

**SKYFALL SUBDIVISION FILING NO. 1**  
**WILDLAND FIRE AND HAZARD MITIGATION REPORT**

June 2, 2021

#### **GENERAL DESCRIPTION**

This Wildland Fire and Hazard Mitigation Report will include information for the parcel proposed to be platted as Skyfall Subdivision Filing No. 1 in northern El Paso County located at 7985 Burgess Road, between Black Forest Road and Volmer Road. The Site is located within the Northwest Quarter of the Northwest Quarter of Section 21, Township 12 South, Range 65 West of the 6th Principal Meridian. The current El Paso County Assessor's schedule number for this property is 5221200027. A Vicinity Map is included in the Appendix for reference.

The site is  $19.485\pm$  acres of land which is situated on the south side of Burgess Road, east of Black Forest Road, and west of Volmer Road. Burgess Road, a public asphalt road with 60 ft right-of-way, is adjacent to the northern edge of the site. Two (2) unplatteed parcels (zoned RR5) each with an existing single-family residential development lie west of the site on the same side of Burgess Road. To the east of the site there are two (2) unplatteed parcels (zoned RR-5) with existing single family residential developments. Lots 2 and 3 Corinado Estates (zoned RR5) with existing single-family residential developments lie south of the site. Black Forest Section 16 lies to the north of the site, across Burgess Road, and is open space owned by the State of Colorado containing a looped recreation trail.

The property contains one existing residence, gravel drive, and auxiliary structures. Most of the site is densely forested with a clearing running north to south through the center of the site which contains pasture/meadow. The ground cover, which is in fair to good condition, consists of native grasses, sparse brush and mature coniferous trees. The existing site topography varies throughout the site. In the northwest corner of the site the site slopes northwest out of the site with grades that range from 3% to 15%. The existing site topography on the eastern side of the site slopes southeast out of the site with grades that range from 3% to 13%. The southern portion of the site slopes south with grades that range from 5% to 11%.

The proposed Skyfall Subdivision Filing No. 1 development will add two additional lots and residences for a total of three (3) single-family rural residential lots (total  $19.183\pm$  acres) and dedication of  $0.302\pm$  acres for right-of-way to existing adjacent Burgess Road. The overall net density of the proposed project is 0.16 dwelling units per acre (or 6.39 acres per dwelling unit). The site is located within the Black Forest Fire Rescue Protection District with an equipped and staffed fire station located within two miles of the site.

#### **ACCESS, INGRESS, EGRESS AND EVACUATION**

Public vehicular access to the one existing and two proposed single family residential lots will be via a single driveway connecting to Burgess Road, a public county road. No new roadways are proposed for the project. A reduced copy of the subdivision plat is included in the Appendix showing road locations.

## WATER SUPPLY

Residences within the proposed subdivision will utilize individual on site wells for their water supply.

## VEGETATIVE CHARACTERISTICS

The site can be characterized by stands of mature Ponderosa Pine interspersed with native grassland meadows. Aerial mapping is attached showing the extent of forested coverage. The included Colorado Wildfire Risk Assessment Summary Report also contains vegetative cover descriptions specific to this site.

## WILDFIRE RISK ASSESSMENT

The Colorado Wildfire Risk Assessment Summary Report is included in the Appendix of this report. The Summary Report contains information on Wildland Urban Interface, Wildfire Risk, Threat, Fire Behavior, Fuels and Vegetation specific to this site.

## FIRE MITIGATION

The “Black Forest Community Wildfire Protection Plan” dated September 2016 and prepared by Dahl Environmental Services & Associates LLC is a comprehensive is a comprehensive strategic plan for wildfire protection. This plan contains information on wildfire response, evacuation routing and recommendations for creating defensible spaces within residential settings. Further information is contained in a document titled “The Home Ignition Zone, A guide to preparing your home for wildfire and creating defensible space” prepared by Colorado State Forest Service. Both documents may be obtained from the Black Forest Fire Rescue website (<https://www.bffire.org/>). The lots at Skyfall Subdivision Filing No. 1 will observe these recommendation and guidelines to promote fire safety in the area.

It should be noted that there is no way to completely eliminate wild fire danger, however, there are several techniques that can be taken to reduce the spread of fire. These are summarized below:

**Arrangement:** Removing dead trees, fallen limbs, dead leaves, and other small organic debris. Because it may not be practical to remove these fuels from the entire property, it is prudent to do this within 50' of structures or in particularly vulnerable areas.

It is suggested that the reduction of most ignitable fuel be done in areas that are within fifty feet of building envelope of all residential structures. This will reduce the amount of small, flash fuel in close proximity. It will also slow the spread of fire toward adjacent property and provide suppression forces additional time to contain a fire. In the 50 foot defensible space, adequate thinning is reached when the outer edge of tree crowns are at least 10-12 feet apart. Occasional clumps of 2-3 trees are acceptable if more space surrounds them. Small patches of brush or shrubs may be left if they are separated by at least 10 feet of irrigated grass or noncombustible material. If the home is located on the crest of a steep hill, thin fuels at least 100 feet below the crest. The following additional measures are also suggested: Dispose of all slash and debris left from thinning. Remove dead limbs, leaves, and other ground litter within the defensible space. Store firewood uphill at least 15 feet from your home. Maintain an irrigated greenbelt immediately around your home. Within the defensible space, mow dry grasses and

weeds to a height of 2 inches or less and keep well-watered, especially during periods of high fire danger. Prune branches from trees within the defensible space to a minimum of 6-10 feet above the ground. Also remove shrubs, small trees or other potential “ladder fuels” from beneath large trees. Left in place, these can carry a brush fire into the tree crowns. Trim branches that extend over the eaves of your roof. Remove branches within 15 feet of a chimney. Clean roof and gutters of pine needles and leaves to eliminate a fuel source for blown embers. Reduce the density of the surrounding forest at least 100 feet out from your home. It is preferable to thin the entire lot. Thin tree crowns so they do not touch each other.

**Continuity:** Creating fire breaks, which remove continuous lines of fuel, help reduce the speed of spread. In this instance the fuel is generally continuous, although it does change fuels throughout. There are breaks created by roads and driveways in the properties adjacent to the east and west. Burgess Road to the north of the site provides a fire break between the site and the forested area to the north.

**Topographic Considerations:** As topography of the proposed development cannot be readily modified to any significant degree, the placement of the structures becomes important. Location of structures should be placed outside of drainage's, saddles, and other topographic risks.

Actual placement of structures is subject to change within that envelope due to other factors such as bed rock, views, accesses, and utilities. Occasionally, it will also be necessary for a structure to be located in a topographically more susceptible area. In this instances, it is recommended that more intense fuel modification be performed.

**Construction:** All new construction should consist of fire resistant materials and engineering as much as is practical. It is also recommended that owners explore fire safe construction options, which may include, but are not limited to, metal, tile, or other non-flammable materials for roofs, sprinkler systems in or around structures, and fire retardant exteriors, including stucco, brick, metal, and fire resistant siding. It is recommended that all decks at ground level be sealed off, in an effort to prevent flammable debris from getting underneath.

Inadequate addressing has been a common discrepancy when accessing a fire. Highly visible addresses for each individual site should be placed along roadways, with letters a minimum of 4" high.

Roads and driveways to individual lots should be no less than 24 feet wide, to allow for simultaneous access of emergency equipment and evacuation. Driveways should provide a minimum width of 12 feet and a minimum height of 15 feet. The entrance to any driveways from public roads should not exceed a ninety degree angle and a turnaround should be provided at all structure sites with driveways more than 150 feet long. Where driveways are over 200 feet and area less than 20 feet wide, it will be necessary to provide turnarounds along the drive.

**Evacuation:** Immediate evacuation from the subdivision will be by way of the private driveway, public Burgess Road to the east or the west. An evacuation plan away from the neighborhood area should be developed in cooperation with local fire department officials.

### **Available Fire Fighting Resources:**

Skyfall Subdivision Filing No. 1 is located in the Black Forest Fire Rescue Protection District (BFFR) service area. The District currently serves the existing residence on the property and has committed to serve the proposed subdivision. The District also participates in mutual aid response with surrounding fire districts and fire departments.

