

Rainbow Services Incorporated

Community Wildfire Protection Plan

2013



Signature Page

The following agencies participated in the development of this plan and mutually agree to its contents.

Colorado State Forest Service

Date

Gunnison Fire Protection District Board

Date

Gunnison Department Chief

Date

Gunnison County Sheriff

Date

Gunnison County Emergency Manager

Date

Bureau of Land Management

Date

Rainbow Services Incorporated

Date

United States Forest Service

Date

West Region Wildfire Council

Date

Table of Contents

Signature Page	- 1 -
Introduction.....	1
The Need for a Community Specific CWPP	1
Rainbow Services Incorporated: Wildland Urban Interface.....	1
Aerial Map: WUI Boundary.....	3
Historic Fires	4
Historic Fire Map	5
Values at Risk.....	6
Historic Values at Risk.....	8
Gunnison Fire Protection District Profile.....	9
Gunnison Volunteer Fire Department:	10
Equipment	10
Creating a CWPP: The Planning Process.....	12
Stakeholder Group	12
Community Involvement.....	13
Wildfire Risk Analysis.....	17
Wildfire Risk Analysis Elements.....	17
Scoring.....	19
Wildfire Risk Analysis Survey Sheet.....	20
Wildfire Risk Analysis Results.....	21
Relative Risk	21
Rainbow Services Risk Rating Map	22
Wildfire Risk Zone Map.....	22
Community Elevation Map	23
Fire Behavior Maps.....	23
Rainbow Services Fuel Models Map.....	26
Rate of Spread	27
Moderate Weather Conditions Rate of Spread Map	28
High Weather Conditions Rate of Spread Map	29
Flame Length.....	30
Moderate Weather Conditions Flame Length Map.....	31
High Weather Conditions Flame Length Map.....	32

Fireline Intensity.....	33
Moderate Weather Conditions Fireline Intensity Map	34
High Weather Conditions Fireline Intensity Map.....	35
Conclusions	36
Implementing Your Risk Reduction Recommendations	36
Project Implementation Funding Assistance	36
West Region Wildfire Council.....	36
FireWise Communities/ USA	36
Other Available Resources.....	36
Plan Maintenance and Updates.....	37
Appendix.....	38
Appendix A: Wildfire Risk Analysis Results	39
Appendix B: Risk Reduction Recommendations	41
Appendix C: Parcel Specific Risk Reduction Recommendations (Key)	44
Appendix D: Parcel Specific Risk Reduction Recommendations	46
Appendix E: Gunnison County CWPP Risk Reduction Recommendations	48
Rainbow Services Incorporated Recommendations:.....	48
General Risk Reduction Recommendations	52
Gunnison County CWPP Recommendations within Rainbow Services	51
General Risk Reduction Recommendations	52
Appendix F: ‘Protecting Your Home from Wildfire: Creating Wildfire-Defensible Zones.....	53
Appendix G: CSFS ‘Fire-Resistant Landscaping no. 6.303.....	65
Appendix I: Rainbow Services Inc. Wildfire Risk Analysis Sign-up	69
CWPP Conference Call Attendance: Draft Plan Review	69
Appendix J: Post Wildfire Resources	70
CSFS ‘Soil Erosion Control after Wildfire Publication no. 6.308	70
Maps 11x17.....	76

Rainbow Services Incorporated: Community Wildfire Protection Plan

Introduction

The Rainbow Services Incorporated (RSI) Community Wildfire Protection Plan (CWPP) builds off of the recently completed Gunnison County CWPP to detail the community's specific risks to wildfire. This plan should be viewed as an addendum to the Gunnison County CWPP.

The Need for a Community Specific CWPP

In an effort to reduce potentially catastrophic outcomes from wildfires, Congress passed the Healthy Forests Restoration Act ([HFRA](#)) in 2003 which aimed to encourage communities to better prepare for wildfire events while addressing forest health initiatives. Among other outcomes, HFRA encouraged communities in the 'Wildland Urban Interface' (WUI) to plan ahead for wildfires by identifying at risk areas and outlining specific risk reduction actions. Simply put, the wildland urban interface is "the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuel" (National Wildland Course Guide).

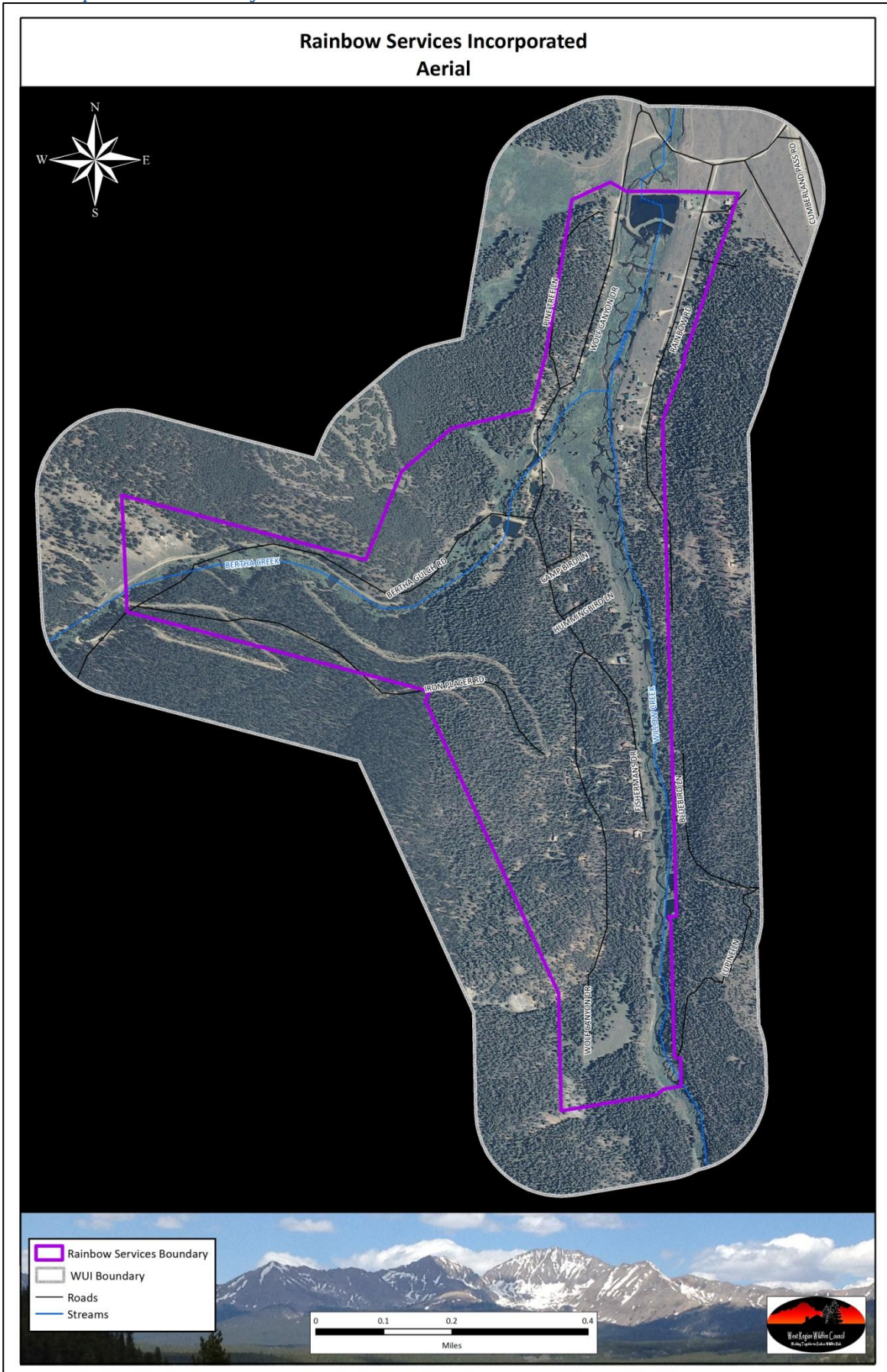
To compliment HFRA, The Colorado Senate passed [Senate Bill 09-001](#) (SB 09-001) which required all Colorado Counties to have completed a Community Wildfire Protection Plan by June 1, 2011. Furthermore, the Colorado State Forest Service (CSFS) came up with a set of '[Minimum Standards](#)' which outlined specific details required of CWPPs. Gunnison County met SB 09-001 and CSFS Minimum Standards requirements by completing their County-wide plan in June of 2011.

Before the completion of the County plan, Rainbow Services Inc. had expressed interest in completing a community specific CWPP. As part of this effort, the Rainbow Services Inc. Homeowner's Association designated select members of the community to head up the 'wildfire mitigation and education' effort in the community. RSI felt that a community specific CWPP would help provide its residents with an educational tool that was specific to each homeowner in the community. RSI, Gunnison Fire Protection District and other planning stakeholders felt that a critical analysis of the community's structures, fuel type, access points and potential fire behavior would further prepare the community and responding firefighters in the case of a wildfire event.

Rainbow Services Incorporated: Wildland Urban Interface

As a requirement of Community Wildfire Protection Plans, a specific wildland urban interface (WUI) boundary must be defined. Given the community's size (54 primary structures), remote location, terrain and fuel type, the planning stakeholders decided that for the purposes of this CWPP, the wildland urban interface boundary is one eighth mile beyond the Rainbow Services Inc. community boundary (as identified in the Gunnison County CWPP). The map on the following page outlines the RSI community boundary as well as the WUI boundary as identified.

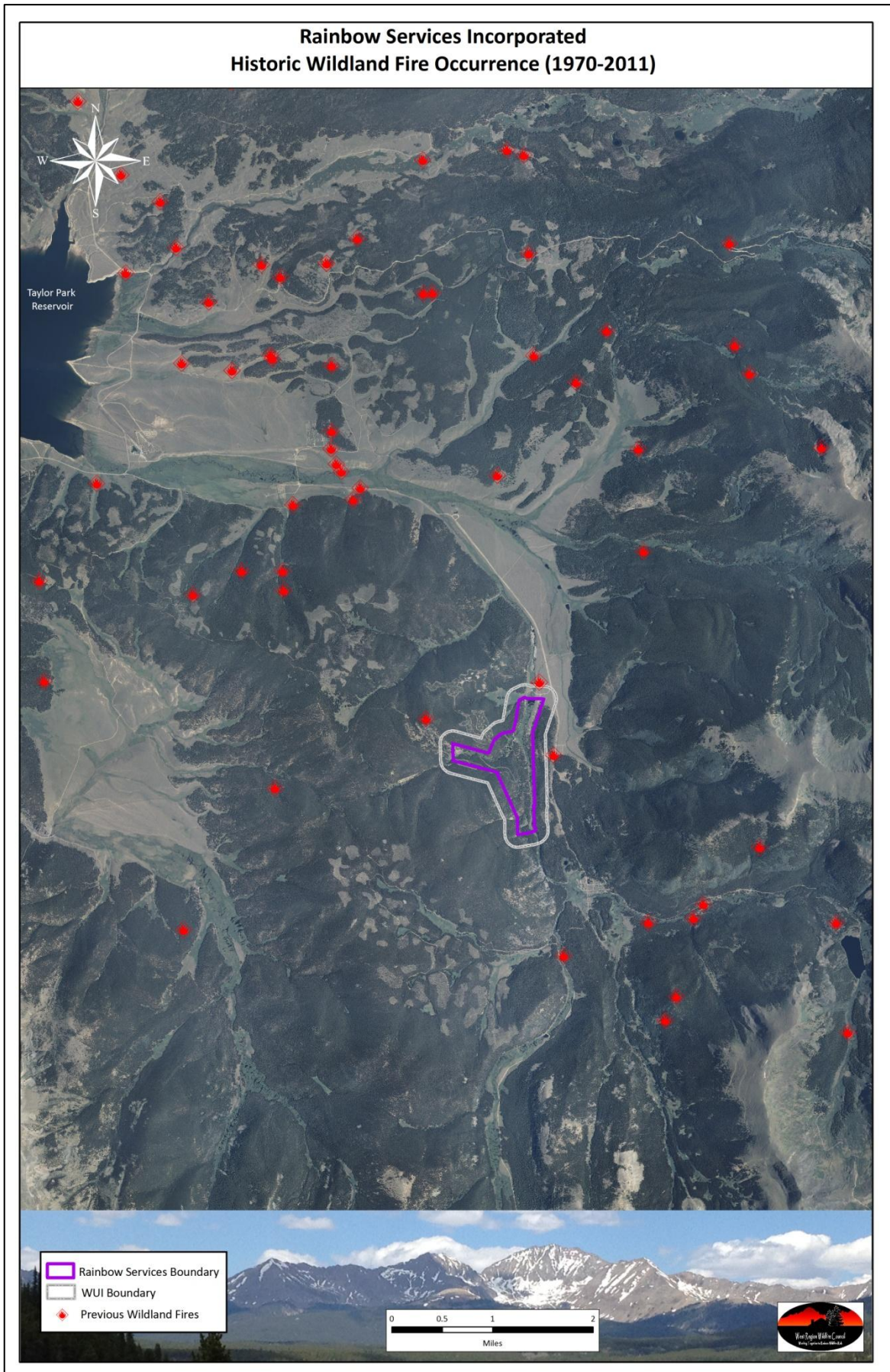
Rainbow Services Inc. property extends beyond the WUI boundary indicated in the maps in this document. Additional property along Willow Creek to the north of the RSI community is owned by RSI. Because there are no primary structures located in the northern portion of RSI property, the community boundary, for the purpose of this CWPP, is referred to as the identified WUI boundary.



Historic Fires

Records indicate that from 1970 to 2011 there have been approximately 94 wildfires in very close proximity to the Rainbow Services Inc. community boundary. The size of these reported wildfires varies from single tree events to larger acreage. The National Fire Incident Reporting System (NFIRS) is a nationwide database that tracks fire events. While subject to certain limitations, this system provides data on fire history, size and ignition source for fires that have been reported. Please see the map on the following page outlining the approximate location of historical fires within or within close proximity to the RSI community.

Historic Fire Map



Values at Risk

In addition to the land values and structure values at risk, the Gunnison County Community Wildfire Protection Plan outlines Areas of Special Interest (ASIs) in Gunnison County that could be impacted by a wildfire event. As defined in the Gunnison County plan, Areas of Special Interest are “places within [a] CWPP study area that could be threatened from wildfire and have a social or economic value which is not based on residential development... Frequent candidates for ASIs include recreation areas such as parks, reservoirs, ski areas and defined open space.” Some of the ASIs outlined in the Gunnison County plan are the Taylor Reservoir, Crested Butte Ski Area, Blue Mesa Recreation Areas and the Curecanti National Recreation Area. Please reference the County CWPP under the ‘Areas of Special Interest’ section for more information and locator map.

Additionally, there are several values within the Rainbow Services Inc. community that could have significant impact on the community if they were to be damaged by wildfire.

- Willow Creek
- Rainbow Services Inc. Water System and outbuildings
- Walking trails and bridges across Willow Creek
- Rainbow Services Inc. Entrance Gates
- Jackpine fencing along community boundary



The following table was taken from the Draft 2012 Gunnison County Multi-Hazards Mitigation Plan and shows the value at risk from wildfire in the County.

Population and Structures at Risk by Community Wildfire Protection Plan Community

CWPP Community	Community Hazard Rating	Structure Count	Building Value	Building Contents	Total Value
Almont	H	123	\$30,971,505	\$16,594,446	\$47,565,951
Antelope Hills	H	91	\$10,217,594	\$5,108,797	\$15,326,391
Arrowhead	VH	276	\$66,107,699	\$33,433,911	\$99,541,610
Blue Mesa Subdivision	H	78	\$18,197,386	\$9,064,399	\$27,261,785

Cranor Acres	M	19	\$5,674,885	\$2,837,443	\$8,512,328
Crested Butte South	H	572	\$196,403,904	\$99,766,569	\$296,170,473
Danni Ranch	H	8	\$7,006,005	\$3,503,002	\$10,509,007
Dos Rios	M	389	\$83,937,992	\$45,037,912	\$128,975,905
Evergreen	H	29	\$10,581,539	\$5,290,770	\$15,872,309
Gold Basin	H	92	\$17,911,325	\$8,955,662	\$26,866,987
Gothic	VH	1	\$579,969	\$579,969	\$1,159,938
Gunnison Highlands	VH	32	\$3,155,013	\$1,820,852	\$4,975,865
Lake Irwin	E	3	\$178,941	\$89,470	\$268,411
Marble & Upper Crystal River	H	236	\$59,158,130	\$30,616,492	\$89,774,622
Mt Crested Butte	M	2,233	\$698,225,676	\$361,326,500	\$1,059,552,176
North Valley Subdivision	M	32	\$6,207,802	\$3,103,901	\$9,311,702
Ohio City	H	60	\$8,696,514	\$4,534,094	\$13,230,608
Pitkin	H	197	\$27,695,106	\$14,272,057	\$41,967,163
Quartz Creek	E	133	\$17,142,112	\$8,541,278	\$25,683,391
Rainbow Services Inc.	H	54	\$9,351,401	\$4,675,701	\$14,027,102
Red Mountain	H	23	\$19,919,135	\$11,030,362	\$30,949,497
Skyland	H	416	\$201,856,985	\$101,332,082	\$303,189,067
Spring Creek	VH	93	\$22,238,038	\$11,161,877	\$33,399,915
Star Mountain Ranch	H	11	\$9,609,194	\$9,552,105	\$19,161,299
The Reserve	H	3	\$5,569,898	\$2,784,949	\$8,354,847
Tin Cup	H	78	\$6,859,479	\$3,600,748	\$10,460,227
Tomichi Heights	M	65	\$13,669,796	\$7,776,506	\$21,446,302
Town of Crested Butte	M	1,036	\$369,436,620	\$220,407,644	\$589,844,264
Trappers	E	40	\$46,493,474	\$23,119,419	\$69,612,893
Washington Gulch	H	134	\$68,626,814	\$34,254,742	\$102,881,556
White Pine	VH	47	\$2,933,905	\$1,466,952	\$4,400,857
Wilderness Streams	VH	73	\$25,232,664	\$12,772,417	\$38,005,081
Totals		6,678	\$2,069,849,501	1,098,413,028	\$3,168,259,529

Source: Gunnison County Multi-Hazards Mitigation Plan

The 2012 Gunnison County Multi-Hazard Mitigation Plan states that \$14,027,102.00 of the county's \$3,168,259,529.00 in estimated value at risk exists within the Rainbow Services Inc. Services Incorporated community. The Gunnison County Multi-Hazard Mitigation plan also points out that a large portion of Gunnison County residents are seasonal. That is true in the RSI community. Most residents of RSI are present only during the summer months.

Historic Values at Risk

There are a few notable historic structures within the RSI community. RSI and the surrounding areas are rich in mining history and therefore, there are a few historic cabins and structures at risk. Notably, the Tin Cup Gold Dredging Company “constructed a bucket-line dredge from timber and equipment transported by freight wagon over Tin Cup Pass.” The dredge, named Columbine No. 1, still stands in the now-Rainbow Services Inc. community. For more information about the mining history in the RSI and Tin Cup area, please visit: <http://home.comcast.net/~pogybait1/tincup3.htm>

The Columbine No. 1 gold dredge is pictured below.



“The rotted superstructure of the electric dredge ‘Columbine No. 1’ where it was left in the steam bed of Willow Creek about two miles north of Tin Cup. The large open area behind the dredge is the site of the long-abandoned town of Hillerton where the Tin Cup & Western’s maintenance facilities are to be located.” (Source: <http://home.comcast.net/~pogybait1/tincup3.htm>)

Gunnison Fire Protection District Profile

The Gunnison Fire Protection District was started in 1974 and has since taken a very active stance on wildfire and the protection of its residents across the 3,300 square miles it serves. The District has two employees, an Assistant Fire Marshall and a Maintenance Technician. The staffing for all responses within the District comes from the Gunnison Volunteer Fire Department. The Gunnison Fire Protection District also works closely with the City of Gunnison and the Fire Marshal's Office.

The Gunnison Volunteer Fire Department is run on a volunteer basis. As of January 2013, the department has 30 active members. There is a Chief, two Assistant Chiefs, one Captain and four Lieutenants. One of the officers is always on duty; and all other members carry pagers for response.

The Gunnison Volunteer Fire Department shares station space with the City of Gunnison, the Gunnison Fire Protection District and Gunnison County. Each entity has apparatus and equipment stored at the station. Additionally, Arrowhead, Ohio City, Pitkin and Sargents have their own groups of volunteers and apparatus.

The Gunnison Volunteer Fire Department is organized and equipped to fight fires in the wildland urban interface. The Department provides fire suppression for structural, wildland fires as well as rescue service for vehicles and structures. Fire safety education, fire investigations and inspections are handled through the City of Gunnison Fire Marshall's Office.

Gunnison Volunteer Fire Department is also equipped to assist neighboring districts, such as Crested Butte Fire Protection District, with incidents. The Gunnison Fire Protection District has mutual aid agreements with Crested Butte, Montrose and Arrowhead Fire Districts/ Departments. Each member of the Gunnison Volunteer Fire Department is equipped with both structure firefighting gear and wildland firefighting gear.

Training is an essential part of ensuring firefighter safety. The Department holds trainings once a week on subjects that cover both structure and wildland fire. In addition to regularly scheduled training opportunities, firefighters can participate in events throughout the year, as well as attend fire academies.

Gunnison Volunteer Fire Department:



Equipment

Title	Description
Rural 1	Rural 1 was purchased new in 1995 and is a 4-wheel drive structural engine, carries 750 gallons of water and has a 1250 gpm pump. It was built by Smeal on an International chassis. It carries 3 firefighters, has a cascade air system and carries 12 SCBA.
Rural 2	Rural 2 was purchased in 2005 as an urban interface engine. It is an E-One build on an International chassis. It carries 750 gallons of water, 30 gallons of class A foam and has a 1250 gpm pump with pump and roll capability. It is 4 wheel drive and carries 2 firefighters. Rural 2 carries both wildland and structural firefighting equipment.
Rural 3	Rural 3 is a 4 wheel drive, 1550 gallon tender with pump and roll capability. It carries 3 firefighters. It was built by Welch on an International chassis.
Rural 4	Rural 4 is a Type 6 engine build on a 2009 single cab Chevrolet 3500 chassis with a Darley skid mount. It carries 3 personnel, 250 gallons of water and 10 gallons of class "A" foam.
Rural 5	Rural 5 is a 2000 Ford F-250 used for carrying additional personnel to a fire scene. It also carries Hurst hydraulic rescue tools so it can operate as a backup rescue when needed.
Rural 6	Rural 6 is a 2006 Smeal on a Freightliner chassis 3000 gallon tender. It carries 3 personnel.
Rural 7	Rural 7 is a Type 6 engine build on a 2005 single cab Chevrolet 3500 chassis with a Darley skid mount. It carries 3 personnel, 250 gallons of water and 10 gallons of class "A" foam.
Rescue 21	Rescue 21 is light rescue built on a 2004 Ford F-550 chassis. It carries 5 personnel, a large compliment of stabilization and rescue tools as well as having a 30 gallon CAFS unit.
Rescue 22	Rescue 22 is a medium rescue built by SVI on an International chassis. It carries

	and even larger compliment of stabilization and rescue tools than Rescue 21 as well as having air and light capabilities and a full complement of RIT tools. It carries 5 personnel and SCBA for all but the driver.
Fire Officer 1	Fire Officer 1 is a 2007 Chevrolet Tahoe that is set up to be a mobile command post. It allows the duty officer to respond ahead of apparatus to get a size up and staging planned prior to arrival of other responding units.
Fire Marshall 2	Fire Marshall 2 is a 2007 Chevrolet 1500 that has the ability to transport 5 personnel to any scene if the need arises.

