure fire moving from the building to the surrounding forest. Defensible space provides *room for firefighters to do their jobs*. Your house is more likely to withstand a wildfire if grasses, brush, trees and other common forest fuels are managed to reduce a fire's intensity.

The measure of fuel hazard refers to its continuity, both horizontal (across the ground) and vertical (from the ground up into the vegetation crown). Fuels with a high degree of both vertical and horizontal continuity are the most hazardous, particularly when they occur on slopes. Heavier fuels (brush and trees) are more hazardous (i.e. produce a more intense fire) than light fuels such as grass.

Mitigation of wildfire hazards focuses on breaking up the continuity of horizontal and vertical fuels. Additional distance between fuels is required on slopes.

Creating an effective defensible space involves developing a series of management zones in which different treatment techniques are used. See Figure 1 for a general view of the relationships among these management zones. Develop defensible space around each building on your property. Include detached garages, storage buildings, barns and other structures in your plan.

The actual design and development of your defensible space depends on several factors: size and shape of buildings, materials used in their construction, the slope of the ground on which the structures are built, surrounding topography,

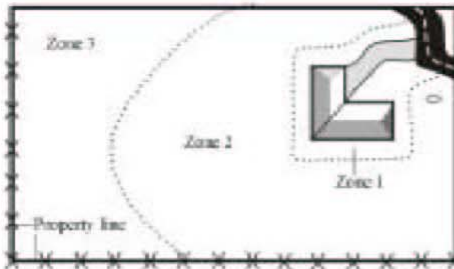


Figure 1: Forested property showing the three fire-defensible zones around a home or other structure.

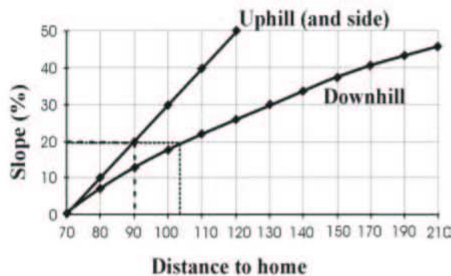


Figure 2: This chart indicates the *minimum recommended* dimensions for defensible space from the home to the outer edge of Zone 2. For example, if your home is situated on a 20 percent slope, the minimum defensible space dimensions would be 90 feet uphill and to the sides of the home and 104 feet downhill from the home.

and sizes and types of vegetation on your property. These factors all affect your design. You may want to request additional guidance from your local Colorado State Forest Service (CSFS) forester or fire department. (See the Special Recommendations section of this fact sheet for shrubs, lodgepole pine, Engelmann spruce, and aspen.)

Defensible Space Management Zones

Zone 1 is the area of maximum modification and treatment. It consists of an area of 15 feet around the structure in which all flammable vegetation is removed. This 15 feet is measured from the outside edge of the home's eaves and any attached structures, such as decks.

Zone 2 is an area of fuel reduction. It is a transitional area between Zones 1 and 3. The size of Zone 2 depends on the slope of the ground where the structure is built. Typically, the defensible space should extend *at least* 75 to 125 feet from the structure. See Figure 2 for the appropriate distance for your home's defensible space. Within this zone, the continuity and arrangement of vegetation is modified. Remove stressed, diseased, dead or dying trees and shrubs. Thin and prune the remaining larger trees and shrubs. Be sure to extend thinning along either side of your driveway all the way to your main access road. These actions help eliminate the continuous fuel surrounding a structure while enhancing homesite safety and the aesthetics of the property.

Zone 3 is an area of traditional forest management and is of no particular size. It extends from the edge of your defensible space to your property boundaries.

Prescriptions

Zone 1

The size of Zone 1 is 15 feet, measured from the edges of the structure. Within this zone, several specific treatments are recommended.

Plant nothing within 3 to 5 feet of the structure, particularly if the building is sided with wood, logs or other flammable materials. Decorative rock, for example, creates an attractive, easily maintained, nonflammable ground cover.

If the house has noncombustible siding, widely spaced foundation plantings of low growing shrubs or other "fire wise" plants are acceptable. Do not plant directly beneath windows or next to foundation vents. Be sure there are no areas of continuous grass adjacent to plantings in this area.