BFFR has two full service/full time manned fire stations. The closest station to Skyfall Subdivision Filing No. 1 is Station 1, located at 11445 Teachout Road, which is 1.1 miles from the site via established public roads. Response times are difficult to predict due to traffic conditions, weather conditions and other factors. However, in favorable conditions, response time to the site is estimated to be 3 minutes. The department has Three fire engines, one ambulance, one water tender truck, and various command and utility vehicles.

BFFR carries Class 5 ISO rating for all properties that are located within 1000 feet of a fire hydrant, but within 5 miles of a fire station. There are no fire hydrants in the vicinity of Skyfall Subdivision Filing No. 1 and Station 1 is located 1.1 miles from the site. Therefore, the ISO rating for this property is 5Y.

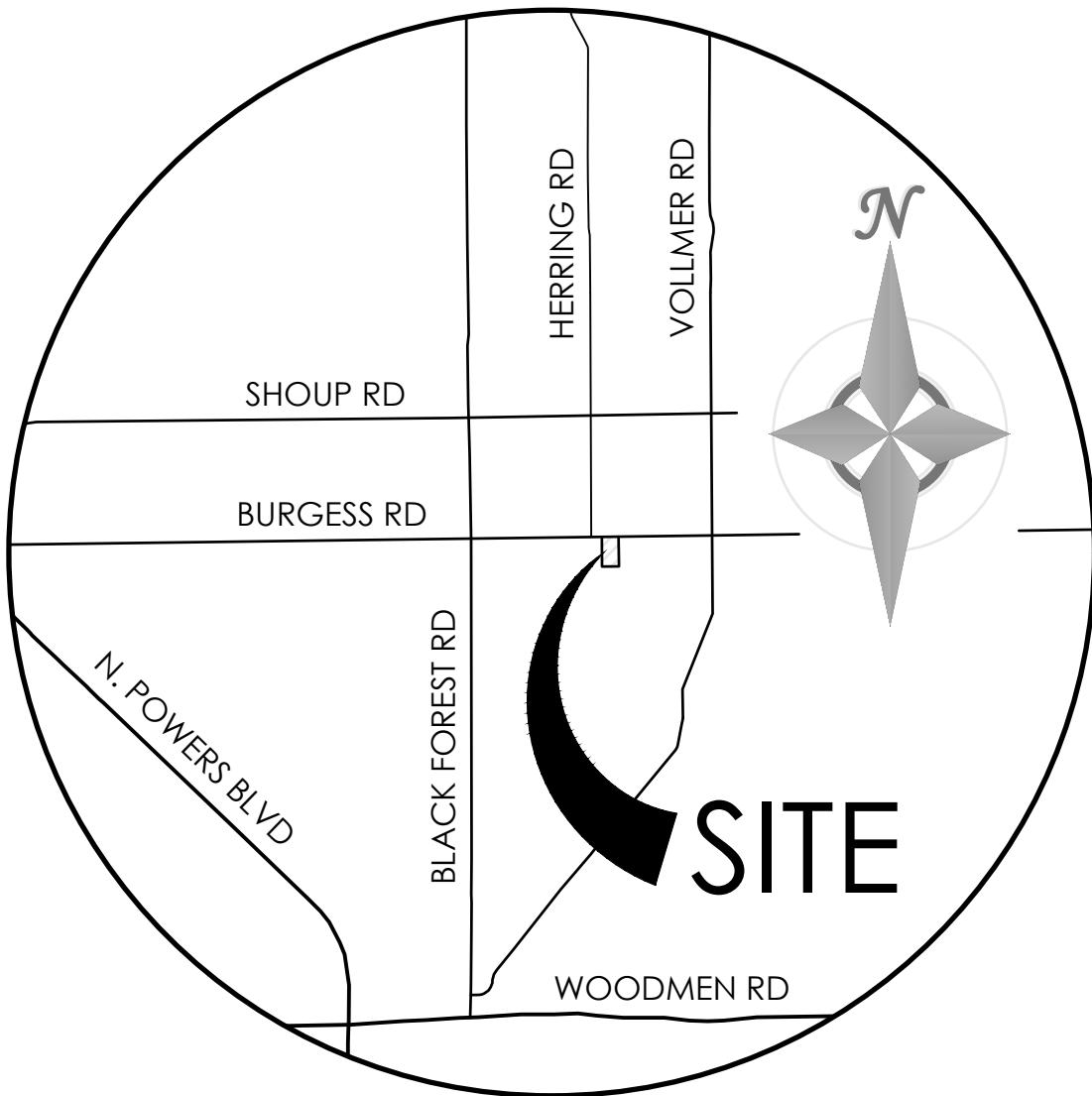
## **APPENDIX**

Vicinity Map

Areal Photograph

Reduced Skyfall Subdivision Filing No. 1 Final Plat

Colorado Wildfire Risk Assessment Summary Report



## VICINITY MAP

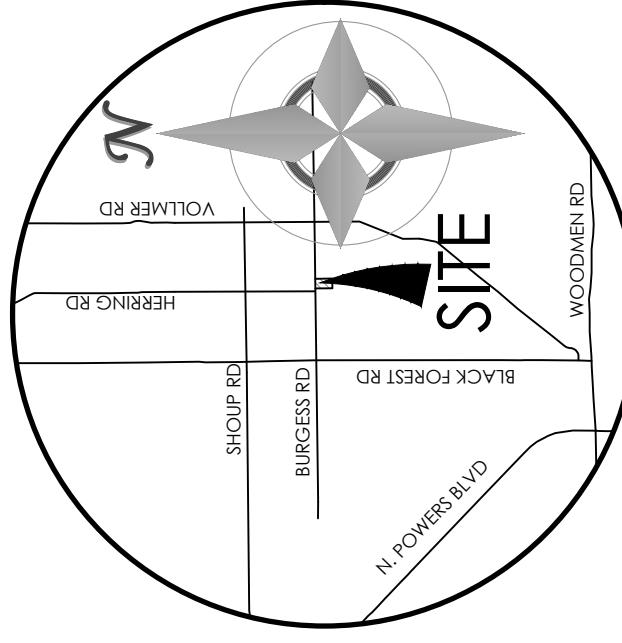
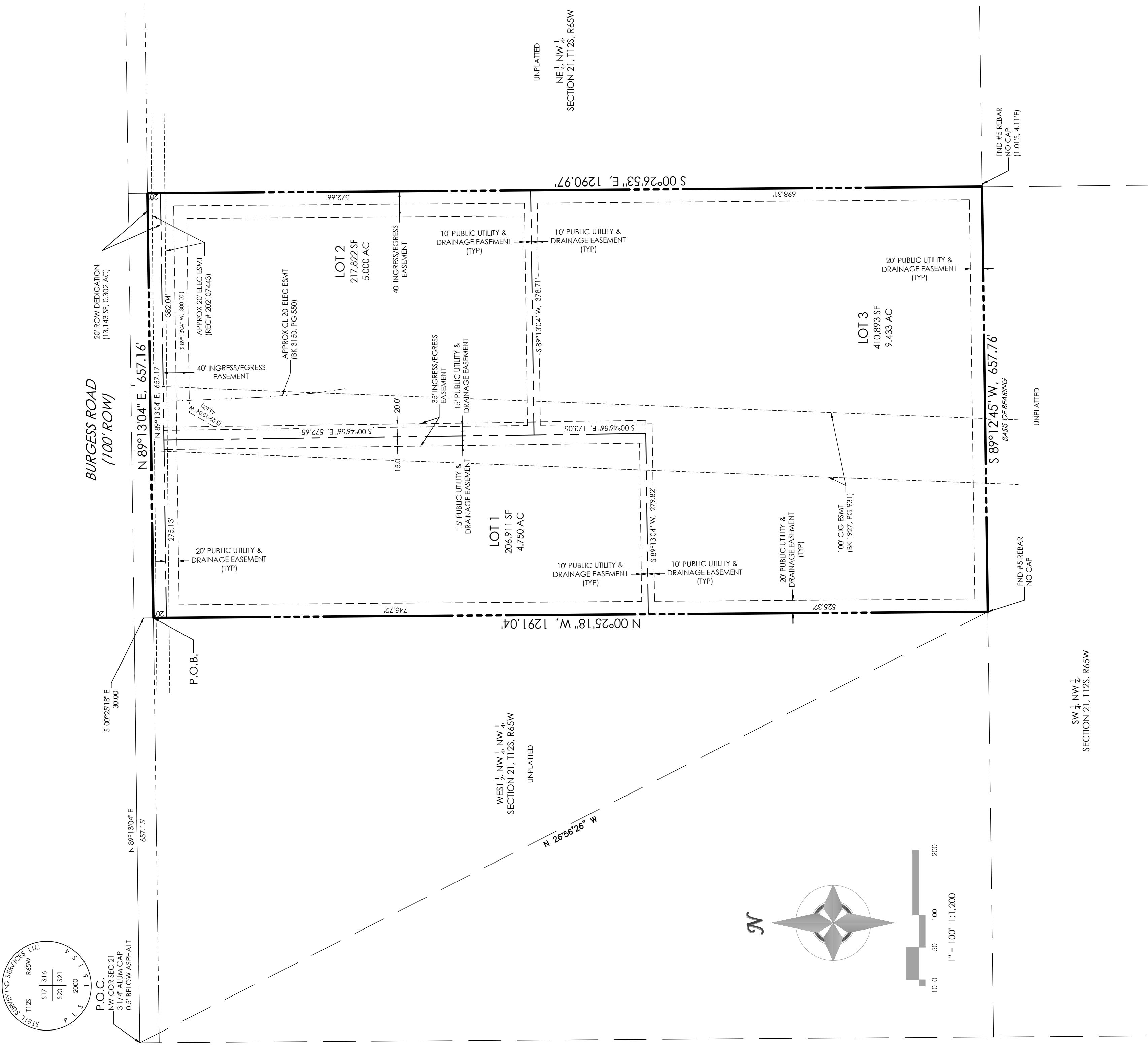
NOT TO SCALE