Creating a CWPP: The Planning Process

Rainbow Services Inc. contracted the West Region Wildfire Council (WRWC) to complete their CWPP. After an initial planning stakeholder meeting involving the Rainbow Services Inc. Wildfire Mitigation Advocate (WMA), Rainbow Services Inc. HOA Board President, West Region Wildfire Council representatives, Colorado State Forest Service, Gunnison Fire Protection District, Gunnison Volunteer Fire Department and USFS, the planning process for the RSI CWPP began to unfold.

At a meeting in May 2012, some members of the planning stakeholder group met to discuss the need, intentions and requirements for the RSI CWPP. At this meeting, it was decided that the foundation of the RSI CWPP would include a parcel specific wildfire risk analysis. The results of this analysis would provide each homeowner in RSI with specific details about their wildfire risk and outline a specific set of risk reduction recommendations for them to implement. The group also discussed the need for further identification of landscape scale projects as well as the need for a dry-hydrant to be installed within the community. The stakeholders toured the RSI property and discussed the overall wildfire risk to the community.

In July of 2012, the WRWC Coordinator and other planning stakeholders attended the RSI Annual HOA Meeting to give a presentation about the upcoming CWPP planning effort. The presentation highlighted the wildfire risk in the RSI community, detailed the planning process for the RSI CWPP and asked homeowners to participate in the ‘wildfire risk analysis’ by providing the WRWC with permission to survey each home within the RSI community.

At another stakeholder meeting/ conference call in September 2012, the stakeholder group outlined the wildfire risk analysis categories and discussed how each element of the analysis would be weighted according to the respective level of risk. The group also discussed the involvement of homeowners and the ongoing outreach effort to the homeowners in RSI. The stakeholder group made plans for completing the wildfire risk analysis and set a date for conducting an additional field tour of the RSI community to identify landscape scale projects.

Stakeholder Group

NAME	AGENCY
Ed Potkey	RSI Wildfire Mitigation Advocate
Kay Johnson	RSI HOA Board President
Dennis Spritzer	City of Gunnison Fire Marshall
Hugo Ferchau	Gunnison Fire Protection District
Lilia Falk	West Region Wildfire Council
Tim Cudmore	Colorado State Forest Service
Sam Pankratz	Colorado State Forest Service
Scott Morrill	Gunnison County Emergency Management
Chris Barth	Bureau of Land Management
Gerry Chonka	United States Forest Service
Rick Besecker	Gunnison County Sheriff

Community Involvement

➤ **Rainbow Services Incorporated Property and Homeowners Association (July 7th, 2012)**

(Three Rivers Inn, Almont)

Representatives from the West Region Wildfire Council, Colorado State Forest Service, US Forest Service and Gunnison Fire Protection District attended the RSI HOA meeting in July. The WRWC Coordinator gave a detailed presentation about the need, intentions and projected results of the RSI CWPP. At this meeting, the wildfire risk analysis portion of the CWPP was explained and RSI residents were asked to sign up to receive the survey. Many residents asked questions about the CWPP, the wildfire risk in the community and the resources available to homeowners for mitigating their property.

➤ **Letter to Residents:**

The WRWC and RSI HOA wanted to ensure that residents who weren't in attendance at the HOA meetings received notification of the CWPP and the associated wildfire risk analysis. To ensure all residents were aware of the upcoming planning effort, the WRWC worked with the RSI President and Wildfire Mitigation Advocate to send out a letter detailing the presentation given at the RSI annual meeting and asked residents to sign up for the wildfire risk analysis.

West Region Wildfire Council

|

Working Together To Reduce Wildfire Risk

September 4, 2012

Dear Rainbow Services, Inc. Homeowner:

Rainbow Services, Inc. (Rainbow) is working in collaboration with the West Region Wildfire Council (WRWC) to develop a 'Community Specific' Community Wildfire Protection Plan (CWPP). As part of the CWPP, the West Region Wildfire Council will be conducting a wildfire risk analysis or 'structure survey' to determine how residents in the Rainbow community can be better prepared in the event of a wildfire.

A member of the West Region Wildfire Council gave a presentation about the CWPP and wildfire risk analysis at the Rainbow 2012 Annual HOA Meeting earlier this summer. Some of the discussion topics included the CWPP planning process, associated field work and the importance of community involvement. At this meeting the Rainbow homeowners' Board of Directors and the WRWC asked that Rainbow homeowners sign up to receive the FREE wildfire risk analysis.

If you did not have the chance to sign up for the wildfire risk analysis at the annual meeting, we ask that you do so now. If you would like more information, or would like to sign up for the structure survey, please email or call Lilia Colter, West Region Wildfire Council Coordinator:

Wrrwc.lilia@gmail.com
970-249-8407 x125

You may also find more information about CWPPs and wildfire mitigation at the West Region Wildfire Council's website: www.COwildfire.org

The West Region Wildfire Council will be conducting the field work associated with completing the structure specific wildfire risk analysis sometime in **October, 2012**. Rainbow's Community Wildfire Protection Plan should be completed by the end of January 2013.

Thank you,

Lilia Colter
WRWC Coordinator

West Region Wildfire Council
102 Par Place, Suite 1 • Montrose, Colorado 81401

➤ **Draft Plan:**

On February 7, 2013 the West Region Wildfire Council and the Rainbow Services Inc. HOA sent a letter to all RSI residents detailing the completion of the draft RSI CWPP. The letter included information about:

- The website where the draft plan could be accessed: http://www.cowildfire.org/wp-content/uploads/RainbowServicesDraft_CWPP.pdf ;
- the opportunity to participate in a social science survey regarding their perception of wildfire risk in their community
- the opportunity to join a conference call where questions about the draft plan could be answered; and
- submitting comments or feedback on the draft plan.

Additionally, all planning stakeholders were sent information regarding the draft plan and the request for comments and or planning feedback.

➤ **www.COwildfire.org:**

Rainbow Services Inc. utilized the West Region Wildfire Council's website (www.COwildfire.org) to post a draft copy of the plan. RSI residents were directed to the website to download and review a copy of the draft plan for comments.

➤ **Draft Plan Comments:**

The West Region Wildfire Council accepted comments on the draft plan for two weeks following the letter sent to Rainbow Services Inc. residents. Hard copies of the draft plan were made available at the Gunnison County Office of Emergency Management and the Colorado State Forest Service office in Gunnison. Comments were accepted in hard copy form, via fax, over the phone and through email.

- Comments submitted by CSFS Forester: Recommendations to add signing up for emergency notification alerts, add information about typical fuels reduction and roadside thinning projects as well as adding a link to reference project implementation guidelines provided in appendix of document.
- Comments submitted by Rainbow Services Inc. Wildfire Mitigation Advocate: Requested an explanation about the riparian area north of the community, request to add the community's identified helicopter landing zone and some document formatting requests.
- Comments submitted by Rainbow Services Inc. HOA President: recommendations to change P&HOA to 'HOA' also to reference the community as Rainbow Services Inc. or RSI. Questions about cross boundary fuels reduction recommendations as well as the request to modify referenced dates to reflect actual timeline for public comment period.

➤ **CWPP Conference Call**

On February 21, the WRWC hosted a conference call to enable RSI residents to express comments or questions concerning the draft CWPP. Three people called in and shared comments/ questions about the draft plan. Call attendance is noted in [Appendix I](#). The following comments were made during the call.

- Rainbow Services Inc. HOA President: Commented that parcels in the south east edge of the community were hard to make out and requested that parcel boundaries be made darker on the 'Wildfire Risk Rating' Map. Kay also had questions pertaining to some of

the data pulled from the Gunnison County All Hazards Mitigation Plan regarding adjusted vacancy rates for the Rainbow Community. As a result, the WRWC, Kay Johnson and Ed Potkey decided to remove the adjusted vacancy rate column from the table.

- Rainbow Services Inc. Wildfire Mitigation Advocate: Commented that Lupine Lane was not designated on the map within the Rainbow Community. The group agreed to 'draw' in the road and label on all appropriate maps.
- The call attendees also discussed future updates to the plan to ensure that completed mitigation work is captured. The HOA board and members will discuss how they would like to approach updating the plan and what a schedule for plan updates might look like.

➤ **Gunnison County Board of County Commissioners Meeting:**

Once the RSI CWPP is completed and has been approved by the CSFS District Forester, the West Region Wildfire Council intends to present results at a Gunnison County Board of County Commissioners meeting (date TBD).

➤ **Final CWPP Presentation (Scheduled for July 2013)**

Most of the homes in RSI are summer homes and are mainly occupied during the summer months only. Winter access is limited to snowmobiles. Since a majority of the homeowners were not present at their homes in RSI when the plan was completed, the WRWC agreed to give a final plan presentation at the 2013 RSI HOA Annual Meeting.

Wildfire Risk Analysis

The wildfire risk analysis is the foundation for the RSI CWPP. The parcel specific wildfire risk analysis builds off of research based on the Home Ignition Zone concept developed by Jack Cohen at the [Fire Science Lab](#) in Missoula, Montana and the latest research and findings from the [Institute for Business and Home Safety](#) (IBHS) on factors that play into a home's survivability during a wildfire event.

The Fire Science Lab focuses on six main areas of fire study. These focus areas are physical fire processes, fuel dynamics, smoke emissions and dispersion, fire ecology, fire and fuel management strategies and science synthesis and delivery. There are several world renowned fire scientists who focus on several areas of interest ranging from fire danger modeling, heat and combustion factors in wildland fire to building materials and survivability.

The purpose of the parcel specific wildfire risk analysis is to give each individual homeowner an educational tool to help them be better prepared in event of a wildfire. The results of the parcel specific analysis provide visual context for the risk rating and give each homeowner a list of recommendations to implement in order to reduce their wildfire risk.

In the beginning of the plan development, Rainbow Services Inc. and the WRWC asked residents to sign up to receive the parcel specific wildfire risk analysis. Residents were also given the opportunity to make an appointment with the RSI WMA and a representative from the WRWC to be present during the analysis of their home. A few homeowners took advantage of this opportunity and were given a step by step analysis of their wildfire risk. Homeowners who signed up to be present during the analysis had the opportunity to ask questions and point out specifics on their property.

All primary homes were assessed for wildfire risk between on October 16th and 17th, 2012. Only primary residential structures were given consideration; out-buildings were not included in the wildfire risk analysis. Pictures of each structure were taken for reference during plan development.

Wildfire Risk Analysis Elements

All homes in the Rainbow Services Inc. community were analyzed using the following criteria:

- **Addressing:** Having correct, visible and reflective addressing is a crucial component to any type of emergency response effort. Smokey environments during a wildfire event reduce visibility. Reflective, contrasting addressing is much easier to see in such conditions.
- **Ingress/ Egress:** Knowing primary and secondary ingress/ egress routes is crucial for successful evacuation. Having more than one way in and out of your neighborhood reduces the risk of becoming trapped by a fast moving wildfire. Furthermore, fire department knowledge of residential areas where there is only one point of access is a helpful tool in pre-planning for evacuation, suppression operations and firefighter safety.
- **Driveway Width:** It is important for firefighters to know that they can safely get their apparatus in and out of a home's driveway. Driveway width analysis is a combination of

approximate shoulder to shoulder measurement as well as the distance between overhanging obstructions and the driveway.

- **Dangerous Topography:** These are areas where wildfires can move quickly and increase in intensity. Steep chimney's and cliff edges with heavy fuels are two examples of dangerous topography. A home's location relative to dangerous topography can largely affect its survivability during a wildfire event. Dangerous topography can have severe impacts on fire behavior over a given landscape.
- **Background Fuel:** The fuel type and density directly surrounding a home can affect the fire behavior in the particular area. Given varying weather conditions, grassy open meadows tend to be conducive to fast moving, yet low intensity fire behavior, whereas fire in a heavily forested environments can be much more intense. The community specific fire [behavior maps](#) provide further detail on how fuel loading and weather conditions impact fire behavior.
- **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." Having defensible space is one of the "primary determinants of the home's ability to survive a wildfire" (CSFS Creating Wildfire-Defensible Zones: Fire-12). Whether or not a home has adequate defensible space is a factor that wildland firefighters take into consideration when deciding where to stage resources. It is also important to remember that during a large wildfire event, resources are often limited. Having defensible space can increase the survivability of a home without firefighter intervention.
- **Roofing Material:** A home's roofing material has been proven to be a primary factor in a home's survivability during wildfire event. Class A, non-combustible roof construction increases a home's survivability, whereas wood shake shingle roofing material increases a home's wildfire risk drastically.
- **Siding Material:** Whether a home's siding is made out of combustible material or a non-combustible material also effects survivability. Vinyl/ wood siding is more likely to fail or ignite than a heavy log, stucco or composite siding material.
 - *NOTE: many homes in the Rainbow Services Incorporated community have half-round log siding which is not considered the same as 'heavy log timer' construction. Homes with D-log siding were rated as having 'wood' siding. Homes with half -log siding were rated differently then homes with 'heavy log' construction.
- **Other Combustibles:** Firewood piles, patio or deck furniture, propane tanks and other combustibles near a structure can be factors that compromise a home's resistance to wildfire.
- **Decking Material:** Decking material has also proven to be a potential vulnerability to a home's resistance to wildfire. In addition, a well maintained wood deck can be less combustible than an unmaintained dry deck.

*NOTE: It is important to consider vulnerability points of the structure. When the wildfire risk analysis was completed, homes were assessed for their 'weakest' point. If a home's siding had both non-combustible material as well as wood siding, the home was analyzed as having 'wood siding' since the wood siding is a component that increases the homes risk to damage or loss from a wildfire.

Scoring

Each criterion in the wildfire risk analysis has an attached 'score' that corresponds directly with the elements' potential to compromise a structure during a wildfire event. In other words, elements that make a structure significantly more vulnerable to wildfire are given more weight when considering the wildfire risk. Roofing material and defensible space are the two most significant survey criteria and therefore carry the heaviest weight. The following pages show the wildfire risk analysis scoring sheet that was completed for each structure within the community.

Wildfire Risk Analysis Survey Sheet

ACCESS

Structure address posted at driveway entrance?

	Posted and reflective	0
	Posted, NOT reflective	5
	Not Visible from road	15

Ingress and Egress

	Two or more roads in/out	0
	One road in/out	10

Width of driveway

	Greater than 24 feet wide	0
	Between 20-24feet wide	5
	Less than 20 feet wide	10

VEGETATION & TOPOGRAPHY

Distance to dangerous topography

	More than 150 feet	0
	50-150 feet	30
	Less than 50 feet	75

Predominant background fuel type in neighborhood

	light (grasses, forbs, tundra)	25
	Moderate (light brush, small trees)	50
	Heavy (dense brush or timber, down and dead fuel)	75

Defensible Space (CSFS FIRE 2012-1 Standards)

	more than 150 feet	0
	30-150 feet	50
	10-30 feet	75
	less than 10 feet	100

STRUCTURE

Roofing Material

	Tile, metal, asphalt	0
	Wood (shake shingle)	200

Building Exterior

	Non-combustible siding (stucco, cement/Masonite)	0
	Log, heavy timbers	20
	Wood, Vinyl or wood shake	60

Location of woodpiles and combustibles (light flashy vegetation, shrubs, trees, trash)

	None or > 30ft from structure	0
	10-30 feet from structure	10
	< 10 feet from structure	30

Balcony, deck or porch

	None/ non combustible	0
	combustible material	20

Wildfire Risk Scores

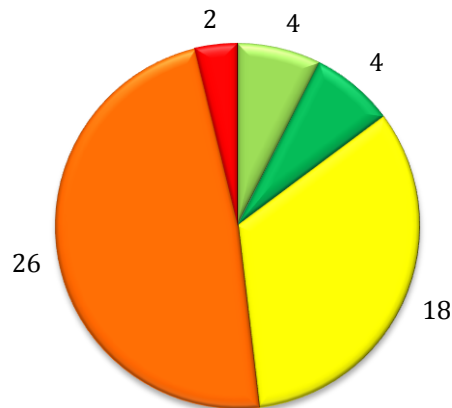
NO SCORE	0-24.999999
LOW	25-150.999999
MODERATE	151-175.999999
HIGH	176-270.999999
VERY HIGH	271-330.999999
EXTREME	331-595.999999

Wildfire Risk Analysis Results

After reviewing the Gunnison County Assessor data and parcel information, 54 primary structures were identified in the RSI community. The results of the wildfire risk analysis found that **4** homes were given a **low** wildfire risk rating, **4** homes were assessed to have a **moderate** risk rating, **18** homes were assessed to have a **high** risk rating, **26** homes had a **very high** risk rating and **2** homes were assessed to have an **extreme** risk to wildfire.

Wildfire Risk Analysis Results

■ Low ■ Moderate ■ High ■ Very High ■ Extreme

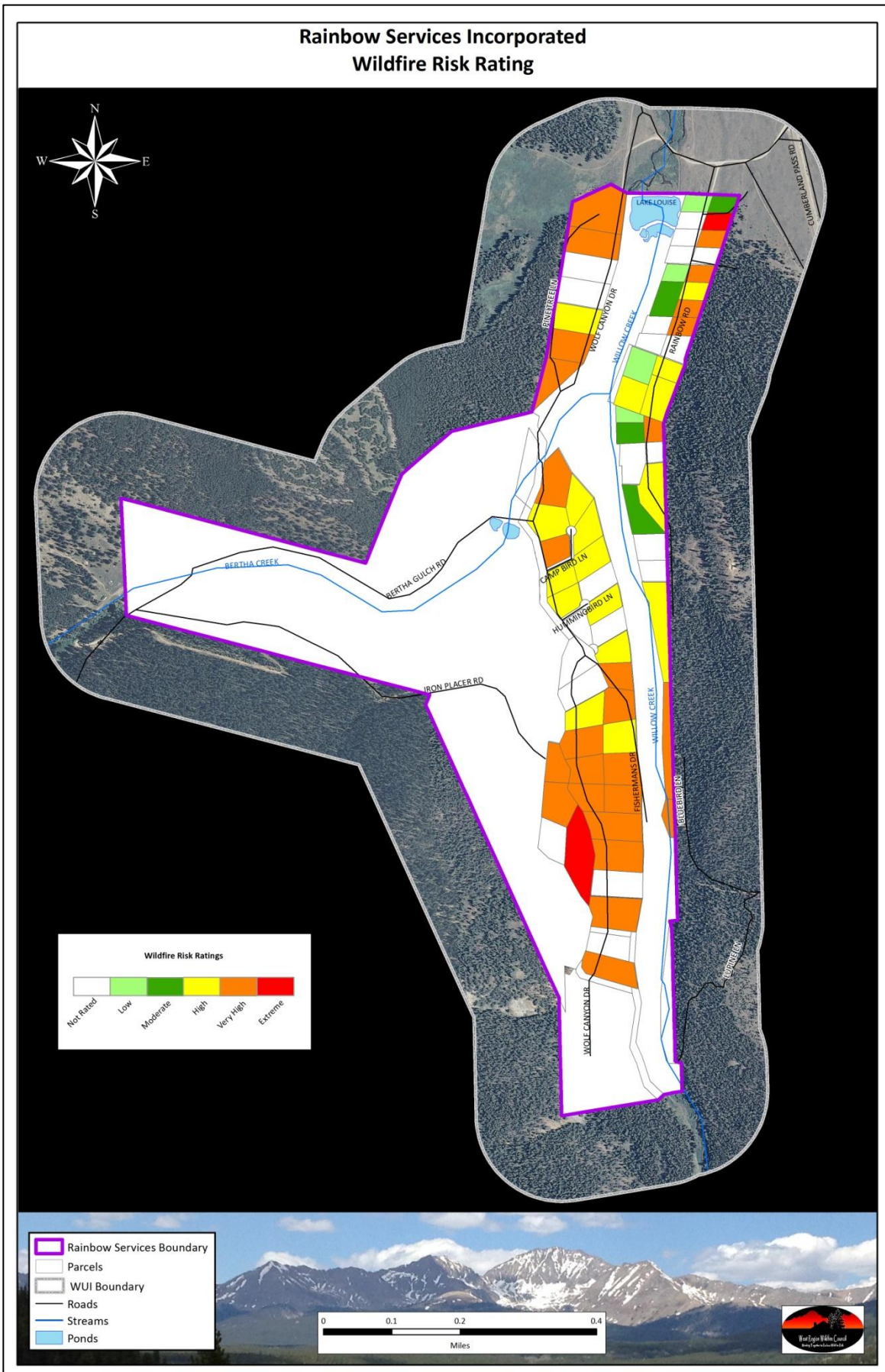


Relative Risk

The wildfire risk analysis results are a demonstration of relative risk; meaning that the risk ratings are based on the level of risk within Rainbow Services Incorporated community and not an absolute risk rating. These risk ratings do not reflect or inform insurance rates or policies. Each insurance provider utilizes their own underwriting guidelines. An 'EXTREME' rating versus a 'LOW' rating is not an absolute indicator of whether a home will burn or survive in a wildfire event. Factors such as response, weather, etc. will influence a specific homes outcome during a wildfire. The risk ratings and subsequent risk reduction recommendations are intended to provide educational information to the RSI community in order to help better prepare for a wildfire event.