Frequently prune and maintain plants in this zone to ensure vigorous growth and a low growth habit. Remove dead branches, stems and leaves.

Do not store firewood or other combustible materials in this area. Enclose or screen decks with metal screening. Extend the gravel coverage under the decks. Do not use areas under decks for storage.

Ideally, remove all trees from Zone 1 to reduce fire hazards. If you do keep a tree, consider it part of the structure and extend the distance of the entire defensible space accordingly. Isolate the tree from any other surrounding trees. Prune it to at least 10 feet above the ground. Remove any branches that interfere with the roof or are within 10 feet of the chimney. Remove all "ladder fuels" from beneath the tree. Ladder fuels are vegetation with vertical continuity that allows fire to burn from ground level up into the branches and crowns of trees. Ladder fuels are potentially very hazardous but are easy to mitigate. No ladder fuels can be allowed under tree canopies. In all other areas, prune all branches of shrubs or trees up to a height of 10 feet above ground (or 1/2 the height, whichever is the least).

Zone 2

Zone 2 is an area of fuel reduction designed to reduce the intensity of any fire approaching your home. Follow these recommended management steps.

Thin trees and large shrubs so there is at least 10 feet between crowns. Crown separation is measured from the furthest branch of one tree to the nearest branch on the next tree (Figure 3). On steep slopes, allow more space between tree crowns. (See Figure 4 for *minimum recommended* spacing for trees on steep slopes.) Remove all ladder fuels from under these remaining trees. Carefully prune trees to a height of at least 10 feet.

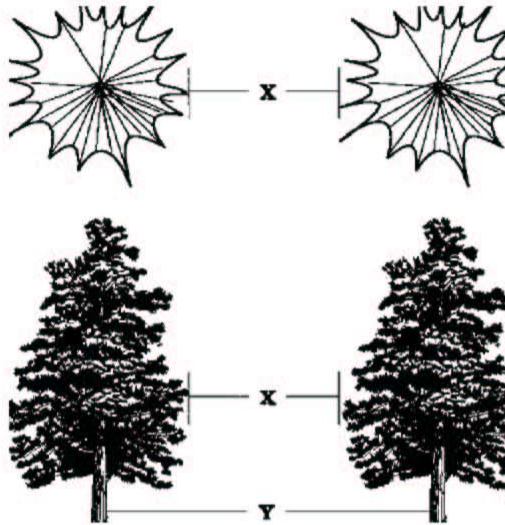


Figure 3: X = crown spacing; Y = stem spacing. Do not measure between stems for crown — measure between the edges of tree crowns.

Small clumps of 2 to 3 trees may be occasionally left in Zone 2. Leave more space between the crowns of these clumps and surrounding trees.

Because Zone 2 forms an aesthetic buffer and provides a transition between zones, it is necessary to blend the requirements for Zones 1 and 3. Thin the portions of Zone 3 adjacent to Zone 2 more heavily than the outer portions.

Isolated shrubs may remain, provided they are not under tree crowns. Prune and maintain these plants periodically to maintain vigorous growth. Remove dead stems from trees and shrubs annually. Where shrubs are the primary fuel in Zone 2, refer to the Special Recommendations section of this fact sheet.

Limit the number of dead trees (snags) retained in this area. Wildlife needs only one or two snags per acre. Be sure any snags left for wildlife cannot fall onto the house or block access roads or driveways.

Mow grasses (or remove them with a weed trimmer) as needed through the growing season to keep them low, a maximum of 6 to 8 inches. This is extremely critical in the fall when grasses dry out and cure or in the spring after the snow is gone but before the plants green up.

Stack firewood and woodpiles uphill or on the same elevation as the structure but at least 30 feet away. Clear and keep away flammable vegetation within 10 feet of these woodpiles. Do not stack wood against your house or on or under your deck, even in winter. Many homes have burned from a woodpile that ignited as the fire passed. Wildfires can burn at almost any time in Colorado.