# MINOR SUBDIVISION PLAT

# **SKYEALL SUBDIVISION ELLING NO. 1**

EL PASO COUNTY, COLORADO  
LOCATED IN THE EAST  $\frac{1}{2}$  OF THE NORTHWEST  $\frac{1}{4}$ , TOWNSHIP 12 SOUTH, RANGE 65 WEST OF THE 6TH PRINCIPAL MERIDIAN



# VICINITY MAP

NOT TO SCALE

KNOW ALL MEN BY THESE PRESENTS

THAT RAMSES II PROPERTIES LLC IS THE OWNER OF THE FOLLOWING DESCRIBED TRACT OF LAND, TO WIT: A TRACT OF LAND LOCATED IN THE EAST ONE-HALF OF THE NORTHWEST ONE-QUARTER (NW 1/4) OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 65 WEST OF THE 6TH PRINCIPAL MERIDIAN, COUNTY OF EL PASO, STATE OF COLORADO, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

(BEARINGS REFERRED TO HEREIN ARE BASED ON THE SOUTH LINE OF THE EAST HALF OF THE NORTHWEST ONE-QUARTER OF SAID SECTION 21, BEARING S 89°12'45" W.)

**COMMENCING** AT THE NORTHWEST CORNER OF THE SAID SECTION 21, THENCE N 89°13'04" E, A DISTANCE OF 657.15 FEET ALONG THE NORTH LINE OF THE SAID NORTHWEST ONE-QUARTER;

**OWNER'S CERTIFICATE**

THE UNDERSIGNED, BEING ALL THE OWNERS, MORTGAGEES, BENEFICIARIES OF DEEDS OF TRUST AND HOLDERS OF OTHER INTERESTS IN THE LAND DESCRIBED HEREIN, HAVE VACATED, LAID OUT, SUBDIVIDED, AND REPLATTED SAID LANDS INTO LOTS, TRACTS, AND EASEMENTS AS SHOWN HEREON UNDER THE NAME AND SUBDIVISION OF "SKYFALL SUBDIVISION FILING NO. 1". THE UTILITY EASEMENTS SHOWN HEREON ARE HEREBY DEDICATED FOR PUBLIC UTILITIES AND COMMUNICATION SYSTEMS AND OTHER PURPOSES AS SHOWN HEREON. THE ENTITIES RESPONSIBLE FOR PROVIDING THE SERVICES FOR WHICH THE EASEMENTS ARE ESTABLISHED ARE HEREBY GRANTED THE PERPETUAL RIGHT OF INGRESS AND EGRESS FROM AND TO ADJACENT PROPERTIES FOR INSTALLATION, MAINTENANCE, AND REPLACEMENT OF UTILITY LINES AND RELATED FACILITIES.

DONNIE WISENBAKER, MANAGER  
STATE OF COLORADO )                          ) SS  
                      )  
COUNTY OF EL PASO )  
  
ACKNOWLEDGED BEFORE ME THIS \_\_\_\_\_ DAY OF \_\_\_\_\_, 2021 BY \_\_\_\_\_.  
AS \_\_\_\_\_.

WITNESS MY HAND AND OFFICIAL SEAL	<hr/> NOTARY PUBLIC <hr/>
<h2>SURVEYOR'S STATEMENT</h2>	
<p>I, RANDALL D. HENCY, A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY CERTIFY THAT THIS SUBDIVISION EXEMPTION IS TRUE AND CORRECTLY REPRESENTS THE RESULTS OF A SURVEY MADE ON 10/08/2020, BY ME OR UNDER MY DIRECT SUPERVISION AND THAT ALL MONUMENTS EXIST AS SHOWN HEREON; THAT MATHEMATICAL CLOSURE ERRORS ARE LESS THAN 1:10,000; AND THAT SAID SUBDIVISION EXEMPTION HAS BEEN PREPARED IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS OF THE STATE OF COLORADO DEALING WITH MONUMENTS, SUBDIVISION, OR SURVEYING OF LAND AND ALL APPLICABLE PROVISIONS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE AND IS NOT A WARRANTY EITHER EXPRESSED NOR IMPLIED.</p>	

RANDALL D. HENCY  
COLORADO REGISTERED PLS #27605  
FOR AND ON BEHALF OF M.V.E., INC.

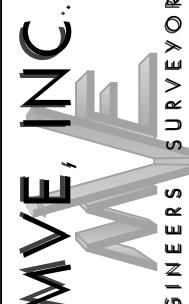
BOARD OF COUNTY COMMISSIONERS CERIFICATE

THIS SUBDIVISION PLAT FOR "SKYFALL SUBDIVISION FILING NO. 1" WAS APPROVED FOR FILING BY THE EL PASO COUNTY, COLORADO BOARD OF COUNTY COMMISSIONERS ON THE \_\_\_\_\_ DAY OF \_\_\_\_\_, 2021, SUBJECT TO ANY NOTES SPECIFIED HEREON AND ANY CONDITIONS INCLUDED IN THE RESOLUTION OF APPROVAL.

\_\_\_\_\_  
CHAIR, BOARD OF COUNTY COMMISSIONERS  
\_\_\_\_\_  
PLANNING AND COMMUNITY DEVELOPMENT DIRECTOR

\_\_\_\_\_  
DATE  
\_\_\_\_\_  
DATE

<p style="text-align: center;"><b>CLERK AND RECORDER</b></p> <p>STATE OF COLORADO      )                             )                             ) COUNTY OF EL PASO      )                             )</p>	<p>I HEREBY CERTIFY THAT THIS INSTRUMENT WAS FILED FOR RECORD IN MY OFFICE AT ____ O'CLOCK __.M. THIS ____ DAY OF _____, 2021, A.D. AND IS DULY RECORDED</p>	<p>AT RECEPTION NO. _____ OF THE RECORDS OF EL PASO COUNTY, COLORADO.</p> <p style="text-align: right;">CHARLES D. BROERMAN, RECORDER</p>
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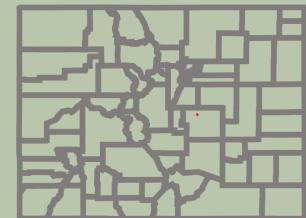
<p style="text-align: center;"> <b>MINOR SUBDIVISION PLAT</b>  <b>SKYFALL SUBDIVISION FILING NO. 1</b>  <b>E1/2, NW1/4, S21, T12S, R65W</b> </p>		
 <p><b>M V E , I N C .</b></p>		

2017

# COLORADO WILDFIRE RISK ASSESSMENT SUMMARY REPORT



*Skyfall Subdivision  
Filing No. 1*



**Report was generated using**

**[www.ColoradoForestAtlas.org](http://www.ColoradoForestAtlas.org)**

**Report version: 1.1.0**

**Report generated: 2021-06-02**

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# Disclaimer

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User should also note that property boundaries included in any product do not represent an on-the-ground survey suitable for legal, engineering, or surveying purposes. They represent only the approximate relative locations.