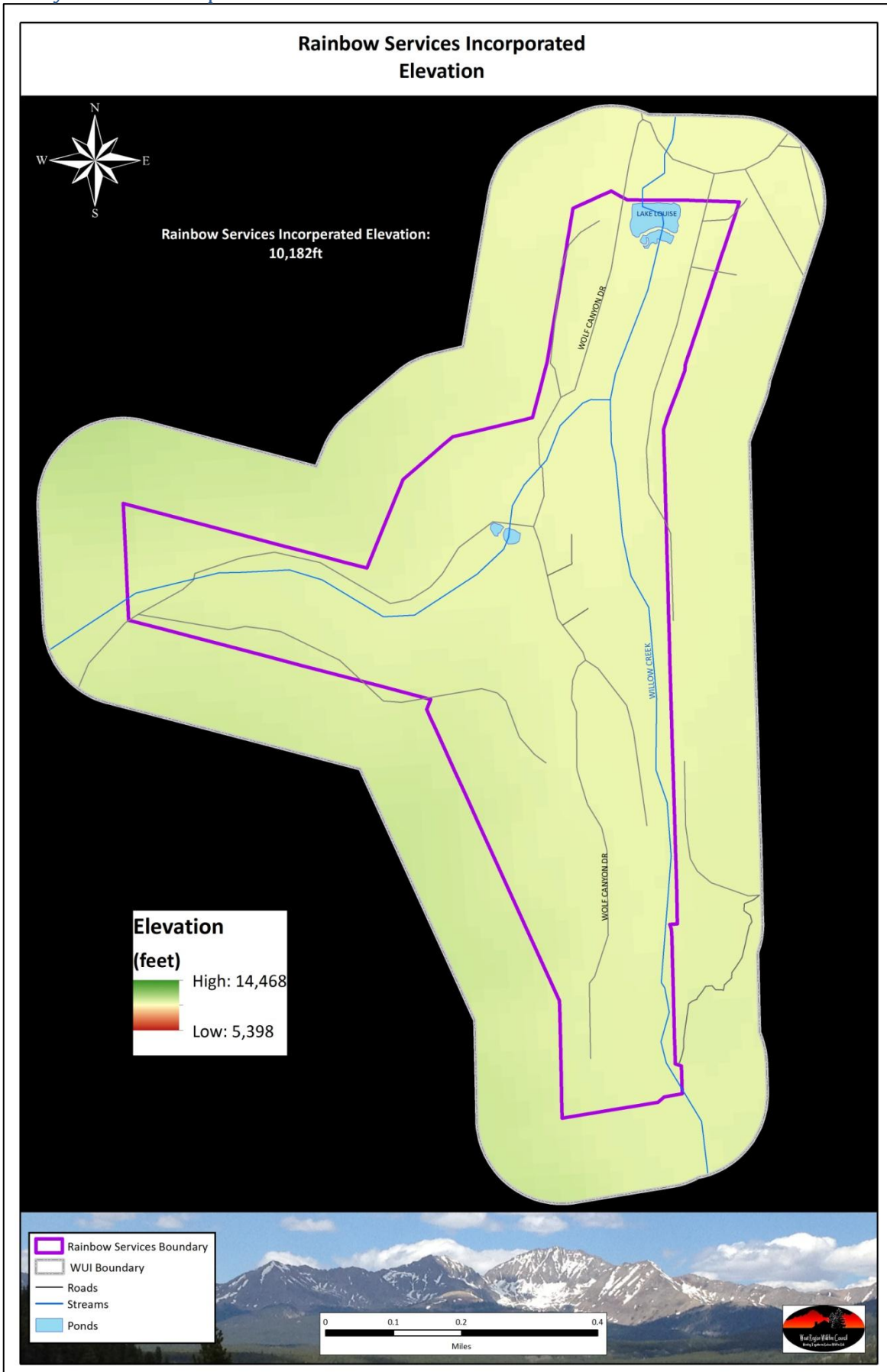
The following maps depict the results of the wildfire risk analysis.

To see your parcel specific wildfire risk analysis results please refer to the [appendix](#) of this document. Wildfire risk analysis results are listed in alphabetical order by street name.



Fire Behavior Maps

Community Elevation Map



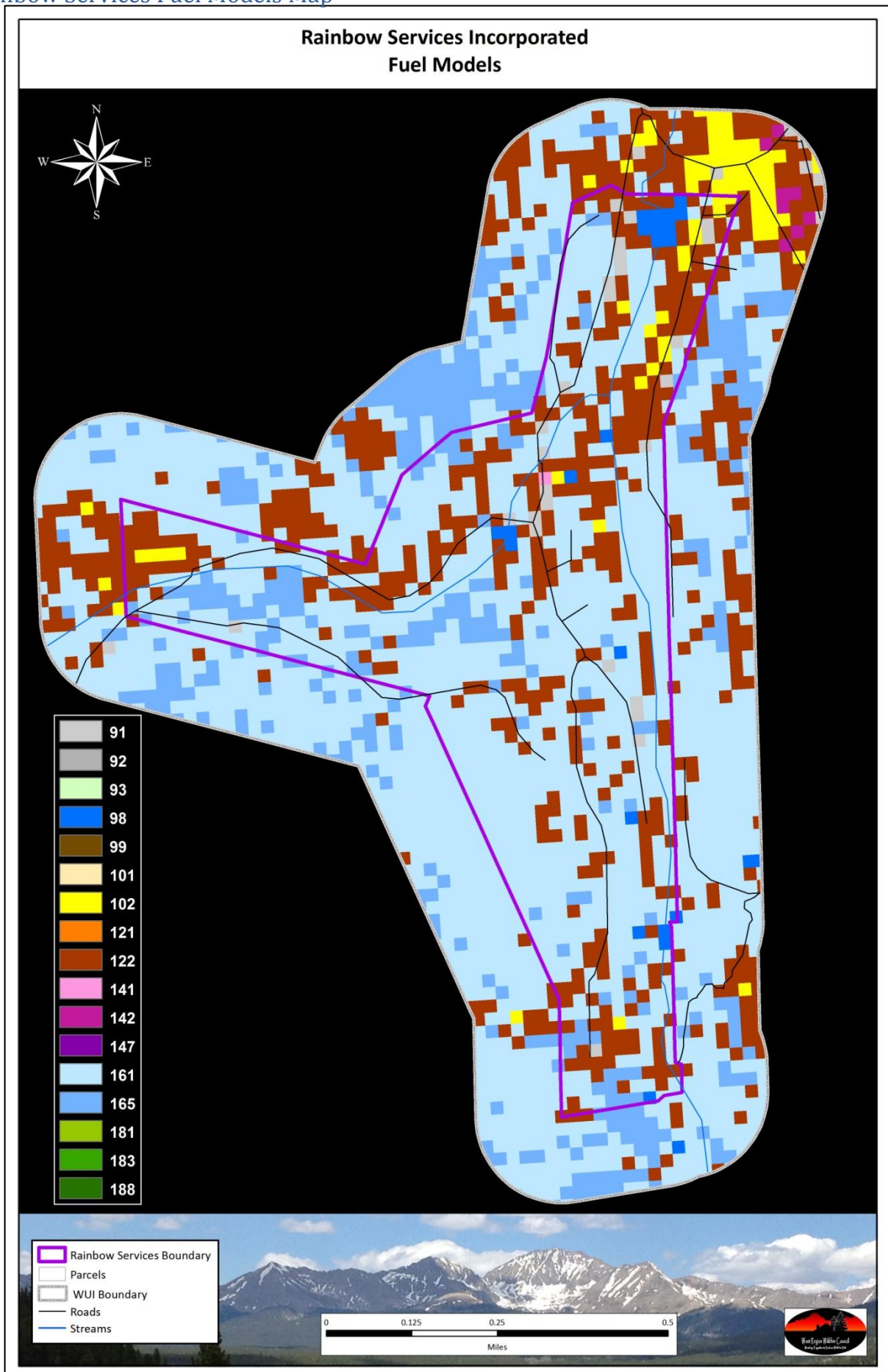
Rainbow Services Fuel Model Map Key

The Fuel Model Map is based off of the Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model. This publication outlines the identified fuel models, gives a brief description of the fuel model and associated fire behavior and gives pictures of examples of that type of fuel model. The table below identifies the fuel models found within the Rainbow Services Incorporated Community. Please reference this table when reviewing the map on the following page.

Color	ID #	Title	Description
	NB1 (91)	Urban/ Developed	Fuel model NB1 consists of land covered by urban and suburban development. To be called NB1, the area under consideration must not support wildland fire spread. In some cases, areas mapped as NB1 may experience structural fire losses during a wildland fire incident; however, structure ignition in those cases is either house-to-house or by firebrands, neither of which is directly modeled using fire behavior fuel models. If sufficient fuel vegetation surrounds structures such that wildland fire spread is possible, then choose a fuel model appropriate for the wildland vegetation rather than NB1.
	NB1 (92)	Snow/Ice	Land covered by permanent snow or ice is included in NB2. Areas covered by seasonal snow can be mapped to two different fuel models: NB2 for use when snow-covered and another for use in the fire season.
	NB3 (93)	Agricultural	Fuel model NB3 is agricultural land maintained in a nonburnable condition; examples include irrigated annual crops, mowed or tilled orchards, and so forth. However, there are many agricultural areas that are not kept in a nonburnable condition. For example, grass is often allowed to grow beneath vines or orchard trees, and wheat or similar crops are allowed to cure before harvest; in those cases use a fuel model other than NB3.
	NB8 (98)	Open Water	Land covered by open bodies of water such as lakes, rivers and oceans comprises NB8.
	NB9 (99)	Bare Ground	Land devoid of enough fuel to support wildland fire spread is covered by fuel model NB9. Such areas may include gravel pits, arid deserts with little vegetation, sand dunes, rock outcroppings, beaches, and so forth.
	GR1 (101)	Short, Sparse Dry Climate Grass (Dynamic)	The primary carrier of fire in GR1 is sparse grass, though small amounts of fine dead fuel may be present. The grass in GR1 is generally short, either naturally or by grazing, and may be sparse or discontinuous. The moisture of extinction of GR1 is indicative of a dry climate fuelbed, but GR1 may also be applied in high-extinction moisture fuelbeds because in both cases predicted spread rate and flame length are low compared to other GR models.
	GR2 (102)	Low Load, Dry Climate Grass (Dynamic)	The primary carrier of fire in GR2 is grass, though small amounts of fine dead fuel may be present. Load is greater than GR1, and fuelbed may be more continuous. Shrubs, if present, do not affect fire behavior.
	GS1 (121)	Low Load, Dry Climate Grass- Shrub (Dynamic)	The primary carrier of fire in GS1 is grass and shrubs combined. Shrubs are about 1 foot high, grass load is low. Spread rate is moderate; flame length low. Moisture of extinction is low.
	GS2 (122)	Moderate Load, Dry Climate Grass- Shrub (Dynamic)	The primary carrier of fire in GS2 is grass and shrubs combined. Shrubs are 1 to 3 feet high, grass load is moderate. Spread rate is high; flame length moderate. Moisture of extinction is low.

	SH1 (141)	Low Load Dry Climate Shrub (Dynamic)	The primary carrier of fire in SH1 is woody shrubs and shrub litter. Low shrub fuel load, fuelbed depth about 1 foot; some grass may be present. Spread rate is very low; flame length very low.
	SH2 (142)	Moderate Load Dry Climate Shrub	The primary carrier of fire in SH2 is woody shrubs and shrub litter. Moderate fuel load (higher than SH1), depth about 1 foot, no grass fuel present. Spread rate is low; flame length low.
	SH7 (147)	Very High Load, Dry Climate Shrub	The primary carrier of fire in SH7 is woody shrubs and shrub litter. Very heavy shrub load, depth 4 to 6 feet. Spread rate lower than SH7, but flame length similar. Spread rate is high; flame length very high.
	TU1 (161)	Low Load Dry Climate Timber-Grass-Shrub (Dynamic)	The primary carrier of fire in TU1 is low load of grass and/or shrub with litter. Spread rate is low; flame length low.
	TU5 (165)	Very High Load, Dry Climate Timber-Shrub	The primary carrier of fire in TU5 is heavy forest litter with a shrub or small tree understory. Spread rate is moderate; flame length moderate.
	TL1 (181)	Low Load Compact Conifer Litter	The primary carrier of fire in TL1 is compact forest litter. Light to moderate load, fuels 1 to 2 inches deep. May be used to represent a recently burned forest. Spread rate is very low; flame length very low.
	TL3 (183)	Moderate Load Conifer Litter	The primary carrier of fire in TL3 is moderate load conifer litter, light load of coarse fuels. Spread rate is very low; flame length low.
	TL8 (188)	Long-Needle Litter	The primary carrier of fire in TL8 is moderate load long-needle pine litter, may include small amount of herbaceous load. Spread rate is moderate; flame length low.

Rainbow Services Fuel Models Map

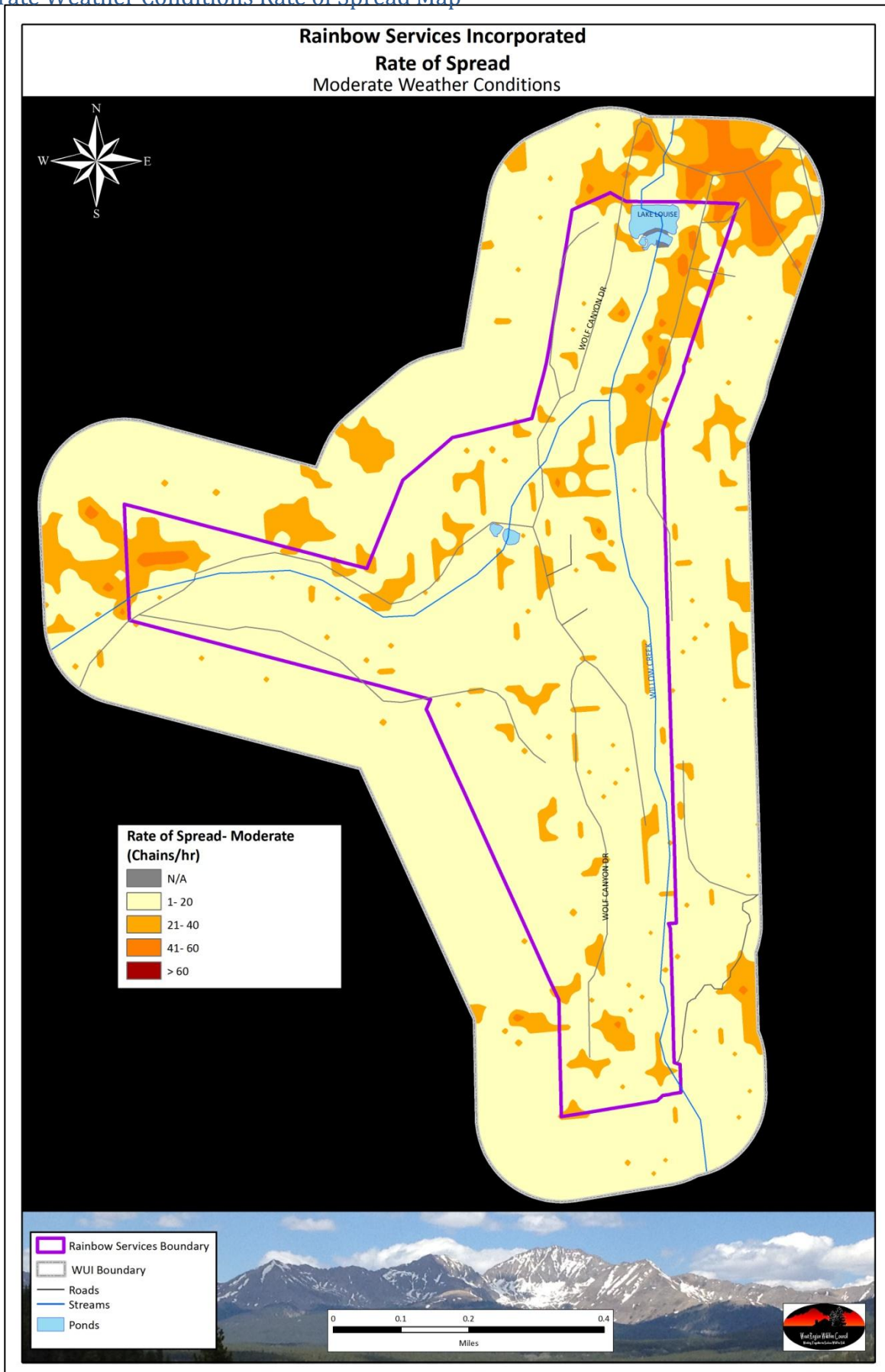


Rate of Spread

Rate of Spread values are generated by FlamMap and are classified into four categories based on standard ranges: 0-20 ch/hr (chains/hour), 20.1-40 ch/hr, 40.1-60 ch/hr, and greater than 60 ch/hr. A chain is a logging measurement that is equal to 66 feet. One mile equals 80 chains. 1 ch/hr equals approximately 1 foot/minute or 80 chains per hour equals 1 mile per hour.

***It should be noted that a high rate of spread is not necessarily severe. Fire will move very quickly across grass fields but may not cause any major damage to the soil.**

Moderate Weather Conditions Rate of Spread Map



High Weather Conditions Rate of Spread Map

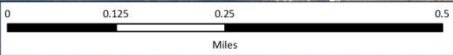
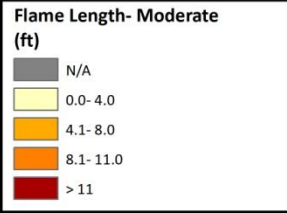
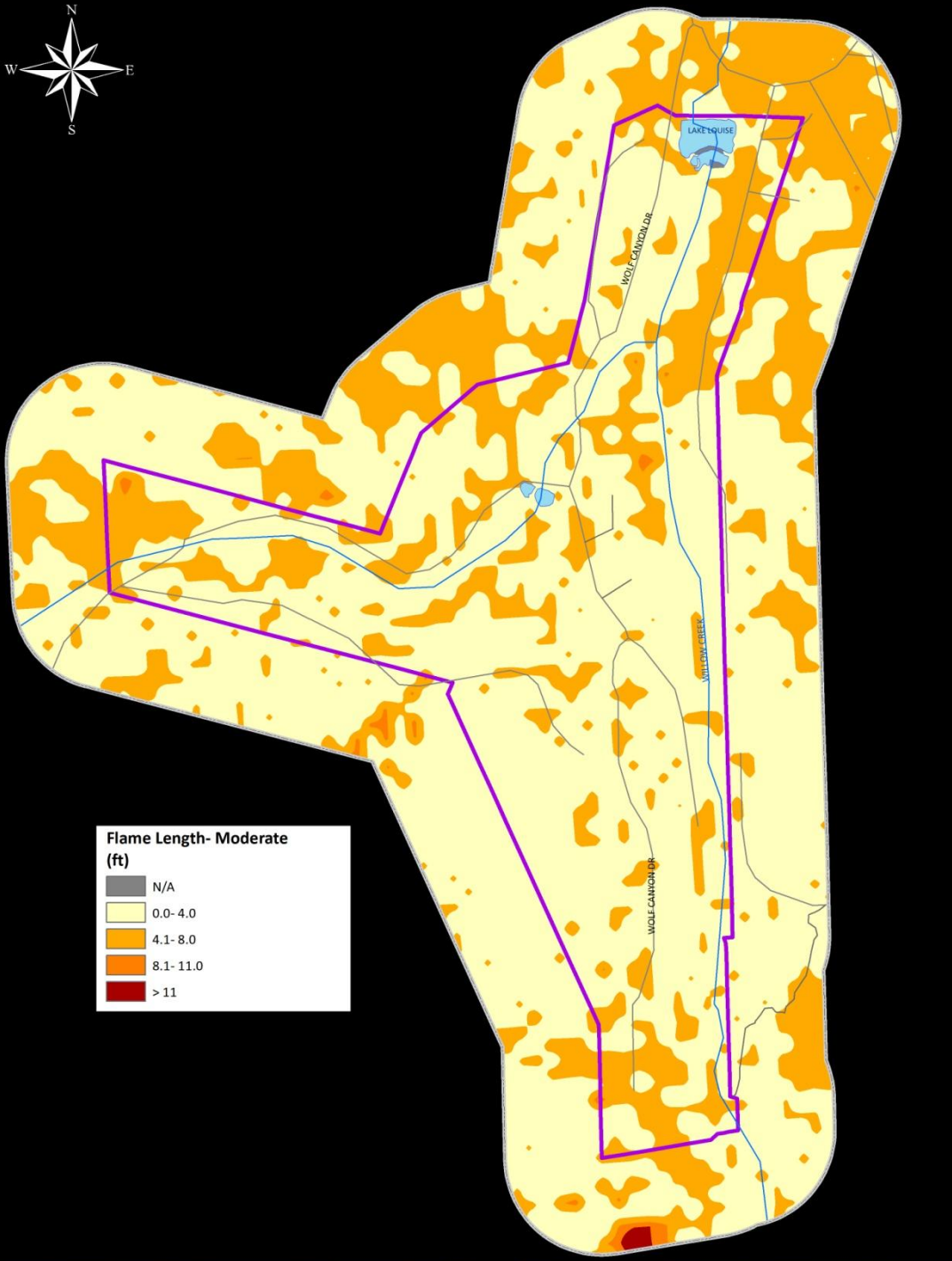


Flame Length

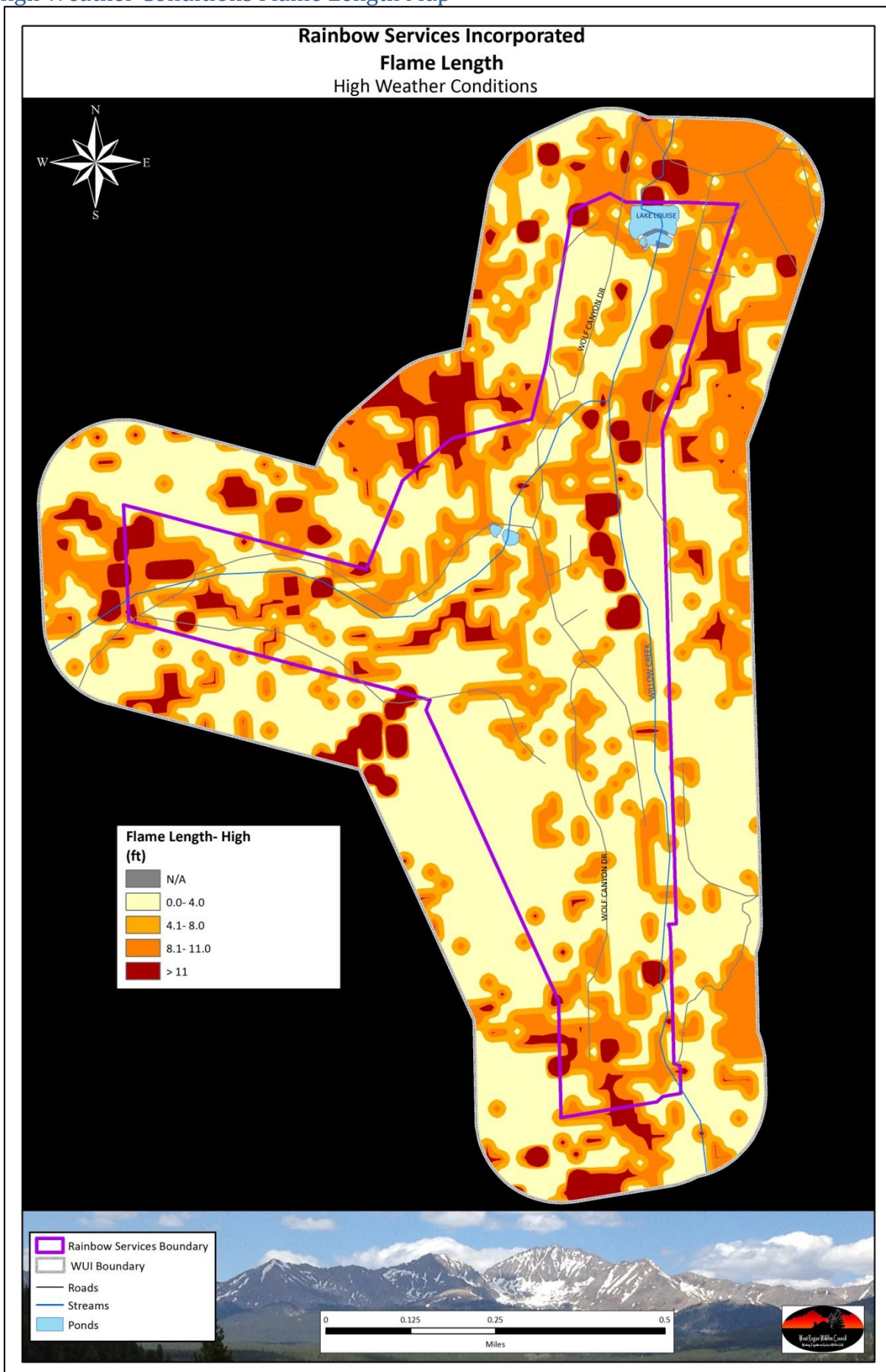
Flame length values are generated by the FlamMap model and were classified into four categories based on standard ranges: 0.1-4.0 feet, 4.1-8.0 feet, 8.1-11.0 feet and greater than 11.0 feet.