Locate propane tanks at least 30 feet from any structures, preferably on the same elevation as the house. You don't want the LP container below your house — if it ignites, the fire would tend to burn uphill. On the other hand, if the tank is above your house and it develops a leak, LP gas will flow downhill into your home. Clear and keep away flammable vegetation within 10 feet of these tanks. Do not screen propane tanks with shrubs or vegetation.

Dispose of slash (limbs, branches and other woody debris) from your trees and shrubs through chipping or by piling and burning. Contact your local CSFS office or county sheriff's office for information about burning slash piles. If neither of these alternatives is possible, lop and scatter slash by cutting it into very small pieces and distributing it over the ground. Avoid heavy accumulations

% slope	Tree Crown Spacing	Brush and Shrub Clump Spacing
0 - 10 %	10'	2 1/2 x shrub height
11 - 20%	15'	3 x shrub height
21 - 40%	20'	4 x shrub height
> 40%	30'	6 x shrub height

Figure 4: Minimum tree crown and shrub clump spacing.

Tree Diameter (in inches)	Average Stem Spacing Between Trees (in feet)
3	10
4	11
5	12
6	13
7	14
8	15
9	16
10	17
11	19
12	21
13	23
14	24
15	26
16	28
17	29
18	31
19	33
20	35
21	36
22	38
23	40
24	42

Figure 5: Minimum tree spacing for Zone 3.

of slash. Lay it close to the ground to speed decomposition. If desired, no more than two or three small, widely spaced brush piles may be left for wildlife purposes. Locate these towards the outer portions of your defensible space.

Zone 3

This zone is of no specified size. It extends from the edge of your defensible space to your property lines. A gradual transition into this zone from defensible space standards to other management objectives you may have is suggested. Typical management objectives for areas surrounding homesites or subdivisions are: provide optimum recreational opportunities; enhance aesthetics; maintain tree health and vigor; provide barriers for wind, noise, dust and visual intrusions; support limited production of firewood, fence posts and other forest commodities; or grow Christmas trees or trees for transplanting.

Specific requirements will be dictated by your objectives for your land and the kinds of trees present. See Figure 5 for the *minimum* suggested spacing between "leave" trees. Forest management in Zone 3 is an opportunity for you to increase the health and growth rate of the forest in this zone. Keep in mind that root competition for available moisture limits tree growth and ultimately the health of the forest.

A high canopy forest reduces the chance of a surface fire climbing into the tops of the trees and might be a priority for you if this zone slopes steeply. The healthiest forest is one that has multiple ages, sizes, and species of trees where adequate growing room is maintained over time. Remember to consider the hazards of ladder fuels. Multiple sizes and ages of trees might increase the fire hazard from Zone 3 into Zone 2, particularly on steep slopes.

A greater number of wildlife trees can remain in Zone 3. Make sure that dead trees pose no threat to power lines or fire access roads.

While pruning generally is not necessary in Zone 3, it may be a good idea from the standpoint of personal safety to prune trees along trails and fire access roads. Or, if you prefer the aesthetics of a well-manicured forest, you might prune the entire area. In any case, pruning helps reduce ladder fuels within the tree stand, thus enhancing wildfire safety.

Mowing is not necessary in Zone 3.

Any approved method of slash treatment is acceptable for this zone, including piling and burning, chipping or lop-and-scatter.

Special Recommendations

Tree spacing guidelines do not apply to *mature* stands of aspen trees where the recommendations for ladder fuels have been complied with. In areas of aspen regeneration and young trees, the spacing guidelines should be followed.

Brush and shrubs

Brush and shrubs are woody plants, smaller than trees, often formed by a number of vertical or semi-upright branches arising close to the ground. Brush is smaller than shrubs and can be either woody or herbaceous vegetation.

On nearly level ground, minimum spacing recommendations between clumps of brush and/or shrubs is 2 1/2 times the height of the vegetation. Maximum diameter of clumps should be 2 times the height of the vegetation. As with tree crown spacing, all measurements are made from the edges of vegetation crowns (Figure 3).

For example: For shrubs 6 feet high, spacing between shrub clumps should be 15 feet or more apart (measured from the edges of the crowns of vegetation clumps). The diameter of shrub clumps should not exceed 12 feet (measured from the edges of the crowns). Branches should be pruned to a height of 3 feet.