# Introduction

## Colorado Wildfire Risk Assessment Report

Welcome to the Colorado Wildfire Risk Assessment Summary Reporting Tool.

This tool allows users of the Risk Reduction Planner application of the Colorado Forest Atlas web portal to define a specific project area and generate information for this area. A detailed risk summary report can be generated using a set of predefined map products developed by the Colorado Wildfire Risk Assessment project which have been summarized explicitly for the user defined project area. The report is generated in PDF format.

The report has been designed so that information from the report can be copied and pasted into other specific plans, reports, or documents depending on user needs. Examples include, but are not limited to, Community Wildfire Protection Plans, Local Fire Plans, Fuels Mitigation Plans, Hazard Mitigation Plans, Homeowner Risk Assessments, and Forest Management or Stewardship Plans. Example templates for some of these reports are available for download on the Colorado Forest Atlas web portal.

The Colorado WRA provides a consistent, comparable set of scientific results to be used as a foundation for wildfire mitigation and prevention planning in Colorado.

Results of the assessment can be used to help prioritize areas in the state where mitigation treatments, community interaction and education, or tactical analyses might be necessary to reduce risk from wildfires.

The Colorado WRA products included in this report are designed to provide the information needed to support the following key priorities:

- Identify areas that are most prone to wildfire
- Plan and prioritize hazardous fuel treatment programs
- Allow agencies to work together to better define priorities and improve emergency response, particularly across jurisdictional boundaries
- Increase communication with local residents and the public to address community priorities and needs



# Products

Each product in this report is accompanied by a general description, table, chart and/or map. A list of available Colorado WRA products in this report is provided in the following table.

COWRA Product	Description
<b>Wildfire Risk</b>	The overall composite risk occurring from a wildfire derived by combining Burn Probability and Values at Risk Rating
<b>Burn Probability</b>	Annual probability of any location burning due to wildfire
<b>Fire Intensity Scale</b>	Quantifies the potential fire intensity by orders of magnitude
<b>Wildland Urban Interface</b>	Housing density depicting where humans and their structures meet or intermix with wildland fuel
<b>Wildland Urban Interface Risk</b>	Annual probability of any location burning due to wildfire
<b>Values at Risk Rating</b>	A composite rating of values and assets that would be adversely impacted by a wildfire by combining the four main risk outputs
<b>Suppression Difficulty Rating</b>	Reflects the difficulty or relative cost to suppress a fire given the terrain and vegetation conditions that may impact machine operability
<b>Drinking Water Risk Index</b>	A measure of the risk to Drinking Water Risk Index Areas (DWIA) based on the potential negative impacts from wildfire
<b>Forest Assets Risk Index</b>	A measure of the risk to forested areas based on the potential negative impacts from wildfire
<b>Riparian Assets Risk Index</b>	A measure of the risk to riparian areas based on the potential negative impacts from wildfire
<b>Characteristic Flame Length</b>	A measure of the expected flame length of a potential fire

COWRA Product	Description
<b>Characteristic Rate of Spread</b>	A measure of the expected rate of spread of a potential fire
<b>Fire Type Extreme Weather</b>	Represents the potential fire type under the extreme percentile weather category
<b>Surface Fuels</b>	A measure of the expected rate of spread of a potential fire
<b>Characteristic Rate of Spread</b>	Characterization of surface fuel models that contain the parameters for calculating fire behavior outputs
<b>Vegetation</b>	General vegetation and landcover types
<b>Forest Assets</b>	Identifies forested land categorized by susceptibility or response to fire
<b>Riparian Assets</b>	Forested riparian areas characterized by functions of water quantity and quality, and ecology
<b>Drinking Water Importance Areas</b>	A measure of quality and quantity of public surface drinking water categorized by watershed

# Wildland Urban Interface

## Description

Colorado is one of the fastest growing states in the Nation, with much of this growth occurring outside urban boundaries. This increase in population across the state will impact counties and communities that are located within the Wildland Urban Interface (WUI). The WUI is described as the area where structures and other human improvements meet and intermingle with undeveloped wildland or vegetative fuels. Population growth within the WUI substantially increases the risk from wildfire.



For the **Skyfall Subdivision Filing No. 1** project area, it is estimated that **0** people or **0.0 %** percent of the total project area population (0) live within the WUI.

**The Wildland Urban Interface (WUI) layer reflects housing density depicting where humans and their structures meet or intermix with wildland fuels.** In the past, conventional wildland-urban interface datasets, such as USFS SILVIS, have been used to reflect these concerns. However, USFS SILVIS and other existing data sources did not provide the level of detail needed by the Colorado State Forest Service and local fire protection agencies.

The new WUI dataset is derived using advanced modeling techniques based on the Where People Live dataset and 2016 LandScan USA population count data available from the Department of Homeland Security, HSIP dataset. WUI is simply a subset of the Where People Live dataset. The primary difference is populated areas surrounded by sufficient non-burnable areas (i.e. interior urban areas) are removed from the Where People Live dataset, as these areas are not expected to be directly impacted by a wildfire. This accommodates WUI areas based on encroachment into urban areas where wildland fire is likely to spread.



A more detailed description of the risk assessment algorithms is provided in the Colorado Wildfire Risk Assessment (Colorado WRA) Final Report, which can be downloaded from [www.ColoradoForestAtlas.org](http://www.ColoradoForestAtlas.org).

Data are modeled at a 30-meter cell resolution (30 m<sup>2</sup> or 900 m area per map cell), which is consistent with other Colorado WRA layers. The WUI classes are based on the number of houses per acre. Class breaks are based on densities understood and commonly used for fire protection planning.

Housing Density	WUI Population	Percent of WUI Population	WUI Acres	Percent of WUI Acres
Less than 1 house/40 ac	0	0.0 %	5	24.0 %
1 house/40 ac to 1 house/20 ac	0	0.0 %	8	39.6 %
1 house/20 ac to 1 house/10 ac	0	0.0 %	6	28.1 %
1 house/10 ac to 1 house/5 ac	0	0.0 %	2	8.3 %
1 house/5 ac to 1 house/2 ac	0	0.0 %	0	0 %
1 house/2 ac to 3 houses/ac	0	0.0 %	0	0 %
More than 3 houses/ac	0	0.0 %	0	0 %
<b>Total</b>	<b>0</b>	<b>0.0%</b>	<b>0</b>	<b>0.0%</b>