The legend boxes display flame length in ranges which are meaningful to firefighters. Flame lengths of four feet and less are deemed to be suitable for direct attack by hand crews, and therefore represent the best chances of direct extinguishment and control. Flame lengths of less than eight feet are suitable for direct attack by equipment such as bulldozers and tractor plows. Flame lengths of eight to 11 feet are usually attacked by indirect methods and aircraft. In conditions where flame lengths exceed 11 feet, the most effective tactics are fuel consumption ahead of the fire by burnouts or mechanical methods. It should be noted that much higher flame lengths of 60-100 feet or more were modeled on steeper slopes with heavy fuel loads.

Rainbow Services Incorporated
Flame Length
 Moderate Weather Conditions



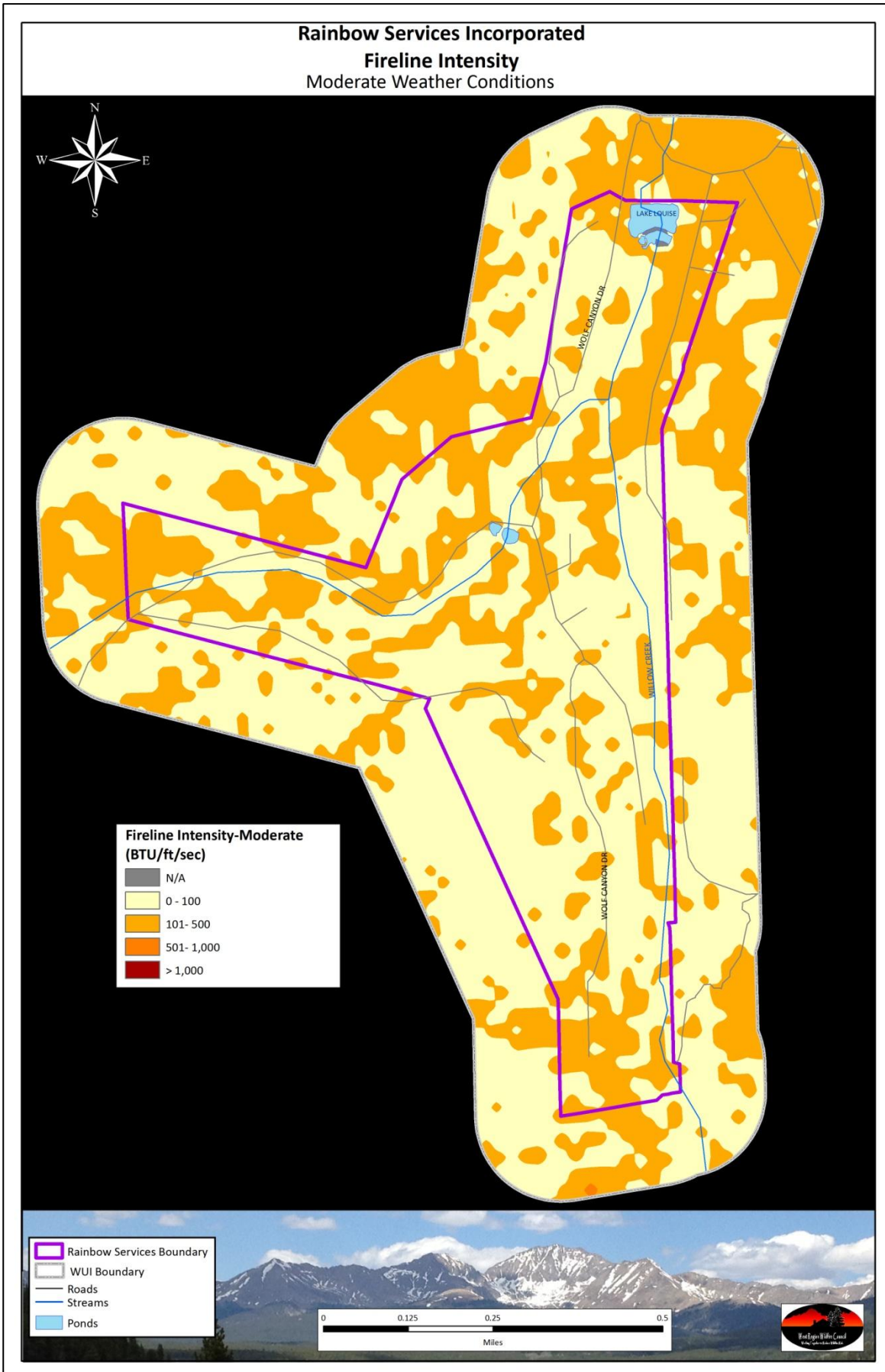
High Weather Conditions Flame Length Map



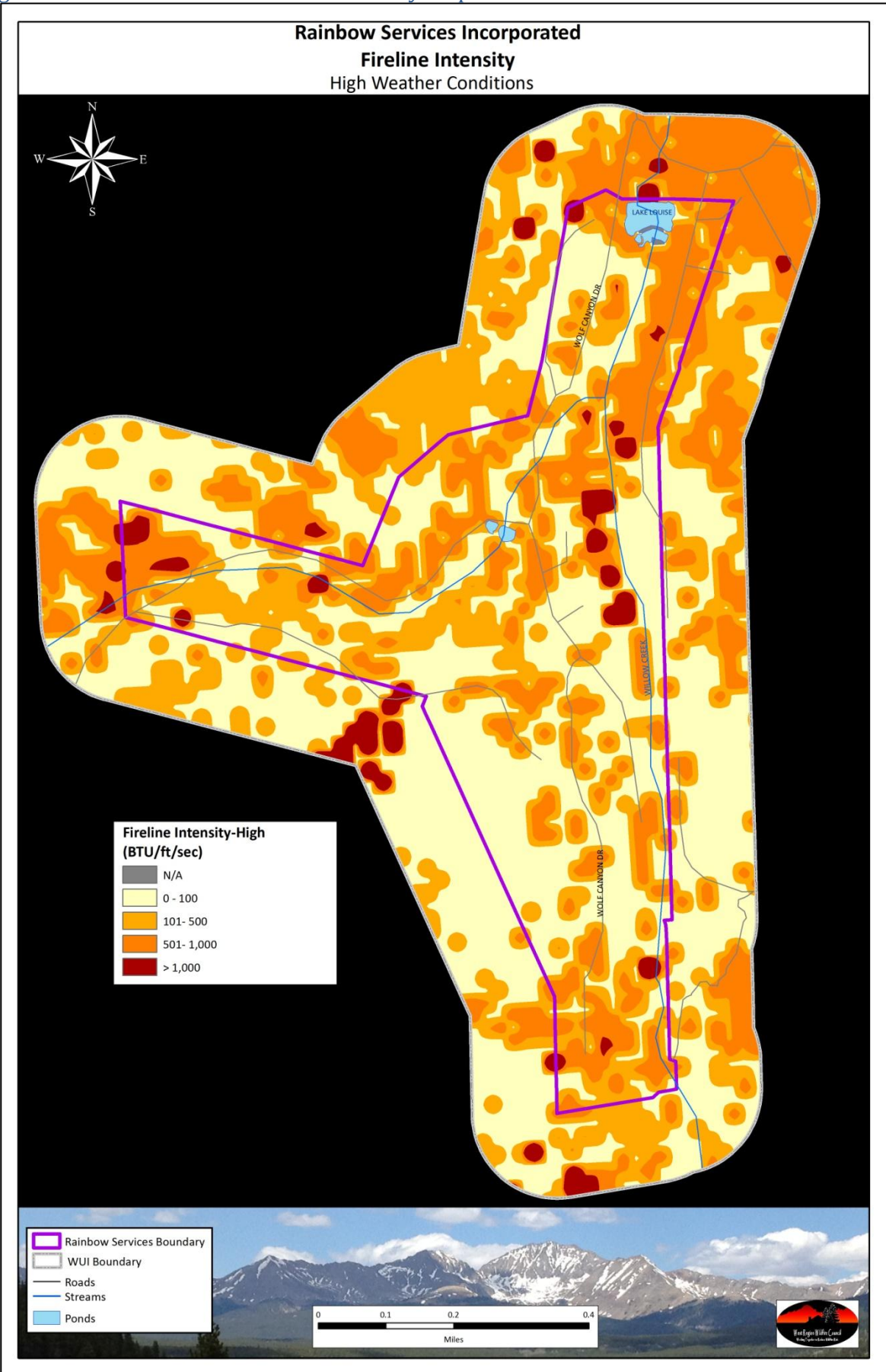
Fireline Intensity

Fireline intensity is a function of rate of spread and heat per unit area and is directly related to flame length. Fireline intensity and the flame length are related to the heat felt by a person standing next to the flames.

Moderate Weather Conditions Fireline Intensity Map



High Weather Conditions Fireline Intensity Map



Conclusions

Implementing Your Risk Reduction Recommendations

The Rainbow Services Incorporated CWPP is an educational document intended to help homeowners understand their risk from wildfire and provide them with recommendations that can be completed to help mitigate wildfire risk. Rainbow Services Incorporated is hopeful that by providing this document, homeowners will take a proactive role in actively mitigating their homes and properties and preparing for wildfire.

Homeowners who implement the recommendations in this plan have the opportunity to change their wildfire risk rating.

Project Implementation Funding Assistance

By having an approved Community Wildfire Protection Plan, additional funding options for implementing projects is possible. There are grant and cost-share programs that provide funding assistance to landowners who want implement fuels reduction projects. Below is a list of a few websites that provide information on funding sources.

- West Region Wildfire Council: www.COwildfire.org
- Colorado State Forest Service: <http://csfs.colostate.edu/pages/funding.html>
- NFPA FireWise: <http://www.firewise.org/Communities/USA-Recognition-Program/>

West Region Wildfire Council

The West Region Wildfire Council supports interagency efforts to develop and implement plans to mitigate the threat of catastrophic wildland fire to communities and natural resources in Delta, Gunnison, Hinsdale, Montrose, Ouray and San Miguel counties. The WRWC promotes information sharing and collaboration between local communities and state and federal fire managers for fuels management, wildfire suppression, enhancing capability, planning and collaboration.

There are several funding assistance programs available to private landowners who are interested in implementing defensible space or completing fuels reduction projects. In 2013 the WRWC partnered with Gunnison County in their effort to reduce wildfire risk to residents by carrying out FireWise activities. For more information, please visit: www.COwildfire.org or contact the West Region Wildfire Council at (970)249-8407 x125.

FireWise Communities/ USA

FireWise Communities/ USA recognition program is a great way for communities to be actively engaged in promoting wildfire risk reduction and education. By completing this CWPP, the Rainbow Services Incorporated community has already completed one of the FireWise Communities/ USA recognition requirements. For more information, please visit: www.Firewise.org.

Other Available Resources

For a complete listing of funding and wildfire related resources, please refer to the Gunnison Community Wildfire Protection Plan in the 'Resources for Implementing CWPP Recommendations'.

Plan Maintenance and Updates

The Rainbow Services Incorporated CWPP should be considered a living document. The plan should be updated annually to reflect wildfire risk reduction actions taken by homeowners. The wildfire risk analysis maps will also need to be updated when a homeowner completes recommendations to reduce their risk. Significant wildfire events, new home construction or large scale fuels reduction projects may warrant plan revision as well. Updating the plan annually provides RSI with an opportunity to reach out to community members and address wildfire concerns, highlight mitigation efforts and provide current information on funding and mitigation resources.

Appendix

Appendix A: Wildfire Risk Analysis Results

House Number	Street Name	Address Visible	Ingress/Egress	Driveway Width	Distance to Dangerous Topography	Background Fuel Type	Defensible space	Roof (Tile, Metal, Asphalt or Wood)	Building Exterior	Other Combustibles	Decks	Wildfire Risk
300	BLUEBIRD	Not Vis.	1 way	< 20 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	10-30	Combust.	300
302	BLUEBIRD	Not Vis.	1 way	< 20 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	320
304	BLUEBIRD	Not Vis.	1 way	< 20 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	320
13	CAMP BIRD	Posted/NOT	1 way	> 24 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	300
14	CAMP BIRD	Not Vis.	1 way	20-24 feet	> 150 feet	Moderate	10-30	T, M, A	Vinyl/Wood	< 10	Combust.	265
42	CAMP BIRD	Posted/NOT	1 way	< 20 feet	> 150 feet	Moderate	10-30	T, M, A	Log	10-30	Combust.	200
76	CAMP BIRD	Not Vis.	1 way	> 24 feet	> 150 feet	Moderate	30-150	T, M, A	Vinyl/Wood	< 10	Combust.	235
101	CAMP BIRD	Not Vis.	1 way	> 24 feet	> 150 feet	Heavy	10-30	T, M, A	Vinyl/Wood	10-30	Combust.	265
104	CAMP BIRD	Not Vis.	1 way	> 24 feet	> 150 feet	Moderate	< 10	T, M, A	Vinyl/Wood	None > 30	Combust.	255
365	FISHERMANS	Posted/NOT	1 way	> 24 feet	> 150 feet	Moderate	10-30	T, M, A	Vinyl/Wood	< 10	Combust.	250
367	FISHERMANS	Not Vis.	1 way	20-24 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	315
369	FISHERMANS	Not Vis.	1 way	> 24 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	310
23	HUMMINGBIRD	Posted/NOT	1 way	20-24 feet	> 150 feet	Moderate	10-30	T, M, A	Log	< 10	Combust.	215
42	HUMMINGBIRD	Not Vis.	1 way	> 24 feet	> 150 feet	Moderate	10-30	T, M, A	Vinyl/Wood	< 10	Combust.	260
110	PINE TREE	Not Vis.	1 way	> 24 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	310
112	PINE TREE	Not Vis.	1 way	> 24 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	295
114	PINE TREE	Not Vis.	1 way	< 20 feet	> 150 feet	Heavy	< 10	T, M, A	Log	10-30	Combust.	260
120	PINE TREE	Not Vis.	1 way	< 20 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	320
122	PINE TREE	Not Vis.	1 way	> 24 feet	> 150 feet	Heavy	10-30	T, M, A	Vinyl/Wood	< 10	Combust.	285
205	RAINBOW	Not Vis.	1 way	> 24 feet	> 150 feet	Light	> 150	T, M, A	Vinyl/Wood	< 10	Combust.	160
206	RAINBOW	Not Vis.	1 way	> 24 feet	> 150 feet	Light	> 150	T, M, A	Log	None > 30	None/Non	55
207	RAINBOW	Not Vis.	1 way	> 24 feet	> 150 feet	Moderate	10-30	Wood	Vinyl/Wood	< 10	Combust.	460
209	RAINBOW	Not Vis.	1 way	20-24 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	315
213	RAINBOW	Not Vis.	1 way	> 24 feet	> 150 feet	Moderate	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	285
214	RAINBOW	Not Vis.	1 way	> 24 feet	> 150 feet	Light	> 150	T, M, A	Log	< 10	Combust.	120
215	RAINBOW	Not Vis.	1 way	> 24 feet	> 150 feet	Moderate	10-30	T, M, A	Vinyl/Wood	< 10	Combust.	260
217	RAINBOW	Not Vis.	1 way	> 24 feet	> 150 feet	Moderate	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	285
218	RAINBOW	Not Vis.	1 way	> 24 feet	> 150 feet	Light	> 150	T, M, A	Vinyl/Wood	< 10	Combust.	160
219	RAINBOW	Not Vis.	1 way	> 24 feet	> 150 feet	Moderate	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	285
237	RAINBOW	Not Vis.	1 way	> 24 feet	> 150 feet	Moderate	10-30	T, M, A	Log	< 10	Combust.	220
241	RAINBOW	Not Vis.	1 way	> 24 feet	> 150 feet	Moderate	30-150	T, M, A	Vinyl/Wood	< 10	Combust.	220
246	RAINBOW	Not Vis.	1 way	> 24 feet	> 150 feet	Light	> 150	T, M, A	Vinyl/Wood	< 10	None/Non	140
248	RAINBOW	Posted/NOT	1 way	> 24 feet	> 150 feet	Light	30-150	T, M, A	Vinyl/Wood	< 10	Combust.	200
250	RAINBOW	Not Vis.	1 way	> 24 feet	> 150 feet	Light	> 150	T, M, A	Log	< 10	Combust.	120
251	RAINBOW	Not Vis.	1 way	20-24 feet	> 150 feet	Moderate	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	290

252	RAINBOW	Not Vis.	1 way	< 20 feet	> 150 feet	Light	> 150	T, M, A	Vinyl/Wood	< 10	Combust.	170
254	RAINBOW	Posted/NOT	1 way	20-24 feet	> 150 feet	Moderate	> 150	T, M, A	Vinyl/Wood	< 10	Combust.	180
257	RAINBOW	Posted/NOT	1 way	20-24 feet	> 150 feet	Light	30-150	T, M, A	Vinyl/Wood	< 10	Combust.	205
258	RAINBOW	Not Vis.	1 way	> 24 feet	> 150 feet	Light	30-150	T, M, A	Log	< 10	Combust.	170
264	RAINBOW	Posted/NOT	1 way	> 24 feet	> 150 feet	Moderate	10-30	T, M, A	Log	< 10	Combust.	210
102	WOLF CANYON	Posted/NOT	1 way	> 24 feet	> 150 feet	Moderate	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	275
365	WOLF CANYON	Posted/Reflect	1 way	> 24 feet	> 150 feet	Heavy	10-30	T, M, A	Vinyl/Wood	< 10	Combust.	270
367	WOLF CANYON	Posted/NOT	1 way	> 24 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	300
368	WOLF CANYON	Not Vis.	1 way	< 20 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	320
370	WOLF CANYON	Not Vis.	1 way	20-24 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	315
374	WOLF CANYON	Not Vis.	1 way	> 24 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	310
375	WOLF CANYON	Posted/NOT	1 way	> 24 feet	> 150 feet	Heavy	10-30	T, M, A	Vinyl/Wood	< 10	Combust.	275
376	WOLF CANYON	Posted/NOT	1 way	> 24 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	10-30	Combust.	280
378	WOLF CANYON	Posted/NOT	1 way	20-24 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	305
379	WOLF CANYON	Posted/NOT	1 way	< 20 feet	> 150 feet	Heavy	< 10	T, M, A	Log	< 10	Combust.	270
380	WOLF CANYON	Posted/NOT	1 way	< 20 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	None/Non	290
384	WOLF CANYON	Not Vis.	1 way	< 20 feet	< 50 feet	Heavy	< 10	T, M, A	Log	< 10	Combust.	355
385	WOLF CANYON	Not Vis.	1 way	< 20 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	320
486	WOLF CANYON	Posted/Not	1 way	< 20 feet	> 150 feet	Heavy	< 10	T, M, A	Vinyl/Wood	< 10	Combust.	310

Access

Addressing: The home's address should be clearly posted and easily visible from the street. The address sign should be made of reflective, non-combustible material. White numbering on a green background is most effective. Characters should be no less than 4 inches high.

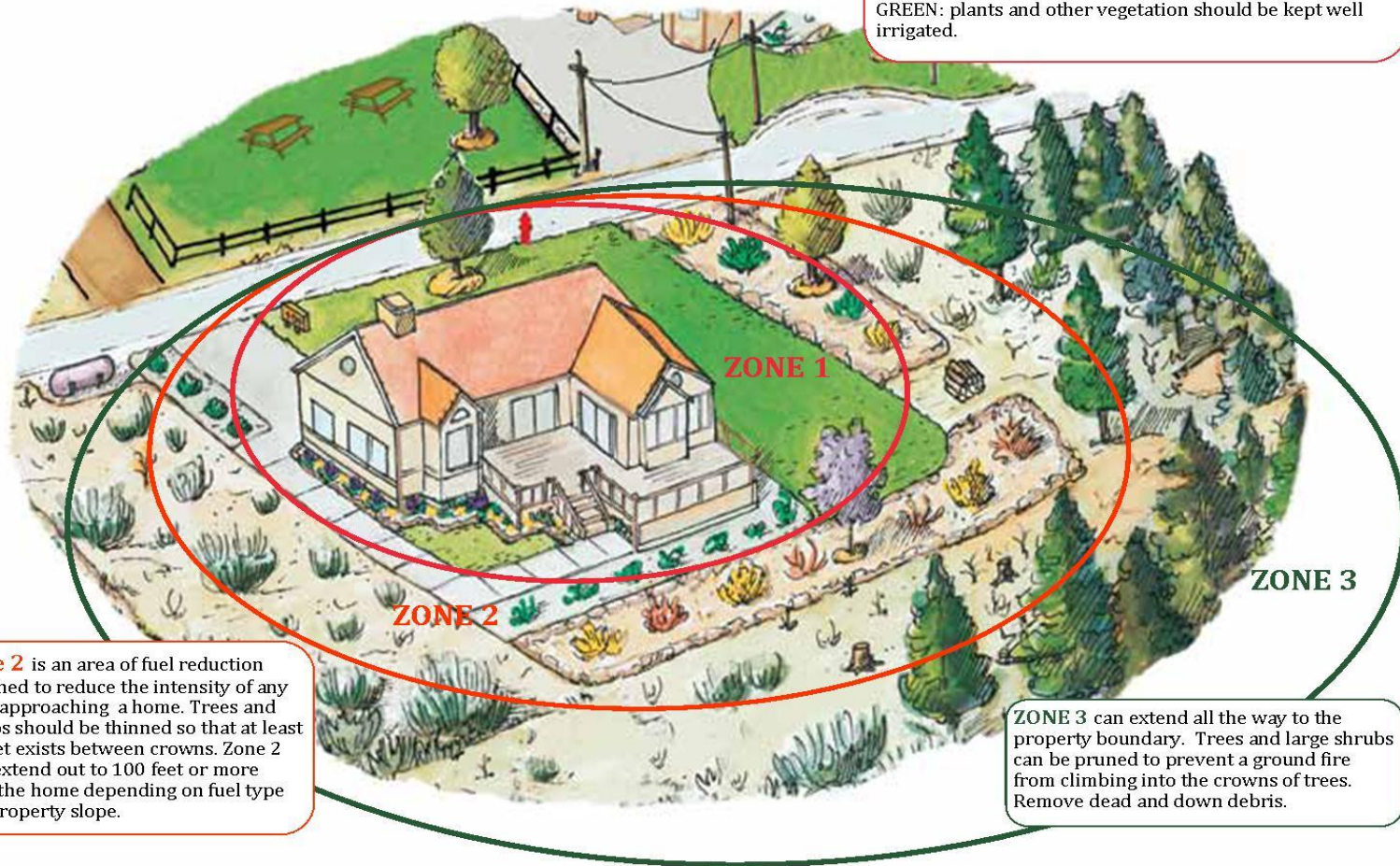
Ingress/ Egress: When communities only have one way in and out, evacuation of residents during an emergency can result in traffic congestion. A second access road, even if only used in emergency situations, can provide an alternate escape route.