Grasses

Keep dead, dry or curing grasses mowed to less than 6 inches. Defensible space size where grass is the predominant fuel can be reduced (Figure 5) when applying this practice.

Windthrow

In Colorado, certain locations and tree species, including lodgepole pine and Engelmann spruce, are especially susceptible to damage and uprooting by high winds (windthrow). If you see evidence of this problem in or near your forest, or have these tree species, consider the following adjustments to the defensible space guidelines. It is highly recommended that you contact a professional forester to help design your defensible space.

Adjustments: If your trees or homesite are susceptible to windthrow and the trees have never been thinned, use a stem spacing of diameter plus five instead of the guides listed in the Zone 3 section. Over time (every 3 to 5 years) *gradually* remove additional trees. The time between cutting cycles allows trees to “firm up” by expanding their root systems. Continue this periodic thinning until the desired spacing is reached.

Also consider leaving small clumps of trees and creating small openings on their lee side (opposite of the predominant wind direction). Again, a professional forester can help you design the best situation for your specific homesite and tree species. Remember, with species such as lodgepole pine and Engelmann spruce, the likelihood of a wildfire running through the tree tops or crowns (crowning) is closely related to the overabundance of fuels on the forest floor. Be sure to remove downed logs, branches and *excess* brush and needle buildup.

Maintaining Your Defensible Space

Your home is located in a forest that is dynamic, always changing. Trees and shrubs continue to grow, plants die or are damaged, new plants begin to grow, and plants drop their leaves and needles. Like other parts of your home, defensible space requires maintenance. Use the following checklist each year to determine if additional work or maintenance is necessary.

% slope	D-space size (uphill, downhill, sidehill)
0 - 20 %	30'
21 - 40%	50'
> 40%	70'

Figure 6: Minimum defensible space size for grass fuels.

Defensible Space and FireWise Annual Checklist

- Trees and shrubs are properly thinned and pruned within the defensible space. Slash from the thinning is disposed of.
- Roof and gutters are clear of debris.
- Branches overhanging the roof and chimney are removed.
- Chimney screens are in place and in good condition.
- Grass and weeds are mowed to a low height.
- An outdoor water supply is available, complete with a hose and nozzle that can reach all parts of the house.
- Fire extinguishers are checked and in working condition.
- The driveway is wide enough. The clearance of trees and branches is adequate for fire and emergency equipment. (Check with your local fire department.)
- Road signs and your name and house number are posted and easily visible.
- There is an easily accessible tool storage area with rakes, hoes, axes and shovels for use in case of fire.
- You have practiced family fire drills and your fire evacuation plan.
- Your escape routes, meeting points and other details are known and understood by all family members.
- Attic, roof, eaves and foundation vents are screened and in good condition.



FIREWISE is a multi-agency program that encourages the development of defensible space and the prevention of catastrophic wildfire.

Stilt foundations and decks are enclosed, screened or walled up.

- Trash and debris accumulations are removed from the defensible space.
- A checklist for fire safety needs inside the home also has been completed. This is available from your local fire department.

References

Colorado State Forest Service, Colorado State University, Fort Collins, CO 80523-5060; (970) 491-6303:

- *FireWise Construction — Design and Materials*
- Home Fire Protection in the Wildland Urban Interface
- Wildfire Protection in the Wildland Urban Interface
- *Landowner Guide to Thinning*

Colorado State University Cooperative Extension, 115 General Services Bldg., Fort Collins, CO 80523-4061; (970) 491-6198; E-mail: resourcecenter@ucm.colostate.edu:

- 6.303, *Fire-Resistant Landscaping*
- 6.304, *Forest Home Fire Safety*
- 6.305, *FireWise Plant Materials*
- 6.306, *Grass Seed Mixes to Reduce Wildfire Hazard*
- 7.205, *Pruning Evergreens*
- 7.206, *Pruning Shrubs*
- 7.207, *Pruning Deciduous Trees*



This fact sheet was produced in cooperation with the Colorado State Forest Service.

¹Wildfire Hazard Mitigation Coordinator, Colorado State Forest Service.