## Wildland Urban Interface

Skyfall Subdivision Filing No. 1

Population



Less than 1  
house/40 ac

1 house/40 ac to 1  
house/20 ac

1 house/20 ac to 1  
house/10 ac

1 house/10 ac to 1  
house/5 ac

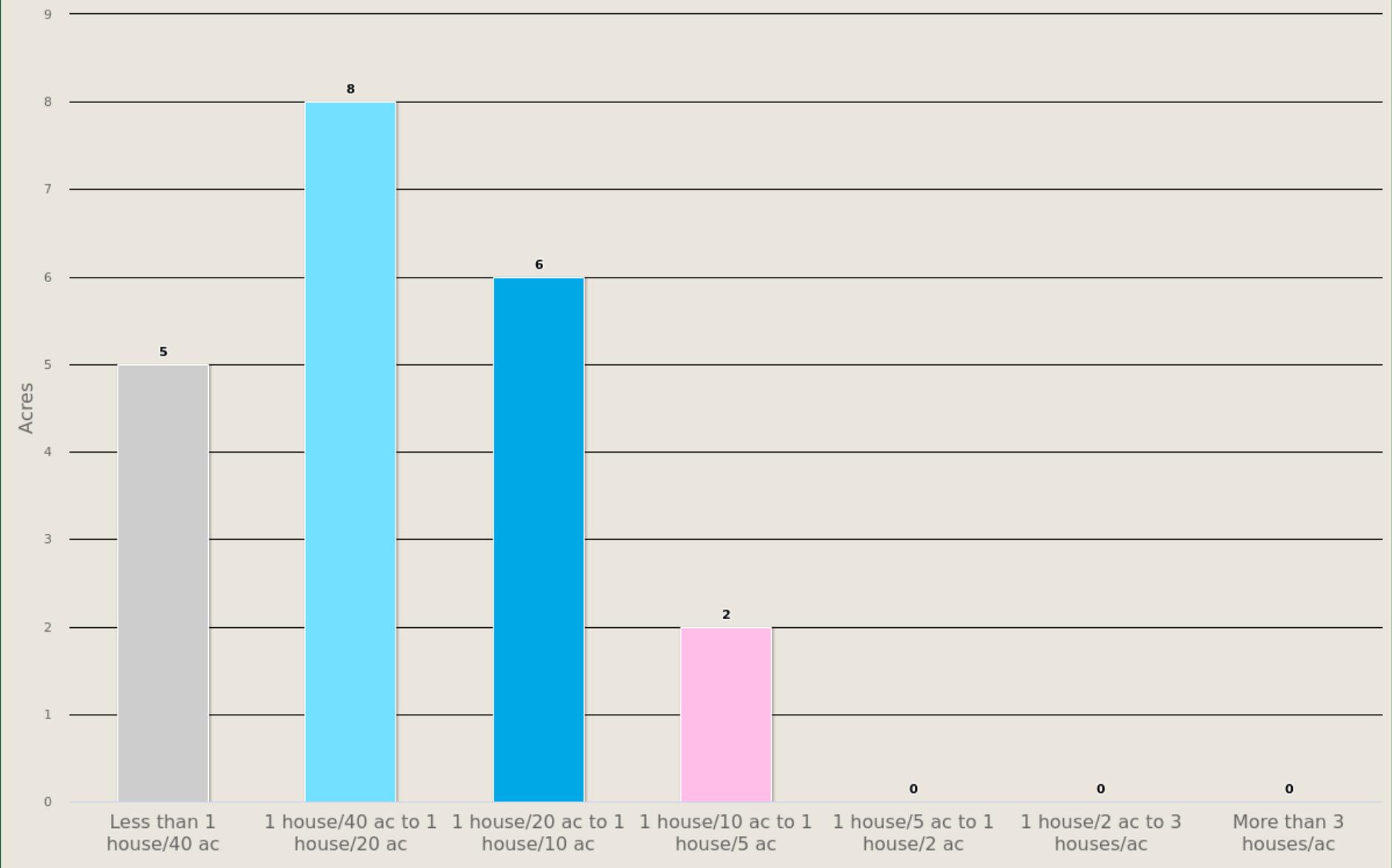
1 house/5 ac to 1  
house/2 ac

1 house/2 ac to 3  
houses/ac

More than 3  
houses/ac

# Skyfall Subdivision Filing No. 1

Wildland Urban Interface



**Skyfall Subdivision Filing No. 1**

**Wildland Urban Interface**

- [Light Gray Box] Less than 1 house/40 ac
- [Light Blue Box] 1 house/40 ac to 1 house/20 ac
- [Medium Blue Box] 1 house/20 ac to 1 house/10 ac
- [Pink Box] 1 house/10 ac to 1 house/5 ac
- [Magenta Box] 1 house/5 ac to 1 house/2 ac
- [Purple Box] 1 house/2 ac to 3 houses/ac
- [Dark Purple Box] More than 3 houses/ac

300 ft



Colorado Wildfire Risk Assessment  
[www.ColoradoForestAtlas.org](http://www.ColoradoForestAtlas.org)

# Wildland Urban Interface (WUI) Risk Index

## Description

The Wildland-Urban Interface (WUI) Risk Index layer is a rating of the potential impact of a wildfire on people and their homes. The key input, WUI, reflects housing density (houses per acre) consistent with Federal Register National standards. The location of people living in the wildland-urban interface and rural areas is essential for defining potential wildfire impacts to people and homes.

The WUI Risk Index is derived using a response function modeling approach. Response functions are a method of assigning a net change in the value to a resource or asset based on susceptibility to fire at different intensity levels, such as flame length.

To calculate the WUI Risk Index, the WUI housing density data were combined with flame length data and response functions were defined to represent potential impacts. The response functions were defined by a team of experts led by Colorado State Forest

Service mitigation planning staff. By combining flame length with the WUI housing density data, it is possible to determine where the greatest potential impact to homes and people is likely to occur.

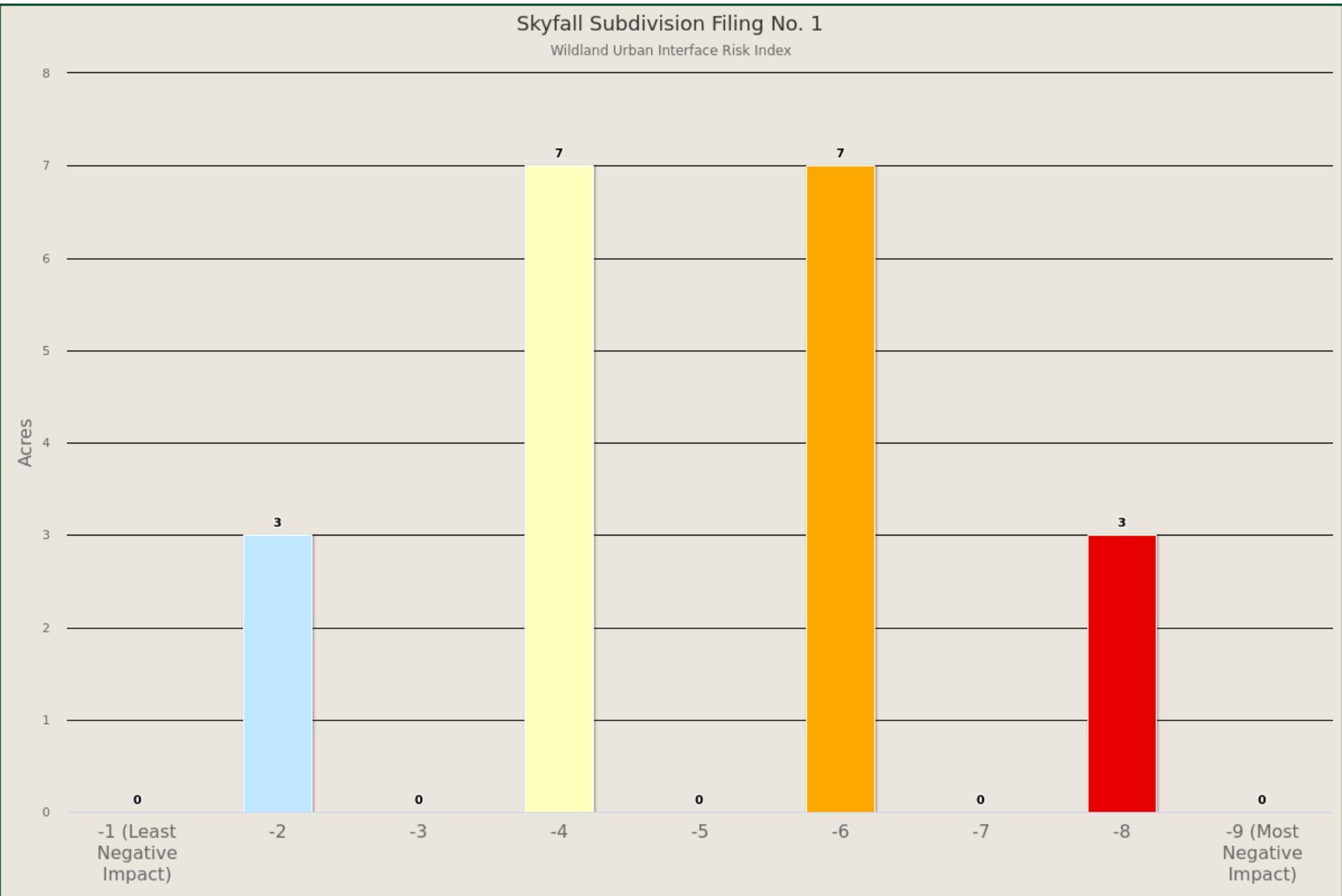
The range of values is from -1 to -9, with -1 representing the least negative impact and -9 representing the most negative impact. For example, areas with high housing density and high flame lengths are rated -9, while areas with low housing density and low flame lengths are rated -1.