Gated Driveways: If your driveway is gated, consider sharing gate combination information or keys with the fire department.

Driveway Width: Driveways should be at least 24 feet wide. Driveways should also have at least 13.5 feet of vertical clearance. Remove flammable vegetation overhead and along the sides of the driveway.

Defensible Space



Zone 1 extends 15 feet beyond the structure, including decks, patios, etc. This area should be lean, clean and green.

LEAN: only a small amount of vegetation should be present within the first 15 feet from the structure.

CLEAN: no accumulation of dead vegetation or flammable debris.

GREEN: plants and other vegetation should be kept well irrigated.

Zone 2 is an area of fuel reduction designed to reduce the intensity of any fire approaching a home. Trees and shrubs should be thinned so that at least 10 feet exists between crowns. Zone 2 may extend out to 100 feet or more from the home depending on fuel type and property slope.

ZONE 3 can extend all the way to the property boundary. Trees and large shrubs can be pruned to prevent a ground fire from climbing into the crowns of trees. Remove dead and down debris.

Built Environment

Windows: Single pane and large windows are the most vulnerable. Install windows that are double-paned and utilize tempered glass on the exterior pane.

Roof: Homes with wood-shake shingle roofs are much more likely to be destroyed during a wildfire than homes with fire resistant roofs. Consider replacing wood-shake or shingle roofs with Class-A fire resistant type (composition, metal or tile).

Firewood: Stacks should be kept at least 30 feet away from the house on the uphill side if possible.



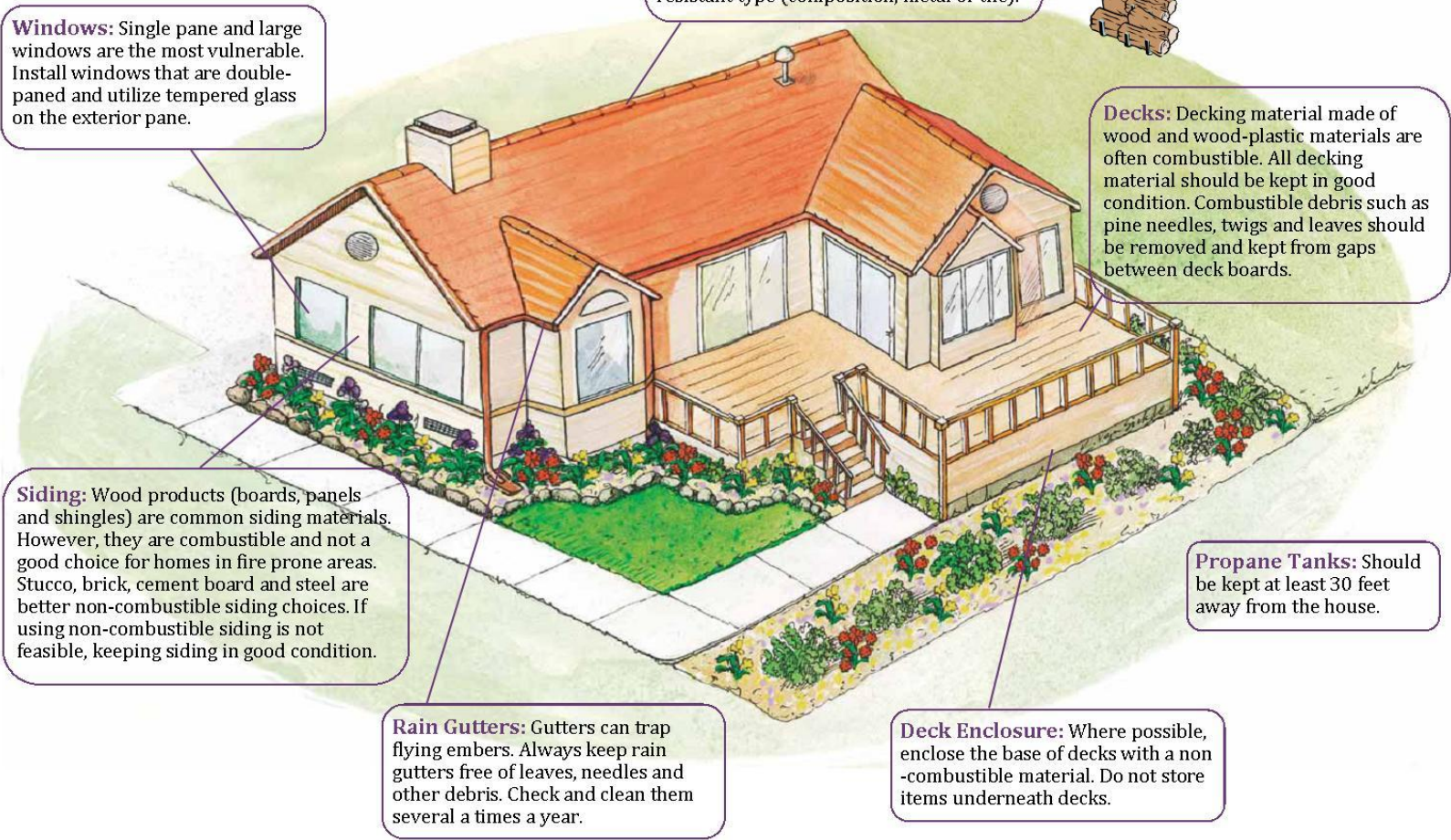
Decks: Decking material made of wood and wood-plastic materials are often combustible. All decking material should be kept in good condition. Combustible debris such as pine needles, twigs and leaves should be removed and kept from gaps between deck boards.

Siding: Wood products (boards, panels and shingles) are common siding materials. However, they are combustible and not a good choice for homes in fire prone areas. Stucco, brick, cement board and steel are better non-combustible siding choices. If using non-combustible siding is not feasible, keeping siding in good condition.

Rain Gutters: Gutters can trap flying embers. Always keep rain gutters free of leaves, needles and other debris. Check and clean them several a times a year.

Deck Enclosure: Where possible, enclose the base of decks with a non-combustible material. Do not store items underneath decks.

Propane Tanks: Should be kept at least 30 feet away from the house.



Appendix C: Parcel Specific Risk Reduction Recommendations (Key)

Wildfire Risk Analysis Recommendation Key

Addressing	Risk Reduction Recommendation	Priority
A1: (Address posted but not reflective)	Replace address markers with reflective signage. Green and white reflective address markers with numbers that are at least four inches in height are recommended to assist emergency responders.	5
A2: (Address not visible)	Clearly post street address with reflective signage. Green and white reflective address markers with numbers that are at least four inches in height are recommended to assist emergency responders.	5
Ingress/ Egress	Risk Reduction Recommendation	Priority
I/E2: (only one ingress/ egress route)	Work with community members and appropriate landowners to identify a secondary emergency egress route.	3
Driveway Width	Risk Reduction Recommendation	Priority
DW1: (driveway width 20-24 feet)	Remove flammable vegetation from overhead and along the sides of driveways. Driveways should be at least 24' wide and have 13.5' of vertical clearance.	4
DW2: (driveway width less than 20 feet)	Remove flammable vegetation from overhead and along the sides of driveways. Driveways should be at least 24' wide and have 13.5' of vertical clearance.	4
Background Fuel	Risk Reduction Recommendation	Priority
BF1: (Light background fuel)	Keep grasses mowed and other combustible materials clear from at least 15' around your home.	3
BF2: (Moderate background fuel)	Implement a defensible space project around your house. Consider extending your defensible space out to Zone 2. Refer to CSFS 'Protecting Your Home From Wildfire: Creating Wildfire-Defensible Zones' for further information. This publication can be found in the appendix of this document.	2
BF3: (Heavy background fuel)	Implement a defensible space project around your home. Consider extending your defensible space out to Zone 2 and 3. Refer to CSFS 'Protecting Your Home From Wildfire: Creating Wildfire-Defensible Zones' for further information. This publication can be found in the appendix of this document.	2
Defensible Space	Risk Reduction Recommendation	Priority
DS1: (less than 10 feet of defensible space)	A defensible space project is recommended to reduce your home's risk to wildfire. Refer to CSFS' Protecting Your Home From Wildfire: Creating Wildfire-Defensible Zones' for specifics on making your defensible space effective. This publication can be found in the appendix of this document.	1
DS2: (10-30 feet of defensible space)	Expand your defensible space. Refer to CSFS 'Protecting Your Home From Wildfire: Creating Wildfire-Defensible Zones' for specifics on making your defensible space effective. This publication can be found in the appendix of this document.	1
DS3: (30-150 feet of defensible space)	Maintain your defensible space. Consider extending your defensible space.	2
DS4: (greater than 150 feet of defensible space)	Maintain your defensible space.	2
Roofing Material	Risk Reduction Recommendation	Priority

R1: (wood shake-shingle roof)	Consider replacing wood roof with non-combustible, Class A, fire-resistant roofing material. Tile, metal or composite shingles; or metal roofing material is recommended.	1
R2: (Non-combustible roof)	Ensure no flammable materials such as pine needles, leaves or other debris accumulate in roof valleys or gutters.	1
Siding Material	Risk Reduction Recommendation	Priority
S1: (Vinyl, wood or other combustible siding)	Replace siding with a non-combustible material such as stucco, brick or cement fibrous siding.	3
Other Combustibles	Risk Reduction Recommendation	Priority
C1: (combustible materials within 30 feet of home)	Move combustibles such as firewood piles and propane tanks at least 30' away from the structure. Firewood piles and propane tanks should be located uphill from the structure. Keep grasses mowed and other combustibles minimized during fire season.	3
Decking Material	Risk Reduction Recommendation	Priority
DK1: (Combustible decking material)	Maintain wood decks and/ or replace with a non-combustible material. Where possible, enclose the base of decks with a non-combustible material. Do not store items underneath decks and keep them free of combustible materials such as leaves and pine needles.	4

Appendix D: Parcel Specific Risk Reduction Recommendations

House Number	Street Name	Address Visible	Ingress/Egress	Driveway Width	Background Fuel Type	Defensible Space	Roof	Siding Material	Other Combustibles	Decks
300	BLUEBIRD	A2	I/E2	DW2	BF3	DS1	R2	S1	C1	DK1
302	BLUEBIRD	A2	I/E2	DW2	BF3	DS1	R2	S1	C1	DK1
304	BLUEBIRD	A2	I/E2	DW2	BF3	DS1	R2	S1	C1	DK1
13	CAMP BIRD	A1	I/E2	none	BF3	DS1	R2	S1	C1	DK1
14	CAMP BIRD	A2	I/E2	DW1	BF2	DS2	R2	S1	C1	DK1
42	CAMP BIRD	A1	I/E2	DW2	BF2	DS2	R2	None	C1	DK1
76	CAMP BIRD	A2	I/E2	none	BF2	DS3	R2	S1	C1	DK1
101	CAMP BIRD	A2	I/E2	none	BF3	DS2	R2	S1	C1	DK1
104	CAMP BIRD	A2	I/E2	none	BF2	DS1	R2	S1	None	DK1
365	FISHERMANS	A1	I/E2	none	BF2	DS2	R2	S1	C1	DK1
367	FISHERMANS	A2	I/E2	DW1	BF3	DS1	R2	S1	C1	DK1
369	FISHERMANS	A2	I/E2	none	BF3	DS1	R2	S1	C1	DK1
23	HUMMINGBIRD	A1	I/E2	DW1	BF2	DS2	R2	None	C1	DK1
42	HUMMINGBIRD	A2	I/E2	none	BF2	DS2	R2	S1	C1	DK1
110	PINE TREE	A2	I/E2	none	BF3	DS1	R2	S1	C1	DK1
112	PINE TREE	A2	I/E2	none	BF3	DS1	R2	S1	C1	DK1
114	PINE TREE	A2	I/E2	DW2	BF3	DS1	R2	None	C1	DK1
120	PINE TREE	A2	I/E2	DW2	BF3	DS1	R2	S1	C1	DK1
122	PINE TREE	A2	I/E2	none	BF3	DS2	R2	S1	C1	DK1
205	RAINBOW	A2	I/E2	none	BF1	DS4	R2	S1	C1	DK1
206	RAINBOW	A2	I/E2	none	BF1	DS4	R2	None	None	None
207	RAINBOW	A2	I/E2	none	BF2	DS2	R1	S1	C1	DK1
209	RAINBOW	A2	I/E2	DW1	BF3	DS1	R2	S1	C1	DK1
213	RAINBOW	A2	I/E2	none	BF2	DS1	R2	S1	C1	DK1
214	RAINBOW	A2	I/E2	none	BF1	DS4	R2	None	C1	DK1
215	RAINBOW	A2	I/E2	none	BF2	DS2	R2	S1	C1	DK1

217	RAINBOW	A2	I/E2	none	BF2	DS1	R2	S1	C1	DK1
218	RAINBOW	A2	I/E2	none	BF1	DS4	R2	S1	C1	DK1
219	RAINBOW	A2	I/E2	none	BF2	DS1	R2	S1	C1	DK1
237	RAINBOW	A2	I/E2	none	BF2	DS2	R2	None	C1	DK1
241	RAINBOW	A2	I/E2	none	BF2	DS3	R2	S1	C1	DK1
246	RAINBOW	A2	I/E2	none	BF1	DS4	R2	S1	C1	None
248	RAINBOW	A1	I/E2	none	BF1	DS3	R2	S1	C1	DK1
250	RAINBOW	A2	I/E2	none	BF1	DS4	R2	None	C1	DK1
251	RAINBOW	A2	I/E2	DW1	BF2	DS1	R2	S1	C1	DK1
252	RAINBOW	A2	I/E2	DW2	BF1	DS4	R2	S1	C1	DK1
254	RAINBOW	A1	I/E2	DW1	BF2	DS4	R2	S1	C1	DK1
257	RAINBOW	A1	I/E2	DW1	BF1	DS3	R2	S1	C1	DK1
258	RAINBOW	A2	I/E2	none	BF1	DS3	R2	None	C1	DK1
264	RAINBOW	A1	I/E2	none	BF2	DS2	R2	None	C1	DK1
102	WOLF CANYON	A1	I/E2	none	BF2	DS1	R2	S1	C1	DK1
365	WOLF CANYON	None	I/E2	none	BF3	DS2	R2	S1	C1	DK1
367	WOLF CANYON	A1	I/E2	none	BF3	DS1	R2	S1	C1	DK1
370	WOLF CANYON	A2	I/E2	DW1	BF3	DS1	R2	S1	C1	DK1
368	WOLF CANYON	A2	I/E2	DW2	BF3	DS1	R2	S1	C1	DK1
374	WOLF CANYON	A2	I/E2	none	BF3	DS1	R2	S1	C1	DK1
375	WOLF CANYON	A1	I/E2	none	BF3	DS2	R2	S1	C1	DK1
376	WOLF CANYON	A1	I/E2	none	BF3	DS1	R2	S1	C1	DK1
378	WOLF CANYON	A1	I/E2	DW1	BF3	DS1	R2	S1	C1	DK1
379	WOLF CANYON	A1	I/E2	DW2	BF3	DS1	R2	None	C1	DK1
380	WOLF CANYON	A1	I/E2	DW2	BF3	DS1	R2	S1	C1	None
384	WOLF CANYON	A2	I/E2	DW2	BF3	DS1	R2	None	C1	DK1
385	WOLF CANYON	A2	I/E2	DW2	BF3	DS1	R2	S1	C1	DK1
486	WOLF CANYON	A1	I/E2	DW2	BF3	DS1	R2	S1	C1	DK1

Appendix E: Gunnison County CWPP Risk Reduction Recommendations

The Gunnison County Community Wildfire Protection Plan outlined landscape scale risk reduction recommendations for the two County CWPP Communities that exist within the Rainbow Services Incorporated community. Please refer to the table below and the map on the following pages. *For more specific information about the projects including suggested methodology for completing the projects, please refer to the Gunnison County CWPP in the 'Rainbow' section of the plan.*

Gunnison County CWPP: Rainbow Services Incorporated Landscape Scale Fuels Treatments

Rainbow Services Linked Defensible Space	The linked defensible space in Rainbow Services is recommended to utilize defensible space projects to isolate the homes and the riparian corridor from the fuel loading around the community.
Patch Cutting	Multiple acre patch cuts should be spread out throughout the community on the property of cooperating landowners in order to reduce the crown continuity of the spruce/fir and lodgepole pine fuels in and around the community.

Rainbow Services Incorporated Recommendations:

As part of the stakeholder meeting held during the planning process, fuels reduction projects and other recommendations were identified. The RSI CWPP Planning Stakeholders discussed several additional recommendations (other than those identified in the Gunnison County CWPP) for the RSI community. These recommendations include:

Roadside Thinning Projects:

1. Wolf Canyon Drive provides primary access for many residents in the RSI community. A majority of the road is overgrown with dense fuel. In many places, it is difficult for two cars to pass each other going in opposing directions. The Stakeholder group recommends a roadside thinning project along Wolf Canyon Drive.
 - Widen Wolf Canyon Drive in several areas to facilitate pull outs and turn around areas.
2. The Bluebird Lane Thinning project is recommended to remove vegetation from this very overgrown ingress/egress route. There are several homes only accessible by Blue Bird Lane and improving accessibility is recommended. This project also ties in with the Blue Bird Lane/ Rainbow Road Fuels Treatment that is identified in the Proposed Project map and in the next section.
3. Pine Tree Lane is a narrow primary access route for several homes in the RSI community. Pine Tree Lane runs primarily along the USFS boundary to the west. The RSI CWPP Stakeholder group recommends completing a roadside thinning project to help clear dense vegetation away from the road. This project also ties in with the Pine Tree Lane Fuels Treatment project that is identified below.

Fuels Treatments:

The Rainbow Services Incorporated community is almost entirely surrounded by National Forest System Lands. The planning stakeholders discussed several cross-boundary fuels reduction projects that would benefit the community greatly in helping to mitigate wildfire risk.

1. The Bluebird Lane/ Rainbow Road Fuels Treatment has been identified as a cross-boundary fuels reduction recommendation to help break up the continuity of heavy fuels between the well traveled Cumberland Pass road and the RSI community. Roadside thinning projects increase firefighter and civilian safety by reducing fire intensity in proximity to ingress/egress routes. The USFS land in between the road and RSI is a popular undeveloped camping location during the summer months. Residents in RSI fear an unattended campfire or potential ignitions from the Cumberland Pass Road may move through the area into the RSI community. Roadside thinning projects increase firefighter and civilian safety by reducing fire intensity in proximity to ingress/egress routes.
2. The Pine Tree Lane Fuels Treatment was identified by the planning stakeholders as a high priority cross-boundary treatment due to the prevailing winds in the area and the dense continuity of fuels outside of the RSI community boundary. Completing this project would help to encourage the recommended roadside thinning along Pine Tree Lane and provide RSI residents with a fuel break on the USFS land boarding their community.

Typical roadside thinning and fuels reduction projects involve thinning trees to increase crown spacing, pruning of residual trees to raise canopy height and removing ladder fuels to reduce the vertical fuel continuity among residual trees.

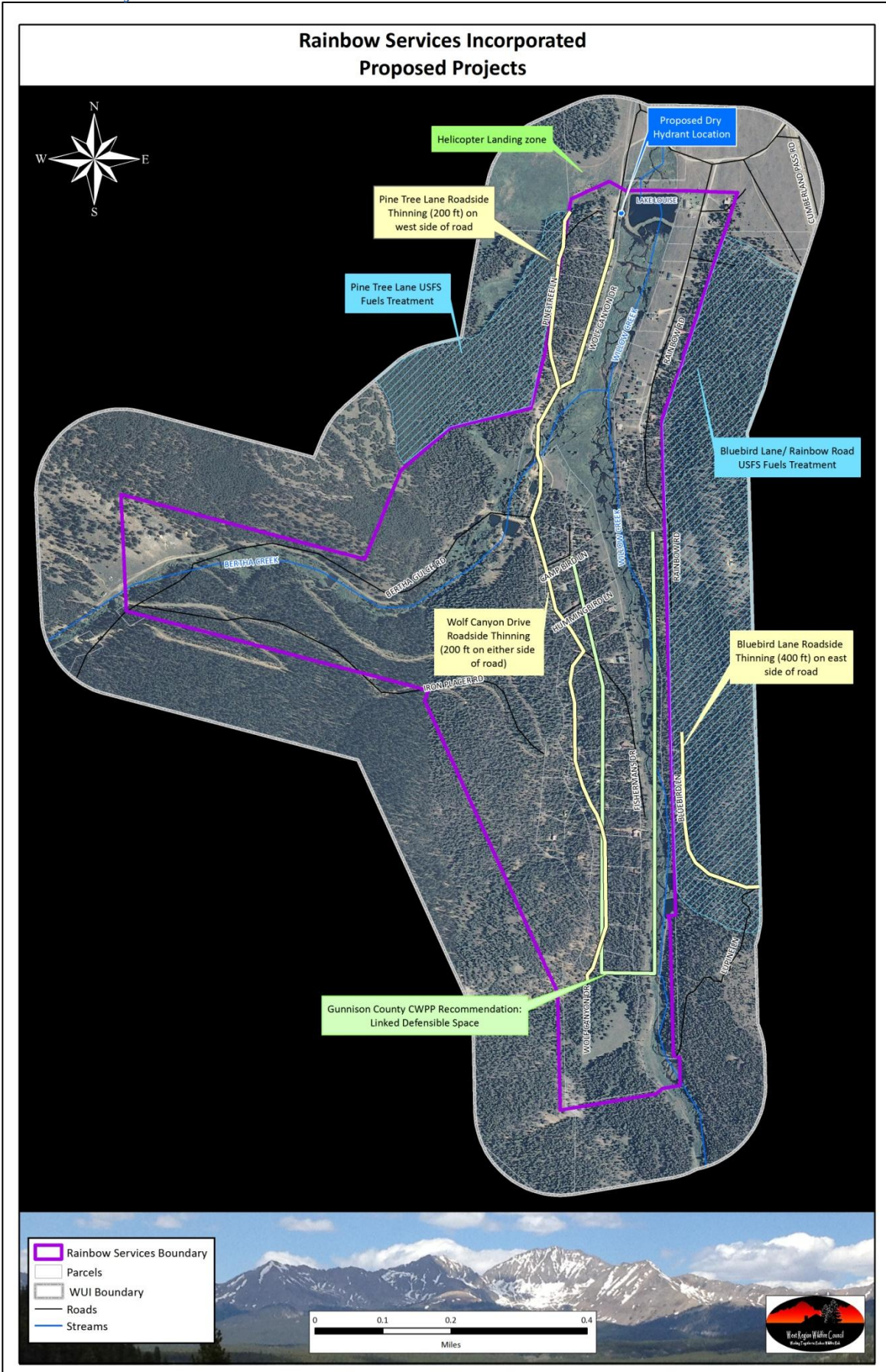
*To obtain more specific information on implementing these recommendations, please see [appendix F](#) in the back of this document.