Colorado State University, U.S. Department of Agriculture, and Colorado counties cooperating. Cooperative Extension programs are available to all without discrimination. No endorsement of products mentioned is intended nor is criticism implied of products not mentioned.

Appendix B: Colorado State Forest Service Fuels Reduction Cost-Share Program:

Colorado State Forest Service Landowner Assistance Program (LOA-9) *Fire and Catastrophic Risk Reduction*

Purpose

Establishment of practices primarily to reduce the risk from wildfire and other catastrophic natural events. Practices should reduce the intensity of wildfire should it occur. Practices can increase the potential for defensibility of structures in the event of wildfire.

Eligible Components

The list below contains each component and its respective cost-share amount. These amounts are not to exceed 50% of actual cost, with total cost-share not to exceed \$1,000 per acre (defensible space cannot exceed \$1200 per home site)

<u>Practice</u>	<u>Maximum Cost-Share</u>
6.302 Defensible Space <i>Removal of both horizontal and vertical fuel hazards around a home</i>	\$1,200.00 per home site. This include tree cutting, pruning and slash disposal
Forest Stand Improvement - Thinning <i>Treatment made to reduce forest density, decreasing heavier fuels, enhancing growth and improving forest health</i>	\$500.00 per acre
Tree/Shrub Pruning <i>Removal of branches from a standing tree to remove vertical fuel continuity</i>	\$75.00 per acre
Prescribed Burning (interface broadcast burn) <i>A planned fire within well-defined boundaries to reduce hazardous fuel loading</i>	\$200.00 per acre
Slash Disposal <i>The removal/treatment of treetops and branches after forest management activities. Include one method.</i>	
Pile burning	\$100.00 per acre
Chipping	\$300.00 per acre
Hauling	\$300.00 per acre
Brush Management (chemical) <i>Chemical application on certain plant species which tend to re-sprout after thinning treatments</i>	\$100.00 per acre
Fuelbreak <i>A wide strip of land, usually 132'-198' wide, on which vegetation has been removed or reduced</i>	\$1,000.00 per acre. This includes tree cutting, pruning and slash disposal

Cost-share Requirements

- Expenses incurred prior to approval of application will not be reimbursed.
- Use \$17.55 per hour for reimbursement if the landowner is doing the work.
- A management plan is required to be eligible for cost-share.

- Practice must be maintained for a minimum of 10 years.
- Chemicals used must be Federally, State and locally registered, and be applied according to registered uses, label directions and other federal or State policies and requirements.
- Prescribed burning will be performed in accordance with State and local laws and regulations.
- The value of wood products generated from forest improvement activities must be deducted from total project cost to determine actual landowner cost. Cost-share payments are based on 50% of actual cost.
- **FOR MORE INFORMATION, CONTACT YOUR CSFS DISTRICT IN GRAND JUNCTION AT 970-248-7325**

Landowners should contact a Colorado State Forest Service (CSFS) representative prior to applying for LOA cost-share. CSFS can provide information about LOA practices, status of available cost-share funds and application procedures. CSFS will approve practices and certify that they have been completed in accordance of plan specifications.

Program Policy

Apply this practice to forest land with existing tree cover.

The general program policy towards cost-share (C/S) eligibility of LOA-9 components is as follows:

<i>If the component is...</i>	<i>and the justification is to...</i>	<i>the C/S are..</i>
<ul style="list-style-type: none"> . defensible space implementation . treatment to reduce forest density, decreasing fuels to reduce the potential of wildfire in areas other than defensible space . removal of branches from a standing tree to remove vertical fuel continuity . a planned fire within well-defined boundaries to reduce fuel loading . removal /treatment of treetops and branches after thinning activities . firebreak . treatment on driveways, adjacent roadways or property boundaries 	<ul style="list-style-type: none"> . reduce the risk from wildfire and other catastrophic natural events . improve access and defensibility of structures in the event of a wildfire 	<p>authorized</p>
<ul style="list-style-type: none"> . treatment of slash from current or planned timber sales . treatments on lands that are eligible for funding under the National Fire Plan 		<p>not authorized</p> <p>Except where eligible practice cannot be funded due to insufficient NFP funds</p>

5/20/04