The WUI Risk Index has been calculated consistently for all areas in Colorado, which allows for comparison and ordination of areas across the entire state. Data are modeled at a 30-meter cell resolution, which is consistent with other Colorado WRA layers.

WUI Risk Class	Acres	Percent
-1 (Least Negative Impact)	0	1.0 %
-2	3	15.6 %
-3	0	2.1 %
-4	7	34.4 %
-5	0	0 %
-6	7	34.4 %
-7	0	0 %
-8	3	12.5 %
-9 (Most Negative Impact)	0	0 %
<b>Total</b>	<b>21</b>	<b>100 %</b>

# Skyfall Subdivision Filing No. 1

Wildland Urban Interface Risk Index



**Wildland Urban Interface Risk**

-1 (Least Negative Impact)

-2

-3

-4

-5

-6

-7

-8

-9 (Most Negative Impact)

300 ft



Colorado Wildfire Risk Assessment  
[www.ColoradoForestAtlas.org](http://www.ColoradoForestAtlas.org)

# Firewise USA®

## Description

Firewise USA® is a national recognition program that provides resources to inform communities how to adapt to living with wildfire and encourages neighbors to take action together to reduce their wildfire risk. Colorado communities that take the following five steps can be recognized as Firewise:

1. Form a Firewise board or committee
2. Obtain a wildfire risk assessment from the CSFS or local fire department, and create an action plan
3. Hold a Firewise event once per year
4. Invest a minimum of \$24.14 per dwelling unit in local Firewise actions annually
5. Create a National Fire Prevention Association (NFPA) profile and follow the application directions located at <https://portal.firewise.org/user/login>

The Firewise USA® dataset defines the boundaries of the recognized communities. Mapping Firewise USA® boundaries will generally be completed by CSFS staff.

Note: These are estimated boundaries using a variety of methods with varying degrees of accuracy. These are not legal boundaries and should not be construed as such. The boundaries may overlap with CWPP areas and are subject to change over time as the communities develop, change, and continue to implement wildfire mitigation efforts.

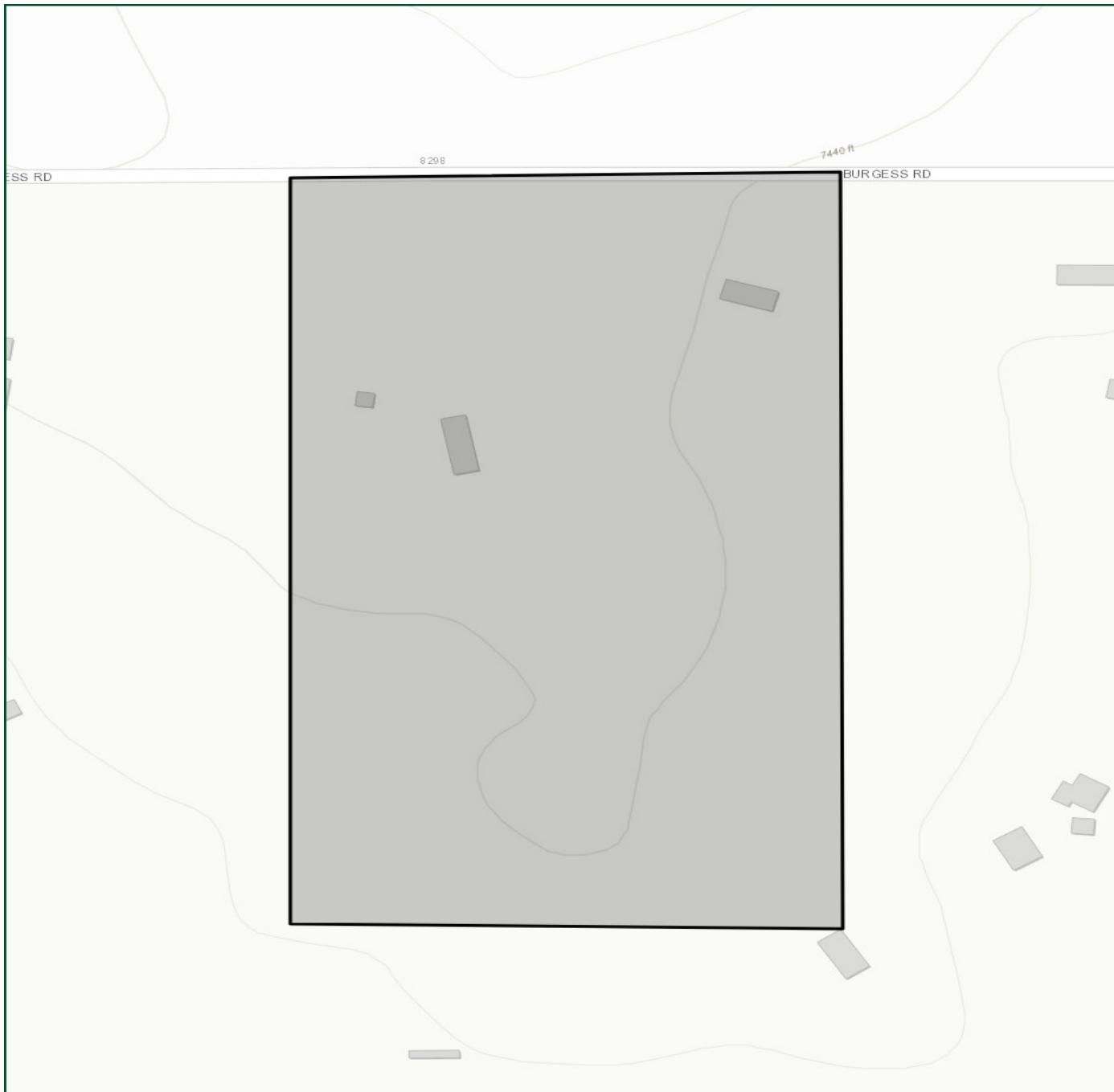
To learn more about the Firewise USA® recognition program or to fill out an application, visit <https://www.nfpa.org/Public-Education/By-topic/Wildfire/Firewise-USA> - OR - <https://csfs.colostate.edu/wildfire-mitigation/colorado-firewise-communities/>



**FIREWISE USA®**

**Residents reducing wildfire risks**

The designated area does not contain data for this section.



Skyfall Subdivision Filing No. 1

**Fire Wise Communities**

Fire Wise Communities 2018



Colorado Wildfire Risk Assessment  
[www.ColoradoForestAtlas.org](http://www.ColoradoForestAtlas.org)

# Community Wildfire Protection Plans (CWPPs)

## Description

A Community Wildfire Protection Plan (CWPP) is a document developed and agreed upon by a community to identify how the community will reduce its wildfire risk. CWPPs identify areas where fuels reduction is needed to reduce wildfire threats to communities and critical infrastructure, address protection of homes and other structures, and plan for wildfire response capability. The Colorado State Forest Service (CSFS) supports the development and implementation of CWPPs and provides resources, educational materials and information to those interested in developing CWPPs.

The CWPP dataset represents the boundaries of those areas that have developed a CWPP. Note that CWPPs can be developed by different groups at varying scales, such as county, Fire Protection District (FPD), community/subdivision, HOA, etc., and as such, can overlap. In addition, the CWPPs can be from different dates. Often a county CWPP is completed first with subsequently more detailed CWPPs done for local communities within that county or FPD. CO-WRAP provides a tool that allows the user to select the CWPP area and retrieve the CWPP document for review (PDF).