Other Recommendations:

1. Install a dry hydrant near the entrance to the RSI Community on Lake Louise (see Proposed Project Map). Volunteer Fire Assistance (VFA) funding may be available through the Colorado Division of Fire Prevention and Control.
2. Further establish the designated slash piling area to the north of the RSI community. Doing so will help encourage community residents to remove dead/ flammable materials from around their homes and lots.
3. Address the single ingress/egress issue. RSI community members have identified the need for and the desire to construct a secondary emergency exit route out of the RSI community. The identified exit route would include building a bridge across Willow Creek allowing residents on Wolf Canyon Drive and Rainbow Road a secondary exit route.
4. Post load limit signage at the Willow Creek Bridge.
5. RSI community members are very concerned with the number of un-established high traffic camping spots that are in close proximity to the RSI community. Several attempts have been made by residents requesting the USFS to proactively regulate the number of campers in the near vicinity. RSI residents have concerns that during high fire danger years, campers

are still having fires and/or being careless despite enacted restrictions. The planning stakeholders recommend that RSI residents continue to address their concerns with the USFS.

6. Lake Louise is the RSI Community's primary water source. RSI residents are concerned because the lake is filling up with sediment. RSI residents have asked that a recommendation be included in the RSI CWPP that addresses this issue. While sedimentation issues are not directly related to wildfire risk, keeping Lake Louise at optimum water capacity could benefit wildfire suppression efforts should a wildfire occur in the area.
7. Visit http://www.gunnisoncounty.org/emergency_management.html and register your phone to receive emergency notification alerts.
8. Incorporate evacuation planning discussions into annual HOA meetings.



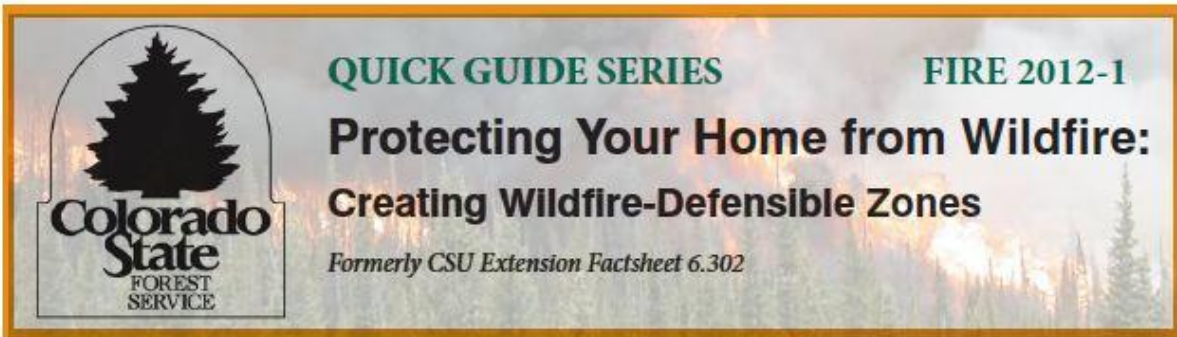
General Risk Reduction Recommendations

These general recommendations are taken from the Gunnison County CWPP in the Rainbow Services section of the plan.

Home Construction	<ul style="list-style-type: none"> ➤ Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. ➤ Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
Landscaping/ Fuels	<ul style="list-style-type: none"> ➤ Clean leaf and needle litter from roofs and gutters and away from foundations. ➤ Thin vegetation along side roads and driveways. This is especially important for narrow driveways and road segments, and for any areas where ravines with heavy fuels are below the access. Focus on removing vegetation in drainages that cross roads. ➤ Remove wood piles and propane tanks to at least 30 feet from structures. Wood piles should be located uphill from the home. ➤ Encourage individual landowners to mow fuels near homes and along roadways and fence lines during times of high fire danger.
Preparedness Planning/ Evacuation	<ul style="list-style-type: none"> ➤ Add reflective addressing to all driveways or homes. A good guideline is to use all metal white markers that are 4 inches in height on a green background. These should be placed three to five feet above ground level. ➤ Ensure that all road signs and attachments are made of reflective, noncombustible materials, and that they are easily understood. ➤ A large-animal evacuation plan should be developed where applicable. Where available, large safety zones should be maintained and identified in all evacuation planning. These safety zones will need to be of adequate size and quality in order to be effective.
Infrastructure	<ul style="list-style-type: none"> ➤ Provide adequate turnarounds for fire apparatus throughout the community. ➤ Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.

While the landscape scale fuel reduction treatments are essential for wildfire risk reduction, Rainbow Services wanted to supply its residents with a more specific list of risk reduction elements. The intention is to give each homeowner in the community a list of specific actions that they can complete in order to reduce their risk to wildfire.

To see your specific list of risk reduction recommendations, please reference the [appendix](#) of this document. Parcel specific risk reduction recommendations are listed in alphabetical order by street name.



If your home is located in the natural vegetation of Colorado's grasslands, shrublands, foothills or mountains, you live in the **wildland-urban interface (WUI)** and are inherently at risk from a wildfire. The WUI is any area where structures and other human developments meet or intermingle with wildland vegetative fuels. In many vegetation types, it is not a matter of *if* a wildfire will impact your home, but *when*.

Wildfires are a natural part of Colorado's varied forest ecosystems. Many rural communities are located in areas historically prone to frequent natural wildfires. Living in the wildland requires more self-reliance than living in urban areas. It may take longer for a fire engine to reach your area, and a small fire department can easily become overwhelmed during an escalating wildfire. Planning ahead and taking actions to reduce fire hazards can increase your safety and help protect your property. As more people choose to live in areas prone to wildfire, additional homes and lives are potentially threatened every year. Firefighters always do their best to protect rural residents, but ultimately, **it is YOUR responsibility to protect your life, family, animals and property from wildfire.**

The information contained in this document is for use by individual landowners to help reduce wildfire risk on their property. In order to effectively protect subdivisions and communities, all landowners must work together to reduce fire hazards within and adjacent to communities. This includes treating individual home sites and common areas within communities, and creating fuelbreaks within and adjoining the community where feasible. This document will focus on actions individual landowners can take to reduce wildfire hazards on their property. For additional information on broader community protection, go to www.csfs.colostate.edu.



Figure 2: Colorado's grasslands, shrublands, foothills and mountains all have areas in the wildland-urban interface where human development meets wildland vegetative fuels. Photo: CSFS

In this guide, you'll read about steps you can take to protect your property from wildfire. These steps focus on beginning work closest to your house and moving outward. Also, remember that keeping your home safe is not a one-time effort – it requires ongoing maintenance. It may be necessary to perform some actions, such as removing pine needles from gutters and mowing grasses and weeds several times a year, while other actions may only need to be addressed once a year. While



Figure 1: Firefighters will do their best to protect homes, but ultimately it is the homeowner's responsibility to plan ahead and take actions to reduce fire hazards around structures. Photo: National Interagency Fire Center

This quick guide was produced by the Colorado State Forest Service to promote knowledge transfer.

October 2012
www.csfs.colostate.edu



Figure 3: Burning embers can be carried long distances by wind. Embers ignite structures when they land in gaps, crevices and other combustible places around the home. Photo: CSFS

Remember...

- **Reducing fuels around a home will increase the chances for survival in a wildfire, but there is no guarantee.**
- **This quick guide provides minimum guidelines. The more fuels you remove, the greater the chance your home will survive.**
- **Working with your neighbors and community will increase the effectiveness of your home's defensible space.**

you may not be able to accomplish ALL of the actions described in this document to prepare your home for wildfire, each completed activity will increase the safety of your home, and possibly your family, during a wildfire.

(Note: These guidelines are adapted for ponderosa pine, Douglas-fir and mixed-conifer ecosystems below 9,500 feet. See page 9 for guidelines adapted to other forest ecosystems.)

This guide primarily will help design your defensible space. **Defensible space** is the natural and landscaped area around a home or other structure that has been modified to reduce fire hazard. Defensible space gives your home a fighting chance against an approaching wildfire. Creating defensible space also reduces the chance of a structure fire spreading to the surrounding forest and other homes.

Three factors determine wildfire behavior: **fuels, weather and topography**. We cannot alter weather or topography, so we must concentrate on altering fuels. Fuels include vegetation, such as trees, brush and grass; near homes, fuels also include

such things as propane tanks, wood piles, sheds and even homes themselves. Some plant species are more flammable than others, and the flammability of vegetative fuels changes depending on the season, recent weather events, and other factors such as drought. Fuel continuity and density also play an important role in wildfire.

Wildfire often creates its own weather conditions. Hot rising air and associated winds can carry embers and other burning materials into the atmosphere for long distances, where they can ignite vegetation and structures up to several miles away. Embers have caused the loss of many homes during wildfires.

As you think about protecting your home and property from wildfire, consider how you can manage fuels on your property to prevent fire from spreading to your home and other structures.

For more information on wildfire behavior, please see [FireWise Construction: Site Design and Building Materials](http://www.csfscolorado.edu) at www.csfscolorado.edu.

Fuel Arrangement and Types

When fuels are abundant, a fire can be uncontrollable and destructive. But when fuels are scarce, a fire cannot build momentum and intensity, which makes it much easier to control and is more likely to be beneficial to the land.

The more dense and continuous the fuels, the bigger the threat they pose to your home. The measure of fuel hazard refers to its continuity, both horizontal and vertical. Horizontal continuity refers to fuels across the ground, while vertical continuity refers to fuels extending from the ground up into the crowns of trees and shrubs. Fuels with a high degree of both vertical and horizontal continuity are the most hazardous, particularly when they occur on slopes. Mitigation of wildfire hazards focuses on breaking up the continuity of horizontal and vertical fuels.

Heavier fuels, such as brush and trees, produce a more intense fire than light fuels, such as grass. However, grass-fueled fires travel much faster than heavy-fueled fires. Some heavier surface fuels, such as logs and wood chips, are potentially hazardous heavy fuels and also should be addressed.

Vertical/Ladder Fuels

Ladder fuels are defined as smaller trees and brush that provide vertical continuity, which allows a fire to burn from the ground level up into the branches and crowns of larger trees. Lower branches on large trees also can act as ladder fuels. These fuels are potentially very hazardous, but are easy to mitigate. The hazards from ladder fuels near homes are especially important to address. Prune all tree branches from ground level up to a height of 10 feet above ground or up to $\frac{1}{3}$ the height of the tree, whichever is less. Do not prune further up because it could jeopardize the health of the tree. Shrubs should be pruned based on specifications recommended for the species. Dead branches should be removed whenever possible.

Surface Fuels

Logs/Branches/Slash/Wood Chips

Naturally occurring woody material on the ground and debris from cutting down trees (also known as slash) may increase the intensity of fires. Increased fire intensity makes a fire harder to control and increases the likelihood of surface fires transitioning to crown fires. Dispose of any heavy accumulation of logs, branches and slash by chipping, hauling to a disposal site or piling for burning later. Always contact your county sheriff's office or local fire department first for information about burning slash piles. Another alternative is to lop and scatter slash by cutting it into very small pieces and distributing it widely over the ground. If chipping logs and/or slash, it's essential to avoid creating continuous areas of wood chips on the ground. Break up the layer of wood chips by adding nonflammable material, or allow for wide gaps (at least 3 feet) between chip accumulations. Also, avoid heavy accumulation of slash by spreading it closer to the ground to speed decomposition. If desired, two or three small, widely spaced brush piles may be left for wildlife habitat. Locate these well away from your home (NOT in Zones 1 or 2; see page 5-8 for zone descriptions).

Pine Needles/Duff Layers

Due to decades of fire suppression, decomposing layers of pine needles, twigs and other organic debris—called duff— is deeper under many large trees today than it would have been a century ago. This is especially true in ponderosa pine forests where frequent and naturally occurring fires have been absent. These large trees often are lost when fires occur, because flames burning in the duff layer can pre-heat live vegetation and ignite the trees, or the tree's roots can be damaged from the intense heat of the smoldering duff, killing the tree. It is important to rake needle or duff layers deeper than 2 inches at least 3 feet away from the base of large trees. This should be done annually, and the additional duff also should be removed from the area.

Grasses

Grasses are perhaps the most pervasive and abundant surface fuel in Colorado. Mow grasses and weeds as often as needed throughout the growing season to keep them shorter than 6 inches. This applies to irrigated lawns and wild or native grasses. This is critical in the fall, when grasses dry out, and in the spring, after the snow is gone but before plants green-up.

Be especially careful when mowing in areas with rocks. Mower blades can hit rocks and create sparks, causing fires in dry grass. Consider mowing only on days with high humidity or after recent moisture to reduce the risk of starting an unwanted fire.

When mowing around trees, be sure to avoid damaging the root system and tree trunk by using a higher blade setting on the mower and trimming grass that grows against the trunk only by hand.

Crown Fuels

An intense fire burning in surface fuels can transition into the upper portion of the tree canopies and become a crown fire. Crown fires are dangerous because they are very intense and can burn large areas. Crown fire hazard can be reduced by thinning trees to decrease crown fuels, reducing surface fuels under the remaining trees, and eliminating vertical fuel continuity from the surface into the crowns. Specific recommendations are provided in the Defensible Space Management Zones, pages 5-8.



Figure 4: Ladder fuels are shrubs and low branches that allow a wildfire to climb from the ground into the tree canopy. Photo: CSFS



Figure 5: Surface fuels include logs, branches, wood chips, pine needles, duff and grasses. Photo: CSFS



Figure 6: Tree canopies offer fuel for intense crown fires. Photo: Paul Mintier



Figure 7: Addressing both components of the Home Ignition Zone will provide the best protection for your home. Credit: CSFS

The Home Ignition Zone

Two factors have emerged as the primary determinants of a home's ability to survive a wildfire – the quality of the defensible space and a structure's ignitability. Together, these two factors create a concept called the **Home Ignition Zone (HIZ)**, which includes the structure and the space immediately surrounding the structure. To protect a home from wildfire, the primary goal is to reduce or eliminate fuels and ignition sources within the HIZ.

Structural Ignitability

The ideal time to address home ignition risk is when the structure is in the design phase. However, you can still take steps to reduce ignitability to an existing home.

The **roof** has a significant impact on a structure's ignitability because of its extensive surface area. When your roof needs significant repairs or replacement, use only fire-resistant roofing materials. Also, check with your county building department – some counties now have restrictions against using wood shingles for roof replacement or require specific classifications of roofing material. Wood and shake-shingle roofs are discouraged because they are highly flammable, and are prohibited in some areas of the state. Asphalt shingles, metal sheets and shingles, tile, clay tile, concrete and slate shingles are all recommended roofing materials.



Figure 8: (above) Wood shingle roofs are highly flammable and not recommended. Photo: CSFS



Figure 9: (above right) Class A roofing materials including tile, clay, concrete, slate and asphalt shingles are fire-resistant options. Photo: CSFS

The extension of the roof beyond the exterior structure wall is the eave. This architectural feature is particularly prone to ignition. As fire approaches the building, the exterior wall deflects hot air and gasses up into the eave. If the exterior wall isn't ignition-resistant, this effect is amplified.

Most **decks** are highly combustible. Their shape traps hot gasses, making them the ultimate heat traps. Conventional wooden decks are so combustible that when a wildfire approaches, the deck often ignites before the fire reaches the house.

The **exterior walls** of a home or other structure are affected most by radiant heat from the fire and, if defensible space is not adequate, by direct contact with flames from the fire.

Windows are one of the weakest parts of a building with regard to wildfire. They usually fail before the building ignites, providing a direct path for flames and airborne embers to reach the building's interior.

Burning embers are produced when trees and structures are consumed by wildfire. These embers sometimes can travel more than a mile. Flammable horizontal or nearly horizontal surfaces, such as wooden decks or shake-shingle roofs, are especially at risk for ignition from burning embers. Since airborne embers have caused the loss of many homes in the WUI, addressing structural ignitability is critical, even if the area surrounding a home is not conducive to fire spread.



Figure 10: Decks, exterior walls and windows are important areas to examine when addressing structure ignitability. Photo: CSFS

This guide provides only basic information about structural ignitability. For more information on fire-resistant building designs and materials, refer to the CSFS *FireWise Construction: Site Design and Building Materials* publication at www.csfs.colostate.edu.

Defensible Space

Defensible space is the area around a home or other structure that has been modified to reduce fire hazard. In this area, natural and manmade fuels are treated, cleared or reduced to slow the spread of wildfire. Creating defensible space also works in the reverse, and reduces the chance of a structure fire spreading to neighboring homes or the surrounding forest. Defensible space gives your home a fighting chance against an approaching wildfire.

Creating an effective defensible space involves a series of management zones in which different treatment techniques are used. Develop these zones around each building on your property, including detached garages, storage buildings, barns and other structures.

The actual design and development of your defensible space depends on several factors: size and shape of building(s), construction materials, slope of the ground, surrounding topography, and sizes and types of vegetation on your property. You may want to request additional guidance from your local Colorado State Forest Service forester, fire department or a consulting forester as you plan a defensible space for your property.

Defensible space provides another important advantage during a fire: increased firefighter safety. Firefighters are trained to protect structures only when the situation is relatively safe for them to do so. They use a process called “structural triage” to determine if it is safe to defend a home from an approaching wildfire. The presence or absence of defensible space around a structure is a significant determining factor used in the structural triage process, as defensible space gives firefighters an opportunity to do their job more safely. In turn, this increases their ability to protect your home.

If firefighters are unable to directly protect your home during a wildfire, having an effective defensible space will still increase your home’s chance of survival. It is important to remember that with wildfire, there are no guarantees. Creating a proper defensible space does not mean that your home is guaranteed to survive a wildfire, but it does significantly improve the odds.

Defensible Space Management Zones

Three zones need to be addressed when creating defensible space:

Zone 1 is the area nearest the home and other structures. This zone requires maximum hazard reduction.

Zone 2 is a transitional area of fuels reduction between Zones 1 and 3.

Zone 3 is the area farthest from the home. It extends from the edge of Zone 2 to your property boundaries.



Figure 11: Homesite before defensible space. Photo: CSFS



Figure 12: Homesite after creating a defensible space. Photo: CSFS



Figure 13: Defensible space management zones. Credit: CSFS



Figure 14: *This homeowner worked hard to create a defensible space around the home. Notice that all fuel has been removed within the first 5 feet of the home, which survived the Waldo Canyon Fire in the summer of 2012. Photo: Christina Randall, Colorado Springs Fire Department*



Figure 15: *Clearing pine needles and other debris from the roof and gutters is an easy task that should be done at least once a year. Photo: CSFS*



Figure 16: *Enclosing decks with metal screens can prevent embers from igniting a house. Photo: Marilyn Brown, La Plata County*

Zone 1

The width of Zone 1 extends a minimum distance of 15-30 feet outward from a structure, depending on property size. Most flammable vegetation is removed in this zone, with the possible exception of a few low-growing shrubs or fire-resistant plants. Avoid landscaping with common ground junipers, which are highly flammable.

Increasing the width of Zone 1 will increase the structure's survivability. This distance should be increased 5 feet or more in areas downhill from a structure. The distance should be measured from the outside edge of the home's eaves and any attached structures, such as decks. Several specific treatments are recommended within this zone:

- Install nonflammable ground cover and plant nothing within the first 5 feet of the house and deck. This critical step will help prevent flames from coming into direct contact with the structure. This is particularly important if a building is sided with wood, logs or other flammable materials. Decorative rock creates an attractive, easily maintained, nonflammable ground cover.
- If a structure has noncombustible siding (i.e., stucco, synthetic stucco, concrete, stone or brick), widely spaced foundation plantings of low-growing shrubs or other fire-resistant plant materials are acceptable. However, do not plant directly under windows or next to foundation vents, and be sure areas of continuous grass are not adjacent to plantings. Information on fire-resistant plants is available on the CSFS website at www.csf.colostate.edu.
- Prune and maintain any plants in Zone 1 to prevent excessive growth. Also, remove all dead branches, stems and leaves within and below the plant.
- Irrigate grass and other vegetation during the growing season. Also, keep wild grasses mowed to a height of 6 inches or less.
- Do not store firewood or other combustible materials anywhere in this zone. Keep firewood at least 30 feet away from structures, and uphill if possible.
- Enclose or screen decks with 1/8-inch or smaller metal mesh screening (1/16-inch mesh is preferable). Do not use areas under decks for storage.
- Ideally, remove all trees from Zone 1 to reduce fire hazards. The more trees you remove, the safer your home will be.
- If you do keep any trees in this zone, consider them part of the structure and extend the distance of the entire defensible space accordingly.
- Remove any branches that overhang or touch the roof, and remove all fuels within 10 feet of the chimney.
- Remove all pine needles and other debris from the roof, deck and gutters.
- Rake pine needles and other organic debris at least 10 feet away from all decks and structures.
- Remove slash, wood chips and other woody debris from Zone 1.

Zone 2

Zone 2 is an area of fuels reduction designed to diminish the intensity of a fire approaching your home. The width of Zone 2 depends on the slope of the ground where the structure is built. Typically, the defensible space in Zone 2 should extend at least 100 feet from all structures. If this distance stretches beyond your property lines, try to work with the adjoining property owners to complete an appropriate defensible space.

The following actions help reduce continuous fuels surrounding a structure, while enhancing home safety and the aesthetics of the property. They also will provide a safer environment for firefighters to protect your home.

Tree Thinning and Pruning

- Remove stressed, diseased, dead or dying trees and shrubs. This reduces the amount of vegetation available to burn, and makes the forest healthier.
- Remove enough trees and large shrubs to create at least 10 feet between crowns. Crown separation is measured from the outermost branch of one tree to the nearest branch on the next tree. On steep slopes, increase the distance between tree crowns even more.
- Remove all ladder fuels from under remaining trees. Prune tree branches off the trunk to a height of 10 feet from the ground or $\frac{1}{3}$ the height of the tree, whichever is less.
- If your driveway extends more than 100 feet from your home, thin out trees within a 30 foot buffer along both sides of your driveway, all the way to the main access road. Again, thin all trees to create 10-foot spacing between tree crowns.
- Small groups of two or three trees may be left in some areas of Zone 2, but leave a minimum of 30 feet 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. For example, if you have a tree in Zone 2 with branches extending into Zone 1, the tree can be retained if there is proper crown spacing.
- Limit the number of dead trees (snags) to one or two per acre. Be sure snags cannot fall onto the house, power lines, roads or driveways.
- As in Zone 1, the more trees and shrubs removed, the more likely your house will survive a wildfire.



Figure 17: In Zone 2, make sure there is at least a 10-foot spacing between tree crowns. Credit: CSFS

Shrub Thinning/Pruning and Surface Fuels

- Isolated shrubs may be retained in Zone 2, provided they are not growing under trees.
- Keep shrubs at least 10 feet away from the edge of tree branches. This will prevent the shrubs from becoming ladder fuels.
- Minimum spacing recommendations between clumps of shrubs is $2\frac{1}{2}$ times the mature height of the vegetation. The maximum diameter of the clumps themselves should be twice the mature height of the vegetation. As with tree-crown spacing, all measurements are made from the edge of vegetation crowns.
- Example – For shrubs 6 feet high, spacing between shrub clumps should be 15 feet or more (measured from the edge of the crowns of vegetation clumps). The diameter of these shrub clumps should not exceed 12 feet.
- Periodically prune and maintain shrubs to prevent excessive growth, and remove dead stems from shrubs annually. Common ground junipers should be removed whenever possible because they are highly flammable and tend to hold a layer of duff beneath them.
- Mow or trim wild grasses to a maximum height of 6 inches. This is especially critical in the fall, when grasses dry out.
- Avoid accumulations of surface fuels, such as logs, branches, slash and wood chips greater than 4 inches deep.



Figure 18: Pruning trees will help prevent a wildfire from climbing from the ground to the tree crowns. Credit: CSFS

Firewood

- Stack firewood uphill from or on the same elevation as any structures, and at least 30 feet away.
- Clear all flammable vegetation within 10 feet of woodpiles.
- Do not stack wood against your home or on/under your deck, even in the winter. Many homes have burned as a result of a woodpile that ignited first.

Propane Tanks and Natural Gas Meters

- Locate propane tanks and natural gas meters at least 30 feet from any structures, preferably on the same elevation as the house.
- The tank should not be located below your house because if it ignites, the fire would tend to burn uphill. Conversely, if the tank or meter is located above your house and it develops a leak, gas will flow downhill into your home.
- Clear all flammable vegetation within 10 feet of all tanks and meters.
- Do not visibly screen propane tanks or natural gas meters with shrubs, vegetation or flammable fencing. Instead, install 5 feet of nonflammable ground cover around the tank or meter.



Figure 19: Keep firewood, propane tanks and natural gas meters at least 30 feet away from structures. Photo: CSFS



Figure 20: This ponderosa pine forest has been thinned, which will not only help reduce the wildfire hazard, but also increase tree health and vigor. Photo: CSFS

Zone 3

Zone 3 has no specified width. It should provide a gradual transition from Zone 2 to areas farther from the home that have other forest management objectives. Your local Colorado State Forest Service forester can help you with this zone.

This zone provides an opportunity for you to improve the health of the forest through proper management. With an assortment of stewardship options, you can proactively manage your forest to reduce wildfire intensity, protect water quality, improve wildlife habitat, boost the health and growth rate of your trees, and increase tree survivability during a wildfire.

In addition, properly managed forests can provide income, help protect trees against insects and diseases, and even increase the value of your property. Typical forest management objectives for areas surrounding home sites or subdivisions provide optimum recreational opportunities; enhance aesthetics; improve tree health and vigor; provide barriers against wind, noise, dust and visual intrusions; support production of firewood, fence posts and other forest commodities; or cultivate Christmas trees or trees for transplanting.

Consider the following when deciding forest management objectives in Zone 3:

- The healthiest forest is one that includes trees of multiple ages, sizes and species, and where adequate growing room is maintained over time.
- Remember to consider the hazards associated with ladder fuels. A forest with a higher canopy reduces the chance of a surface fire climbing into the tops of the trees, and might be a priority if this zone has steep slopes.
- A greater number of snags – two or three per acre, standing or fallen – can be retained in Zone 3 to provide wildlife habitat. These trees should have a minimum diameter of 8 inches. Make sure that snags pose no threat to power lines or firefighter access roads.
- While tree 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 firefighter 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 tree stands, thus reducing the risk of crown fire.
- Mowing grasses is not necessary in Zone 3.
- Any approved method of slash treatment is acceptable, including piling and burning, chipping or lop-and-scatter.

Other Recommendations

Windthrow

In Colorado, some tree species, including lodgepole pine, Engelmann spruce and Douglas-fir, are especially susceptible to damage and uprooting by high winds or windthrow. If you see evidence of this problem in or near your home, consider making adjustments to the defensible space guidelines. It is highly recommended that you contact a professional forester to help design your defensible space, especially if you have windthrow concerns.

Water Supply

If possible, make sure that an on-site water source is readily available for firefighters to use, or that other water sources are close by. Lakes, ponds, swimming pools and hot tubs are all possible options. If there are no nearby water sources, consider installing a well-marked dry hydrant or cistern. If your primary water source operates on electricity, be sure to plan for a secondary water source. During wildfires, structures often are cut off from electricity. For more information on how to improve the accessibility of your water source, contact your local fire department.

Recommendations for Specific Forest Types

The above recommendations refer primarily to ponderosa pine, Douglas-fir and mixed-conifer ecosystems. For other forest types, please refer to the additional recommendations below:

Aspen

Tree spacing and ladder fuel guidelines do not apply to mature stands of aspen trees. Generally, no thinning is recommended in aspen forests, regardless of tree size, because the thin bark is easily damaged, making the tree easily susceptible to fungal infections. However, in older stands, numerous dead trees may be on the ground and require removal. Conifer trees often start growing in older aspen stands. A buildup of these trees eventually will increase the fire hazard of the stand, so you should remove the young conifers. Brush also can increase the fire hazard and should be thinned to reduce flammability.

Lodgepole Pine

Lodgepole pine management in the WUI is much different than that for lodgepole pine forests located away from homes, communities and other developments. Normally, it is best to develop fuels management and wildfire mitigation strategies that are informed and guided by the ecology of the tree species. This is not the case with lodgepole pine.

Older lodgepole pine stands generally do not respond well to selective thinning, but instead respond better to the removal of all trees over a defined area to allow healthy forest regeneration. Selectively thinning lodgepole can open the stand to severe windthrow and stem breakage. However, if your home is located within a lodgepole pine forest, you may prefer selective thinning to the removal of all standing trees.

To ensure a positive response to thinning throughout the life of a lodgepole pine stand, trees must be thinned early in their lives – no later than 20 to 30 years after germination. Thinning lodgepole pine forests to achieve low densities can best be



Figure 21: During high winds, these lodgepole pine trees fell onto the house. Lodgepole pine is highly susceptible to windthrow. Photo: CSFS



Figure 22: Mature aspen stands can contain many young conifers, dead trees and other organic debris. This can become a fire hazard. Photo: CSFS



Figure 23: A young lodgepole pine stand. Thinning lodgepole pines early on in their lives will help reduce the wildfire hazard in the future. Photo: CSFS

The defensible space guidelines in this quick guide are predominantly for ponderosa pine and mixed-conifer forests. These guidelines will vary with other forest types.



Figure 24: Piñon-juniper forests are often composed of continuous fuels. Creating clumps of trees with large spaces in between clumps will break up the continuity. Photo: CSFS



Figure 25: Gambel oak needs to be treated in a defensible space at least every 5-7 years because of its vigorous growing habits. Photo: CSFS

accomplished by beginning when trees are small saplings, and maintaining those densities through time as the trees mature.

Thinning older stands of lodgepole pine to the extent recommended for defensible space may take several thinning operations spaced over a decade or more. When thinning mature stands of lodgepole pine, do not remove more than 30 percent of the trees in each thinning operation. Extensive thinning of dense, pole-sized and larger lodgepole pine often results in windthrow of the remaining trees. Focus on removing trees that are obviously lower in height or suppressed in the forest canopy. Leaving the tallest trees will make the remaining trees less susceptible to windthrow.

Another option is leaving clumps of 30-50 trees. Clumps are less susceptible to windthrow than solitary trees. Allow a minimum of 30-50 feet between tree crowns on the clump perimeter and any adjacent trees or clumps of trees. Wildfire tends to travel in the crowns of lodgepole pine. By separating clumps of trees with large spaces between crowns, the fire is less likely to sustain a crown fire.

Piñon-Juniper

Many piñon-juniper (PJ) forests are composed of continuous fuel that is highly flammable. Fire in PJ forests tend to burn intensely in the crowns of trees. Try to create a mosaic pattern when you thin these trees, with a mixture of individual trees and clumps of three to five trees. The size of each clump will depend on the size, health and location of the trees. The minimum spacing between individual trees should be 10 feet between tree crowns, with increasing space for larger trees, clumps, and stands on steeper slopes.

Tree pruning for defensible space is not as critical in PJ forests as in pine or fir forests. Instead, it is more important to space the trees so that it is difficult for the fire to move from one tree clump to the next. Trees should only be pruned to remove dead branches or branches that are touching the ground. However, if desired, live branches can be pruned to a height of 3 feet above the ground. Removing shrubs that are growing beneath PJ canopies is recommended to reduce the overall fuel load that is available to a fire.

It is NOT recommended to prune live branches or remove PJ trees between April and October, when the piñon ips beetle is active in western Colorado. Any thinning activity that creates the flow of sap in the summer months can attract these beetles to healthy trees on your property. However, it is acceptable to remove dead trees and dead branches during the summer months.

For more information, please refer to the CSFS [Piñon-Juniper Management Quick Guide](http://www.csfscolorado.edu) at www.csfscolorado.edu.

Gambel Oak

Maintaining Gambel oak forests that remain resistant to the spread of wildfire can be a challenge because of their vigorous growing habits. Gambel oak trees grow in clumps or groves, and the stems in each clump originate from the same root system. Most reproduction occurs through vegetative sprouts from this deep, extensive root system. You may need to treat Gambel oak near your home every five to seven years. Sprouts also should be mowed at least once every year in Zones 1 and 2. Herbicides can be used to supplement mowing efforts for controlling regrowth.

For more information, please refer to the CSFS [Gambel Oak Management](http://www.csfscolorado.edu) publication at www.csfscolorado.edu.

Note: This publication does not address high-elevation spruce-fir forests. For information on this forest type, please contact your local CSFS district office.

Maintaining Your Defensible Space

Your home is located in a dynamic environment that is always changing. Trees, grasses and shrubs continue to grow, die or are damaged, and drop their leaves and needles each season. Just like your home, the defensible space around it requires regular, ongoing maintenance to be effective. Use the following checklists to build and maintain your defensible space.

Defensible Space: Initial Projects

- Properly thin and prune trees and shrubs within Zones 1 and 2.
- Dispose of slash from tree/shrub thinning.
- Screen attic, roof, eaves and foundation vents, and periodically check them to ensure that they are in good condition.
- Screen or wall-in stilt foundations and decks; screens should be $\frac{1}{8}$ -inch or smaller metal mesh ($\frac{1}{16}$ -inch mesh is best).
- Post signs at the end of the driveway with your last name and house number that are noncombustible, reflective and easily visible to emergency responders.
- Make sure that the driveway is wide enough for fire trucks to enter and exit, and that trees and branches are adequately cleared for access by fire and emergency equipment. Contact your local fire department or check the CSFS website for information specific to access.
- Take pictures of your completed defensible space for comparison of forest growth over time.



Figure 26: Keeping the forest properly thinned and pruned in a defensible space will reduce the chances of a home burning during a wildfire. Photo: CSFS

Defensible Space Tasks: Annual Requirements

- Clear roof, deck and gutters of pine needles and other debris. *
- Mow grass and weeds to a height of 6 inches or less. *
- Rake all pine needles and other flammable debris away from the foundation of your home and deck. *
- Remove trash and debris accumulations from the defensible space.*
- Check fire extinguishers to ensure that they have not expired and are in good working condition.
- Check chimney screens to make sure they are in place and in good condition.
- Remove branches that overhang the roof and chimney.
- Check regrowth of trees and shrubs by reviewing photos of your original defensible space; properly thin and prune trees and shrubs within Zones 1 and 2.
- Dispose of slash from tree/shrub thinning. *



Figure 27: Sharing information and working with your neighbors and community will give your home and surrounding areas a better chance of surviving a wildfire. Photo: CSFS

*Address more than once per year, as needed.

Be Prepared

- Complete a checklist of fire safety needs inside your home (these should be available at your local fire department). Examples include having an evacuation plan and maintaining smoke detectors and fire extinguishers.
- Develop your fire evacuation plan and practice family fire drills. Ensure that all family members are aware of and understand escape routes, meeting points and other emergency details.
- Contact your county sheriff's office and ensure that your home telephone number and any other important phone numbers appear in the county's Reverse 911 or other emergency notification database.
- Prepare a "grab and go" disaster supply kit that will last at least three days, containing your family's and pets' necessary items, such as cash, water, clothing, food, first aid and prescription medicines.
- Ensure that an outdoor water supply is available. If it is safe to do so, make a hose and nozzle available for responding firefighters. The hose should be long enough to reach all parts of the house.

11

Preparing your home and property from wildfire is a necessity if you live in the wildland-urban interface. It is important to adequately modify the fuels in your home ignition zone. Remember, every task you complete around your home and property will make your home more defensible during a wildfire.

Always remember that creating and maintaining an effective defensible space in the home ignition zone is not a one-time endeavor – it requires an ongoing, long-term commitment.

If you have questions, please contact your local CSFS district office. Contact information can be found at www.csfs.colostate.edu.

List of Additional Resources

- The Colorado State Forest Service, <http://www.csfs.colostate.edu>
- CSFS wildfire-related publications, <http://csfs.colostate.edu/pages/wf-publications.html>
- Community Wildfire Protection Planning, <http://csfs.colostate.edu/pages/community-wf-protection-planning.html>
- Colorado's "Are You FireWise?" information, <http://csfs.colostate.edu/pages/wf-protection.html>
- National Fire Protection Association's Firewise Communities USA, <http://www.firewise.org>
- Fire Adapted Communities, <http://fireadapted.org/>
- Ready, Set, Go!, <http://wildlandfirersg.org/>



Figure 28: This house has a high risk of burning during an approaching wildfire. Modifying the fuels around a home is critical to reduce the risk of losing structures during a wildfire. Photo: CSFS



Figure 29: This house survived the Fourmile Canyon Fire in 2010. Photo: CSFS

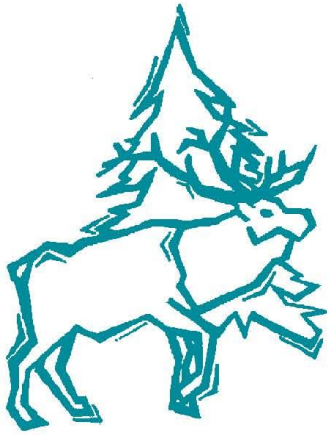


Figure 30: Firefighters were able to save this house during the 2012 Weber Fire because the homeowners had a good defensible space. Photo: Dan Bender, La Plata County

**Colorado
State**
FOREST
SERVICE

www.csfs.colostate.edu

This quick guide was produced by the Colorado State Forest Service (CSFS). CSFS programs are available to all without discrimination. No endorsement of products or services is intended, nor is criticism implied of products not mentioned.



FORESTRY

Fire-Resistant Landscaping

no. 6.303

by F.C. Dennis¹

Quick Facts...

More people are moving into Colorado's rural areas, increasing the chances of wildfire.

"Defensible space" is the primary determinant of a structure's ability to survive wildfire.

Native species are generally the best plant materials for landscaping in defensible space, but others can be grown successfully in Colorado.

To be a FireWise homeowner, plan well, plant well and maintain well.

Colorado's population is growing, its urban areas are rapidly expanding, and people are building more homes in what was once natural forest and brushlands. Newcomers to rural areas need to know how to correctly landscape their property to reduce wildfire hazards.

Improper landscaping worries land managers and fire officials because it can greatly increase the risk of structure and property damage from wildfire. It is a question of *when*, not *if*, a wildfire will strike any particular area.

Vegetative clearance around the house (defensible space) is a primary determinant of a home's ability to survive wildfire. Defensible space is, simply, room for firefighters to do their job. If grasses, brush, trees and other common forest fuels are removed, reduced, or modified to lessen a fire's intensity and keep it away from the home, chances increase that the structure will survive. It is a little-known fact that in the absence of a defensible space, firefighters will often bypass a house, choosing to make their stand at a home where their safety is more assured and the chance to successfully protect the structure is greater.

Landscaping Defensible Space

People often resist creating defensible space because they believe that it will be unattractive, unnatural and sterile-looking. It doesn't have to be! Wise landowners carefully plan landscaping within the defensible space. This effort yields a many-fold return of beauty, enjoyment and added property value. Development of defensible space is outlined in fact sheet 6.302, *Creating Wildfire-Defensible Zones*.

Colorado has great diversity in climate, geology and vegetation. Home and cabin sites can be found from the foothills through 10,000-foot elevations. Such extremes present a challenge in recommending plants. While native plant materials generally are best, a wide range of species can be grown successfully in Colorado.

Many plant species are suitable for landscaping in defensible space. Use restraint and common sense, and pay attention to plant arrangement and maintenance. It has often been said that *how* and *where* you plant are more important than *what* you plant. While this is indeed true, given a choice among plants, choose those that are more resistant to wildfire.

Consider the following factors when planning, designing and planting the FireWise landscape within your home's defensible space:

- Landscape according to the recommended defensible-space zones. That is, the plants near your home should be more widely spaced and lower growing than those farther away.
- Do not plant in large masses. Instead, plant in small, irregular clusters or islands.



Putting Knowledge to Work

© Colorado State University
Cooperative Extension. 5/99.
Reviewed 10/04.
www.ext.colostate.edu

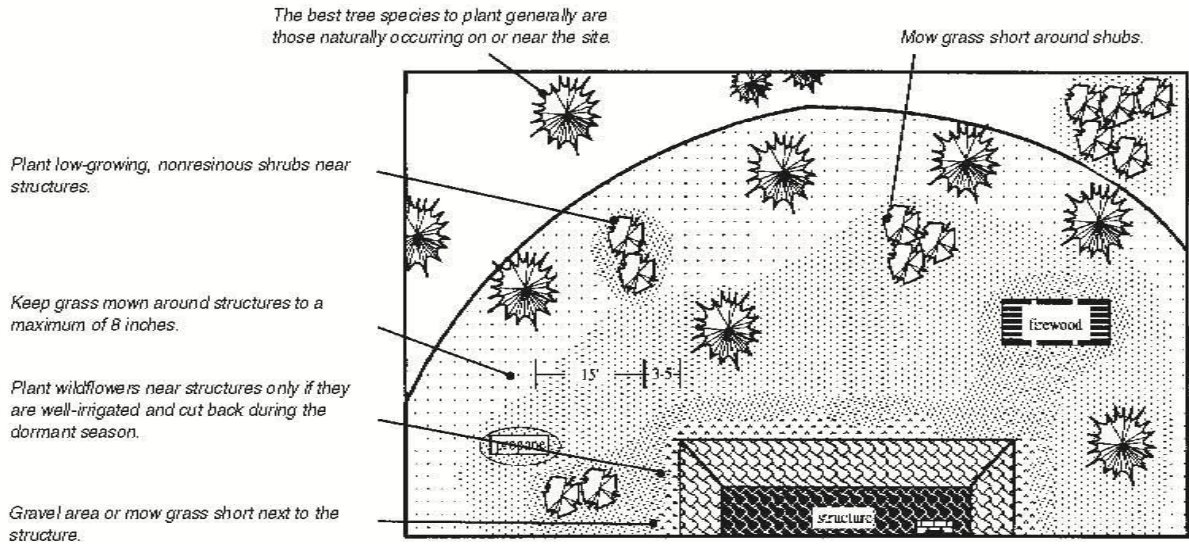


Figure 1: Forested property surrounding a homesite; shows optimum placement of vegetation near the structure.

- Use decorative rock, gravel and stepping stone pathways to break up the continuity of the vegetation and fuels. This can modify fire behavior and slow the spread of fire across your property.
- Incorporate a diversity of plant types and species in your landscape. Not only will this be visually satisfying, but it should help keep pests and diseases from causing problems within the whole landscape.
- In the event of drought and water rationing, prioritize plants to be saved. Provide a available supplemental water to plants closest to your house.
- Use mulches to conserve moisture and reduce weed growth. Mulch can be organic or inorganic. Do not use pine bark, thick layers of pine needles or other mulches that readily carry fire.
- Be creative! Further vary your landscape by including bulbs, garden art and containers for added color.

References

- 6.302, Creating Wild-Fire Defensible Zones
- 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
- 7.233, Wildflowers for Colorado
- 7.406, Flowers for Mountain Communities
- 7.423, Trees and Shrubs for Mountain Areas
- 7.413, Ground Covers for Mountain Communities

Grasses

During much of the year, grasses ignite easily and burn rapidly. Tall grass will quickly carry fire to your house. Mow grasses low in the inner zones of the defensible space. Keep them short closest to the house and gradually increase height outward from the house, to a maximum of 8 inches. This is particularly important during fall, winter and before green-up in early spring, when grasses are dry, dormant and in a “cured” fuel condition. Given Colorado’s extremely variable weather, wildfires can occur any time of the year. Maintenance of the grassy areas around your home is critical.

Mow grasses low around the garage, outbuildings, decks, firewood piles, propane tanks, shrubs, and specimen trees with low-growing branches.

Ground Cover Plants

Replace bare, weedy or unsightly patches near your home with ground covers, rock gardens, vegetable gardens and mulches. Ground cover plants are a good alternative to grass for parts of your defensible space. They break up the monotony of grass and enhance the beauty of your landscape. They provide a



Figure 2: Ladder fuels enable fire to travel from the ground surface into shrubs and then into the tree canopy.

Structural Elements of a FireWise Landscape

When building a deck or patio, use concrete, flagstone or rock instead of wood. These materials do not burn and do not collect flammable debris like the space between planks in wooden decking.

Where appropriate on steeper ground, use retaining walls to reduce the steepness of the slope. This, in turn, reduces the rate of fire spread. Retaining walls also act as physical barriers to fire spread and help deflect heat from the fire upwards and away from structures.

Rock or masonry walls are best, but even wooden tie walls constructed of heavy timbers will work. Put out any fires burning on tie walls after the main fire front passes.

On steep slopes, consider building steps and walkways around structures. This makes access easier for home maintenance and enjoyment. It also serves as a physical barrier to fire spread and increases firefighters' speed and safety as they work to defend your home.

variety of textures and color and help reduce soil erosion. Consider ground cover plants for areas where access for mowing or other maintenance is difficult, on steep slopes and on hot, dry exposures.

Ground cover plants are usually low growing. They are succulent or have other FireWise characteristics that make them useful, functional and attractive. When planted in beds surrounded by

walkways and paths, in raised beds or as part of a rock garden, they become an effective barrier to fire spread. The ideal groundcover plant is one which will spread, forming a dense mat of roots and foliage that reduces soil erosion and excludes weeds.