At a minimum, a CWPP should include:

- The wildland-urban interface (WUI) boundary, defined on a map, where people, structures and other community values are most likely to be negatively impacted by wildfire
- The CSFS, local fire authority and local government involvement and any additional stakeholders
- A narrative that identifies the community's values and fuel hazards
- The community's plan for when a wildfire occurs
- An implementation plan that identifies areas of high priority for fuels treatments

CWPPs are not shelf documents and should be reviewed, tracked and updated. A plan stays alive when it is periodically updated to address the accomplishments of the community. Community review of progress in meeting plan objectives and determining areas of new concern where actions must be taken to reduce wildfire risk helps the community stay current with changing environment and wildfire mitigation priorities.

If your community is in an area at risk from wildfire, now is a good time to start working with neighbors on a CWPP and preparing for future wildfires. Contact your local CSFS district to learn how to start this process and create a CWPP for your community: <http://csfs.colostate.edu/pages/your-local-forester.html>

For the Skyfall Subdivision Filing No. 1 test project area, there are 2 CWPPs areas that are totally or partially in the defined project area.

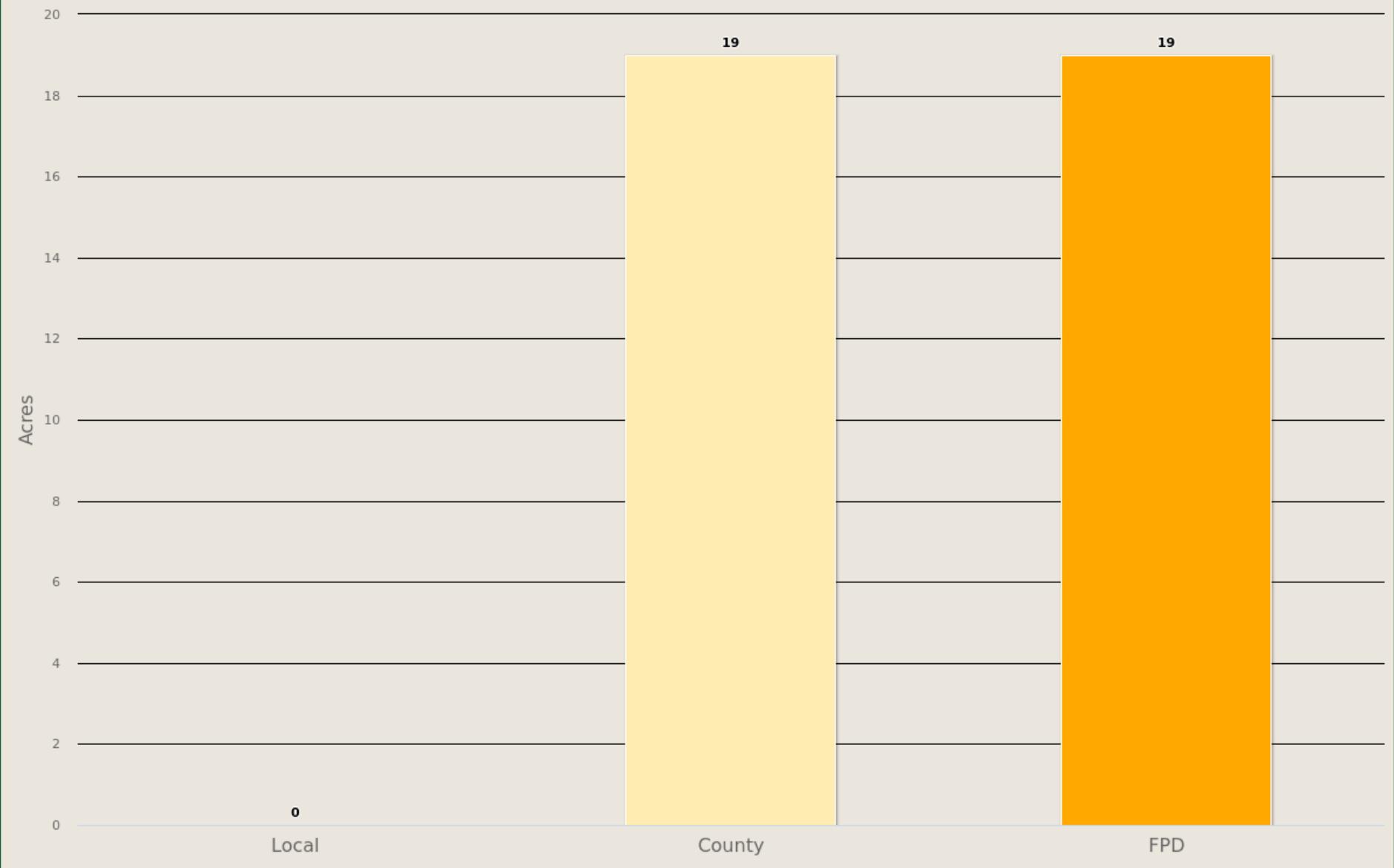


**Community input is the foundation of a Community Wildfire Protection Plan that identifies community needs and garners community support.**

Community CWPP Name	CWPP Type	CSFS District	Acres inside project area	Total Acres
El Paso County	County	Woodland Park	19	1,361,915
Black Forest Fire/Rescue Protection District	FPD	Woodland Park	19	33,466
<b>Total Acres</b>			<b>38</b>	<b>1,395,381</b>

# Skyfall Subdivision Filing No. 1

Community Wildfire Protection Plans



**Skyfall Subdivision Filing No. 1**

**CWPP**

- Community
- FPD
- County



300 ft



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# Wildfire Risk

## Description

Wildfire Risk is a composite risk rating obtained by combining the probability of a fire occurring with the individual values at risk layers. Risk is defined as the possibility of loss or harm occurring from a wildfire. It identifies areas with the greatest potential impacts from a wildfire – i.e. those areas most at risk - considering all values and assets combined together – WUI Risk, Drinking Water Risk, Forest Assets Risk and Riparian Areas Risk.

Since all areas in Colorado have risk calculated consistently, it allows for comparison and ordination of areas across the entire state. The Values at Risk Rating is a key component of Wildfire Risk. The Values at Risk Rating is comprised of several inputs focusing on values and assets at risk. This includes Wildland Urban Interface, Forest Assets, Riparian Assets and Drinking Water Importance Areas (watersheds).