Mulch helps control erosion, conserve moisture and reduce weed growth. It can be organic (compost, leaf mold, bark chips, shredded leaves) or it can be inorganic (gravel, rock, decomposing granite).

When using organic mulches, use just enough to reduce weed and grass growth. Avoid thick layers. When exposed to fire, they tend to smolder and are difficult to extinguish. Likewise, while your property might yield an abundance of needles from your native pines or other conifers, don't use them as mulch because they can readily catch and spread wildfire. Rake, gather and dispose of them often within your defensible space.

Wildflowers

Wildflowers bring variety to a landscape and provide color from May until frost. Wildflower beds give a softer, more natural appearance to the otherwise manicured look often resulting from defensible space development.

A concern with wildflowers is the tall, dense areas of available fuel they can form, especially in dormancy. To reduce fire hazard, plant wildflowers in widely separated beds within the defensible space. Do not plant them next to structures unless the beds are frequently watered and weeded and vegetation is promptly removed after the first hard frost. Use gravel walkways, rock retaining walls or irrigated grass areas mowed to a low height to isolate wildflower beds from each other and from other fuels.

Shrubs

Shrubs lend color and variety to the landscape and provide cover and food for wildlife. However, shrubs concern fire professionals because, as the next level in the "fuel continuum," they can add significantly to total fuel loading. Because of the woody material in their stems and branches, they are a potential source of fire brands. When carried in the smoke column ahead of the main fire, fire brands can rapidly spread the fire in a phenomenon known as "spotting."

But the primary concern with shrubs is that they are a "ladder fuel" – they can carry a relatively easy-to-control surface grass fire into tree crowns. Crown fires are difficult, sometimes impossible, to control (see Figure 2).

To reduce the fire-spreading potential of shrubs, plant only widely separated, low-growing, nonresinous varieties close to structures. Do not plant them directly beneath windows or vents or where they might spread under wooden decks. Do not plant shrubs under tree crowns or use them to screen propane tanks, firewood piles or other flammable materials. Plant shrubs individually, as specimens, or in small clumps apart from each other and away from any trees within the defensible space.

Mow grasses low around shrubs. Prune dead stems from shrubs annually. Remove the lower branches and suckers from species such as Gambel oak to raise the canopy away from possible surface fires.



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



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

¹Wildfire Hazard Mitigation Coordinator, Colorado State Forest Service.

Trees

Trees provide a large amount of available fuel for a fire and can be a significant source of fire brands if they do burn. Radiant heat from burning trees can ignite nearby shrubs, trees and structures.

Colorado's elevation and temperature extremes limit tree selection. The best species to plant generally are those already growing on or near the site. Others may be planted with careful selection and common sense.

If your site receives enough moisture to grow them, plant deciduous trees such as aspen or narrow-leaf cottonwood. These species, even when planted in dense clumps, generally do not burn well, if at all. The greatest problem with these trees is the accumulation of dead leaves in the fall. Remove accumulations close to structures as soon as possible after leaf drop.

When site or available moisture limits recommended species to evergreens, carefully plan their placement. Do not plant trees near structures. Leave plenty of room between trees to allow for their growth. Spacing within the defensible space should be at least 10 feet between the edges of tree crowns. On steep ground, allow even more space between crowns. Plant smaller trees initially on a 20- to 25-foot spacing to allow for tree growth. At some point, you will have to thin your trees to retain proper spacing.

As the trees grow, prune branches to a height of 10 feet above the ground. Do not overprune the crowns. A good rule of thumb is to remove no more than one-third of the live crown of the tree when pruning. Prune existing trees as well as ones you planted.

Some trees (for example, Colorado blue spruce) tend to keep a full crown. Other trees grown in the open may also exhibit a full growth habit. Limit the number of trees of this type within the defensible space. Prune others as described above and mow grasses around such specimen trees.

Maintenance

A landscape is a dynamic system that constantly grows and changes. Plants considered fire resistant and that have low fuel volumes can lose these characteristics over time. Your landscape, and the plants in it, must be maintained to retain their FireWise properties.

- Always keep a watchful eye towards reducing the fuel volumes available to fire. Be aware of the growth habits of the plants within your landscape and of the changes that occur throughout the seasons.
- Remove annuals and perennials after they have gone to seed or when the stems become overly dry.
- Rake up leaves and other litter as it builds up through the season.
- Mow or trim grasses to a low height within your defensible space. This is particularly important as grasses cure.
- Remove plant parts damaged by snow, wind, frost or other agents.
- Timely pruning is critical. Pruning not only reduces fuel volumes but also maintains healthier plants by producing more vigorous, succulent growth.
- Landscape maintenance is a critical part of your home's defense system. Even the best defensible space can be compromised through lack of maintenance. The old adage "An ounce of prevention is worth a pound of cure" applies here.

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 I: Rainbow Services Inc. Wildfire Risk Analysis Sign-up

RAINBOW SERVICES INC. WILDFIRE RISK ANALYSIS (Community Meeting 7/7/12)			
SIGN-UP SHEET			
Name	Physical Address	City, State Zip	Phone Number
* Steve / Carole Sumpti.	246 Rainbow Rd. (Rainbow Service)	Almont CO	970 641-4474
* Art / Susan Horecki	248 Rainbow Rd	" "	720-272-8273
Dave + Suzanne Ward	251 Rainbow Road	Almont, CO	719-539-8523
* HOWARD M. BROCK	254 RAINBOW ROAD	ALMONT, CO	979-299-4756
Douglas Mavis	23 Hummingbird Ln	" "	314-962-4578
ED + LINDA POTKEY	182 WOLF CANYON DRIVE	ALMONT, CO	805-218-8305
KEN + NIKKI BOYD	252 RAINBOW RD.	ALMONT, CO	817 891 7326
JOE + MARILYN SCHIEFFELIN	114 PINE TREE LN.	ALMONT, CO	719-331-5162
Dean + Janice Mueller			719-527-8524
XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXX	(970) 214-XXXX
* NICK DiDOMENICO	215 RAINBOW RD	ALMONT, CO	970 641-5087
Donna + Kevan Granat	385 Wolf Canyon Dr.	Almont, CO	970-641-1298
ED HOCKER	42 CAMP BIRD LN	" 81210	719 570 5550
Richard Huff	264 Rainbow Rd	Almont CO	480-773-1957
* DUANE KIRKLEY ***	300 Bluebird Lane	Almont, CO	303-279-1332
Senny + Kay Johnson	104 CAMP BIRD LANE	" "	970-641-3901
* CHARLES HICKET	365 WOLF CANYON DRIVE	ALMONT CO	720-379-4239
* CURTIS JOHNSTON	365 FISHERMAN'S DRIVE	" "	720-935-6911
Herb + Karen Axe	369 Fisherman's Drive	" "	970-243-7689
* Patty Thomas	42 Hummingbird Lane	Almont, CO	720-363-8099
			970 441-9504

CWPP Conference Call Attendance: Draft Plan Review

Rainbow Services Inc. Draft Plan Conference Call (2/21/13) 3:00pm		
Name	Representing	Notes
Lilia Falk	WRWC	
Kay Johnson	Rainbow Services Inc.	Questions about data from the Gunnison County All Hazards plan regarding adjusted vacancy rates.
Ed Potkey	Rainbow Services Inc.	Request to make parcel boundaries darker on hazards rating map. Add Lupine Lane to maps.



Quick Facts...

The most immediate consequence of fire is the potential for soil erosion.

Intense heat from fire can make the soil repel water, a condition called hydrophobicity.

Landowners should take quick action to minimize erosion once it's safe to return to the property:

- fell damaged trees to slow water runoff after rainfall;
- create check dams in drainages using straw bales;
- spread straw to protect the soil and reseeding efforts;
- use water bars to reduce soil erosion on roads.

Colorado State University

Extension

© Colorado State University Extension. 4/02.
Revised 7/08.
www.ext.colostate.edu

N A T U R A L R E S O U R C E S  S E R I E S

FORESTRY

Soil Erosion Control after Wildfire no. 6.308

by R. Moench and J. Fusaro¹

The potential for severe soil erosion is a consequence of wildfire because as a fire burns it destroys plant material and the litter layer. Shrubs, forbs, grasses, trees, and the litter layer break up the intensity of severe rainstorms. Plant roots stabilize the soil, and stems and leaves slow the water to give it time to percolate into the soil profile. Fire can destroy this soil protection. There are several steps to take to reduce the amount of soil erosion. A landowner, using common household tools and materials, can accomplish most of these methods in the aftermath of a wildfire.



After a severe fire, soil erosion can cause adverse effects on many ecosystems.

Hydrophobic soils

In severe, slow-moving fires, the combustion of vegetative materials creates a gas that penetrates the soil profile. As the soil cools, this gas condenses and forms a waxy coating. This causes the soil to repel water – a phenomena called hydrophobicity. This hydrophobic condition increases the rate of water runoff. Percolation of water into the soil profile is reduced, making it difficult for seeds to germinate and for the roots of surviving plants to obtain moisture.

Hydrophobic soils do not form in every instance. Factors contributing to their formation are: a thick layer of litter before the fire; a severe slow-moving surface and crown fire; and coarse textured soils such as sand or decomposed granite. (Finely textured soils such as clay are less prone to hydrophobicity.)

The hydrophobic layer can vary in thickness. There is a simple test to determine if this water repellent layer is present: 1. Place a drop of water on the exposed soil surface and wait a few moments. If the water beads up and does not penetrate the soil than it's hydrophobic.

2. Repeat this test several times, but each time remove a one-inch thick layer of the soil profile. Breaking this water repellent layer is essential for successful reestablishment of plants.



A simple test can determine whether a water repellent layer is present.



A positive initial step after a wildfire is to reseed grass in the affected area.

In addition, freezing and thawing, and animal activity will help break up the hydrophobic layer.

Erosion Control Techniques

The first step after a wildfire is reseeding grass in the severely burned areas. Remember many plants can recover after fire depending on the severity of the burn. It is important to leave existing vegetation if the plants do not threaten personal safety or property (hazardous trees in danger of falling should be identified first).

Seed can be purchased throughout Colorado. It's a good idea to obtain certified (blue tag) seed – this guarantees the variety, that it was tested under field conditions, and that it is recommended for the state.

Varieties recommended (this is not an all inclusive list) include mountain brome grass, slender wheat-grass, bluebunch wheatgrass, western wheatgrass, Arizona fescue, streambank wheatgrass, Idaho fescue (western slope), thickspike wheatgrass, steambank wheatgrass, and blue gramma. Species selection will vary from one site to another. Species selection is based on soils, elevation, aspect, and location in the state. You may plant a nurse crop with the grass mix to provide a quick cover (oats or a sterile hybrid such as Regreen™ or QuickGuard™) until the native grasses germinate.

Seeding tips for hand planting

1. Roughen the soil surface to provide a better seedbed by breaking through the hydrophobic layer. A steel rake works well for this, or, depending on the slope, a small tractor drawn harrow could be used.

2. Broadcast the seed (a “Cyclone” seeder works well). Seeding rate depends



A “Cyclone” seeder works well to broadcast grass seed.

upon the variety of seed sown. A good estimate is 10 to 20 pounds per acre of grass seed with another 10 to 15 pounds per acre of the nurse crop.

3. Rake or harrow in 1/4 inch to 3/4 inch deep.

4. If the area is small enough, roll or tamp the seed down to ensure good soil/seed contact.

5. Spread certified, weed-free hay straw. If the area is small, crimp the hay in with a shovel. (This will help keep soil, seed, and mulch in place during wind and rain.)

6. Control weeds as needed by cutting off the flower heads before they can produce seed.

7. Do not use herbicides for broadleaf weed control until after the grass has germinated and developed five leaves.

Weed Control

Weeds are among the first plants to recolonize after a fire. In many instances they are not a problem. However, if the weeds are listed as noxious, they must be controlled. Noxious weeds displace native plants and decrease wildlife habitat, plant productivity, and diversity. They can spread downstream or into agricultural areas,

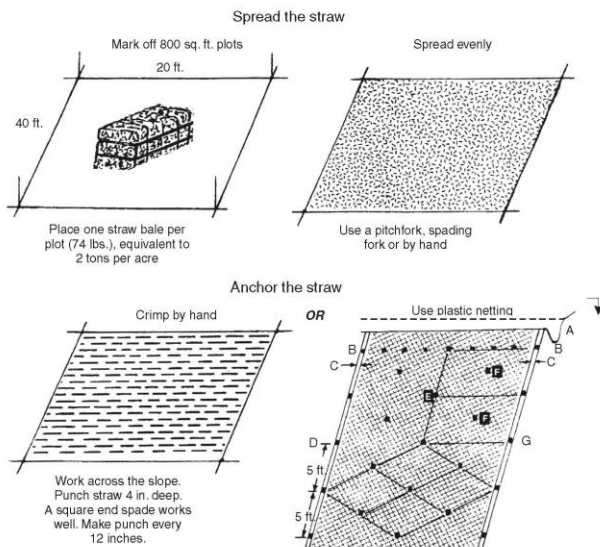


Figure 1. Application of straw to prevent erosion control (graphic courtesy of Natural Resources Conservation Service.)



Spread straw over seeded areas to prevent erosion.

resulting in high control costs. Control of noxious weeds is best accomplished through an integrated pest management system that includes chemical, biological, mechanical, and cultural controls. (See fact sheet 3.106, *Weed management for small rural acreage owners.*)

Mulching

Straw provides a protective cover over seeded areas to reduce erosion and create a suitable environment for revegetation and seed germination. If possible, the straw should be crimped into the soil, covered with plastic netting or sprayed with a tacking agent. If you can only broadcast the straw, do so; it's better to have some coverage than none at all. The straw should cover the entire reseeded section and extend into the undamaged area to prevent wind and water damage. Use only certified weed-free hay straw to avoid spreading noxious weeds. (Contact the State Department of Agriculture for a listing of Certified Weed Free Hay growers.)

Straw should be applied to a uniform depth of two to three inches. When applied at the proper density, 20 to 40 percent of the soil surface is visible. One typical square bale will cover about 800 square feet. (Figure 1.) For small areas a product call StrawNet™ (a pelletized, weed-free, straw fiber with binding agents) can be broadcast over the seeded area.

Contour log terraces

Log terraces provide a barrier to runoff from heavy rainstorms. Dead trees are felled, limbed, and placed on the contour perpendicular to the direction of the slope. Logs are placed in an alternating fashion (Figure 2.) so the runoff no longer has a straight downslope path to follow. The water is forced to meander back and forth between logs, reducing the velocity of the runoff, and giving water time to percolate into the soil.



Contour log terraces (above and below).

Logs should be 6 to 8 inches in diameter (smaller logs can be used) and 10 to 30 feet long. The logs should be bedded into the soil for the entire log length and backfilled with soil so water cannot run underneath; backfill should be tamped down. Secure the logs from rolling by driving stakes on the downhill side. It is best to begin work at the top of the slope and work down. (It is easier to see how the water might flow by looking down on an area to better visualize the alternating spacing of the logs.)



Figure 2. Contour Log Terrace. These barriers are an effective, first-year treatment for hydrophobic soils, low ground cover density, and severely burned areas (graphic courtesy of Natural Resources Conservation Service).



Straw wattles

Straw wattles are long tubes of plastic netting packed with excelsior, straw, or other material. Wattles are used in a similar fashion to log terraces. The wattle is flexible enough to bend to the contour of the slope. Wattles must be purchased from an erosion control material supplier.



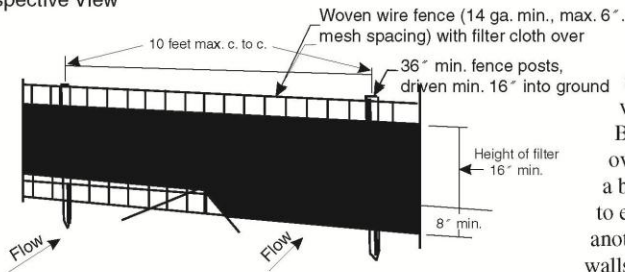
Straw wattles are used in a similar fashion to log terraces

Silt fences

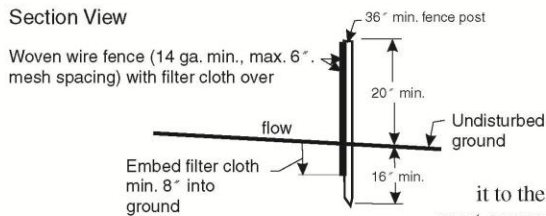
Silt fences are made of woven wire and a fabric filter cloth. The cloth traps sediment from runoff. These should be used in areas where runoff is more dispersed over a broad flat area. Silt fences are not suitable for concentrated flows occurring in small rills or gullies. Silt fences are made from materials available at hardware stores, lumberyards, and nurseries. (Figure 3.)

Figure 3. Silt fences are suitable for areas where runoff is in the form of "sheet flow" (graphic courtesy of Natural Resources Conservation Service).

Perspective View



Section View



Straw bale check dam

Straw bales placed in small drainages act as a dam – collecting sediments from upslope and slowing the velocity of water traveling down slope. Bales are carefully placed in rows with overlapping joints, much as one might build a brick wall. Some excavation is necessary to ensure bales butt up tightly against one another forming a good seal. Two rows (or walls) of bales are necessary and should be imbedded below the ground line at least six inches. (Figure 4.)

Water bars and culverts

Bare ground and hydrophobic soils left after a fire increase water runoff. This requires intervention to channel water off of the burned area and release it to the streams below. The two most common structures to do this are culverts and water bars. Determining the type of drainage practice to use depends on the soil, type of road use, slope, speed of vehicles, season of use, and amount of use.

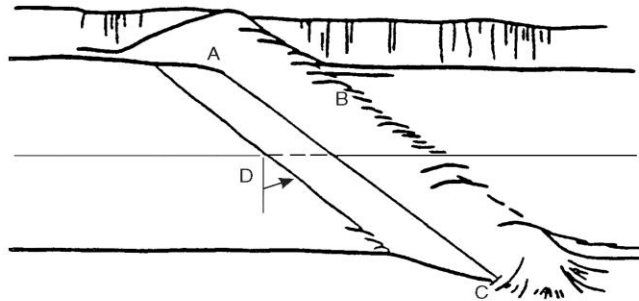
Culverts

A professional engineer is able to determine the size of the drainage area and the amount of runoff for rainfall events of varying intensity that needs carried by culverts. Once sized, the culverts must be installed properly at the correct locations. Installing more culverts than previously existed before the fire may be required. The



To be effective, culverts must be installed properly and at proper locations.

Waterbar –
Top view



Waterbar –
Cross-section

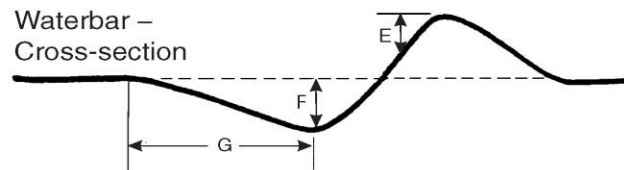


Figure 5. Waterbar construction for forest or ranch roads with little or no traffic. Specifications are average and may be adjusted to conditions.
A. Bank tie-in point; cut 6 inches to 1 foot into the roadbed.
B. Cross drain berm height 1 to 2 feet above the roadbed.
C. Drain outlet cut 8 inches to 16 inches into the roadbed.
D. Angle drain 30 to 45 degrees downgrade with road centerline.
E. Up to 2 feet in height.
F. Depth to 18 inches.
G. 3 to 4 feet.

inlet sides must be regularly maintained to prevent sediment and trash from plugging the pipe. It is common practice to armor the ground at the outlet end with rock rip rap in order to dissipate the energy of the discharged water and to spread it over the slope below. The inlet side can have a drop inlet so as to allow sediment to settle out before water enters the pipe. Armoring the inlet side with rock will also prevent water from scouring under and around the pipe and flowing under the road.

Water bars

Water bars are berms of soil or bedded logs that channel water off roads and trails to avoid the creation of gullies. Water bars are angled downslope to the outlet side. These bars can divert water to a vegetated slope below or redirect it to a channel that will take it to a culvert. On-site soils and the road grade will dictate spacing. (Figure 5.)

References

- USDA Natural Resources Conservation Service, New Mexico State Office, 6200 Jefferson NE, Albuquerque, NM 87109; (800) 410-2067; www.nm.nrcs.usda.gov
- USDA NRCS Fact Sheet, Vegetation Establishment for Soil Protection
- USDA NRCS Fact Sheet, Temporary Erosion Control Around the Home Following a Fire
- USDA NRCS Fact Sheet, Straw Mulching
- USDA NRCS Fact Sheet, Contour Log Terraces
- USDA NRCS Fact Sheet, Straw Bale Check Dam
- USDA NRCS Fact Sheet, Silt Fence
- *USDA NRCS Fact Sheet, Drainage Tips*
From Colorado State Forest Service, Colorado State University, Fort Collins, CO 80523-5060; (970) 491-6303; Fax (970) 491-7736; www.colostate.edu/Depts/CSFS:
- 6.302, *Creating wildfire defensible zones*
- 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.*
- 6.307, *Vegetative Recovery after Wildfire.*



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

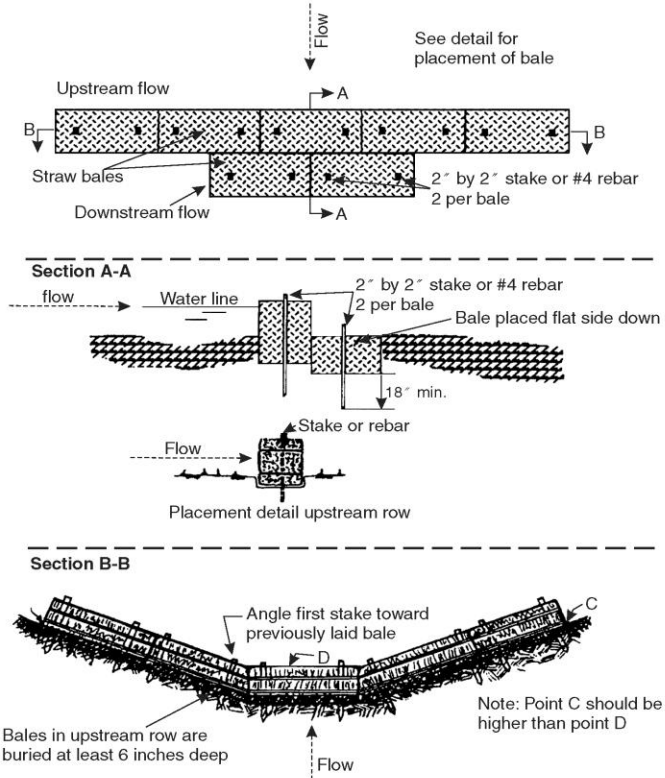


Figure 4. Typical Straw Bale Check Dam



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

¹R. Moench, manager, Colorado State Forest Service; J. Fusaro, rangeland management specialist, Natural Resources Conservation Service.

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

Maps 11x17
(Printed separately)