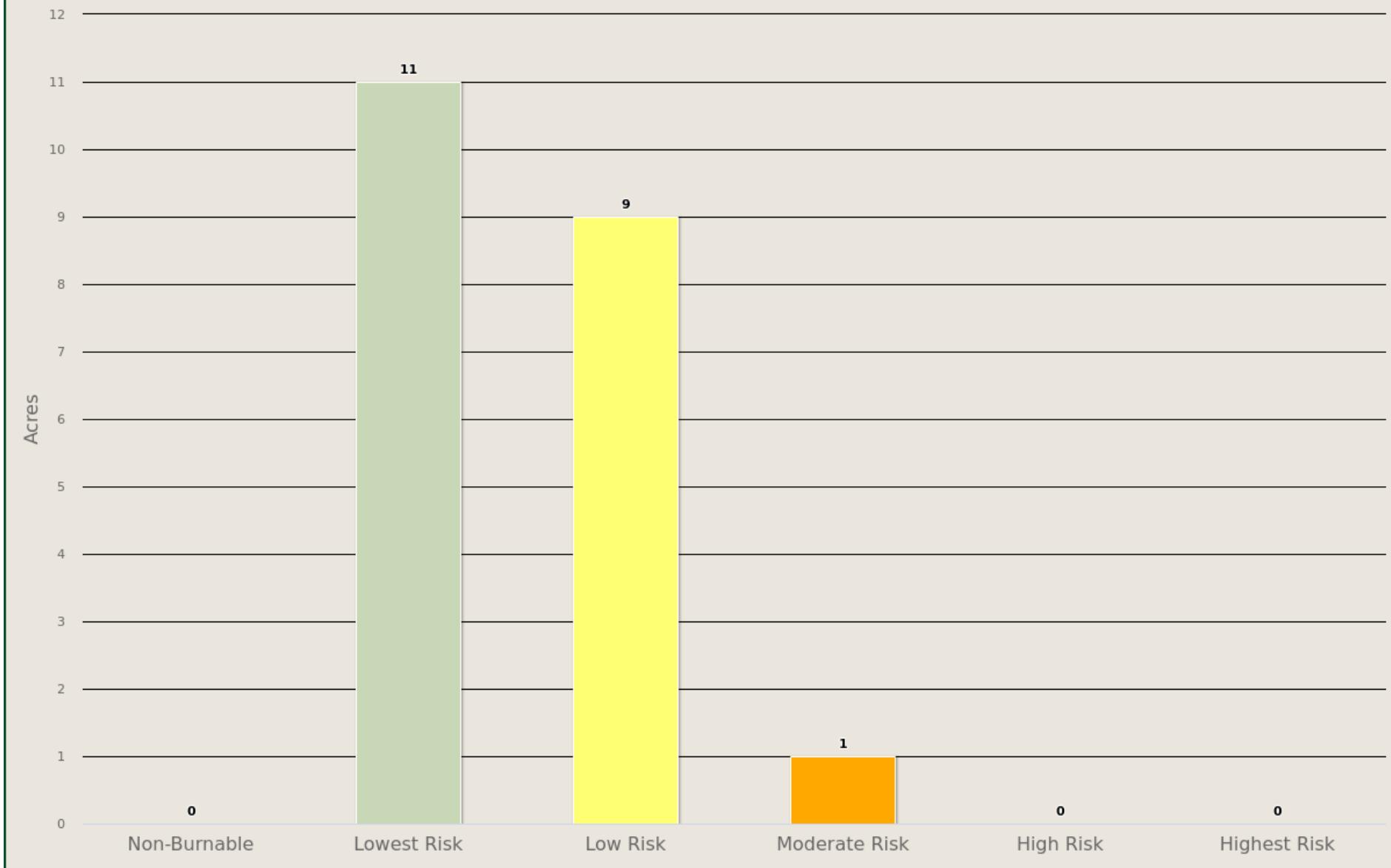
To aid in the use of Wildfire Risk for planning activities, the output values are categorized into five (5) classes. These are given general descriptions from Lowest to Highest Risk.

Wildfire Risk Class	Acres	Percent
Non-Burnable	0	0 %
Lowest Risk	11	50.0 %
Low Risk	9	43.8 %
Moderate Risk	1	6.2 %
High Risk	0	0 %
Highest Risk	0	0 %
<b>Total</b>	<b>21</b>	<b>100%</b>



## Skyfall Subdivision Filing No. 1

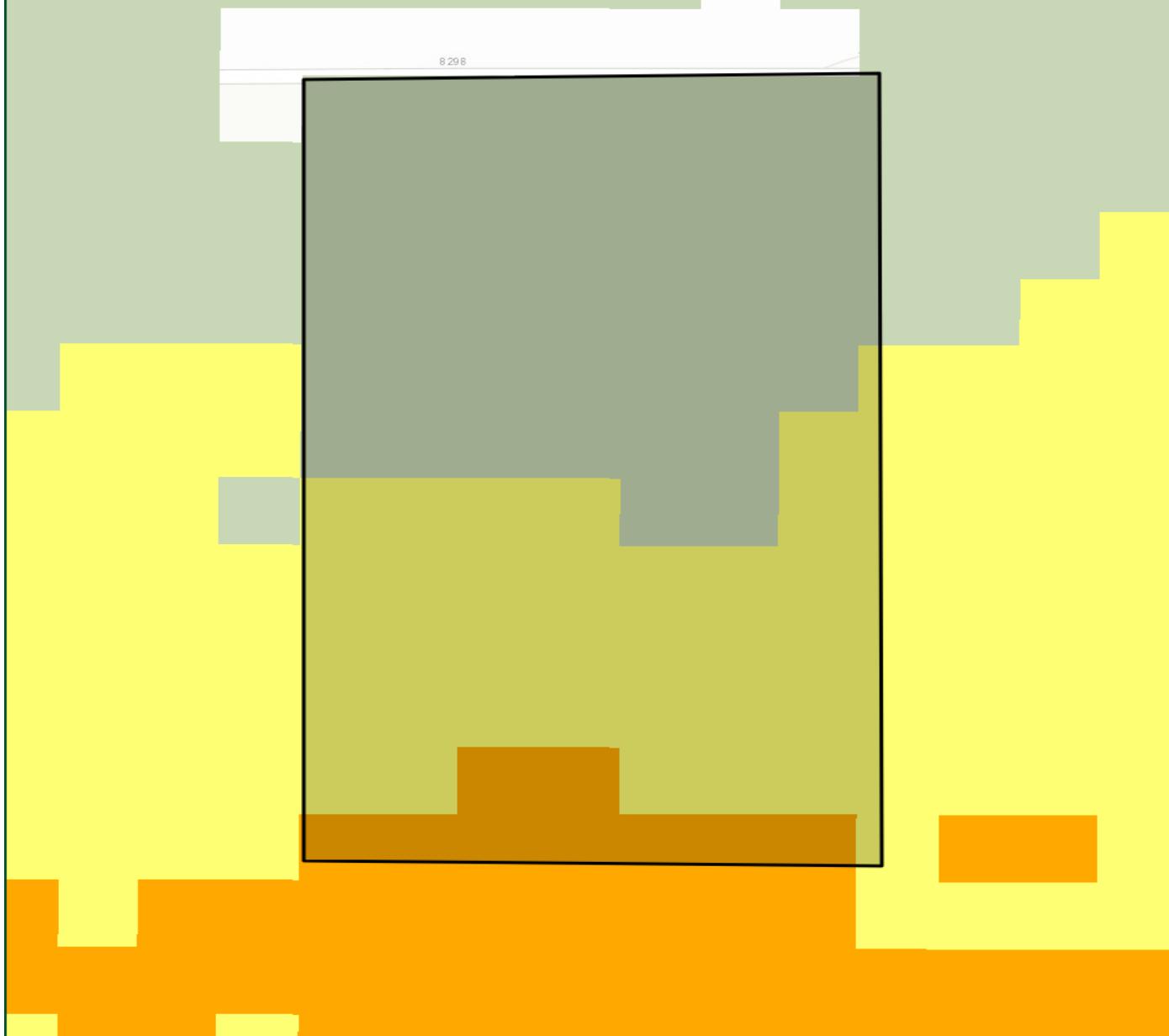
### Wildfire Risk



**Skyfall Subdivision Filing No. 1**

**Wildfire Risk**

- Non-Burnable
- Lowest Risk
- Low Risk
- Moderate Risk
- High Risk
- Highest Risk



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# Burn Probability

## Description

**Burn Probability (BP)** is the annual probability of any location burning due to a wildfire. BP is calculated as the number of times that a 30-meter cell on the landscape is burned from millions of fire simulations. The annual BP was estimated by using a stochastic (Monte Carlo) wildfire simulation approach with Technosylva's Wildfire Analyst software ([www.WildfireAnalyst.com](http://www.WildfireAnalyst.com)).

A total number of 3,200,000 fires were simulated across the state, including those fires outside the Colorado border which were used in a buffer area around the state, to compute BP with a mean ignition density of 8.68 fires/km<sup>2</sup>. The simulation ignition points were spatially distributed evenly every 500 meters across the state. Only high and extreme weather conditions were used to run the simulations. All fires simulations had a duration of 10 hours.

The Wildfire Analyst fire simulator considered the number of times that the simulated fires burned each cell. After that, results were weighted by considering the historical fire occurrence of those fires that burned in high and extreme weather conditions. The weighting was done by assessing the relationship between the annual historical fire ignition density in Colorado and the total number of simulated fires with varying input data in the different weather scenarios and the historical spatial distribution of the ignition points.

The probability map is derived at a 30-meter resolution. This scale of data was chosen to be consistent with the accuracy of the primary surface fuels dataset used in the assessment. While not appropriate for site specific analysis, it is appropriate for regional, county or local protection mitigation or prevention planning.

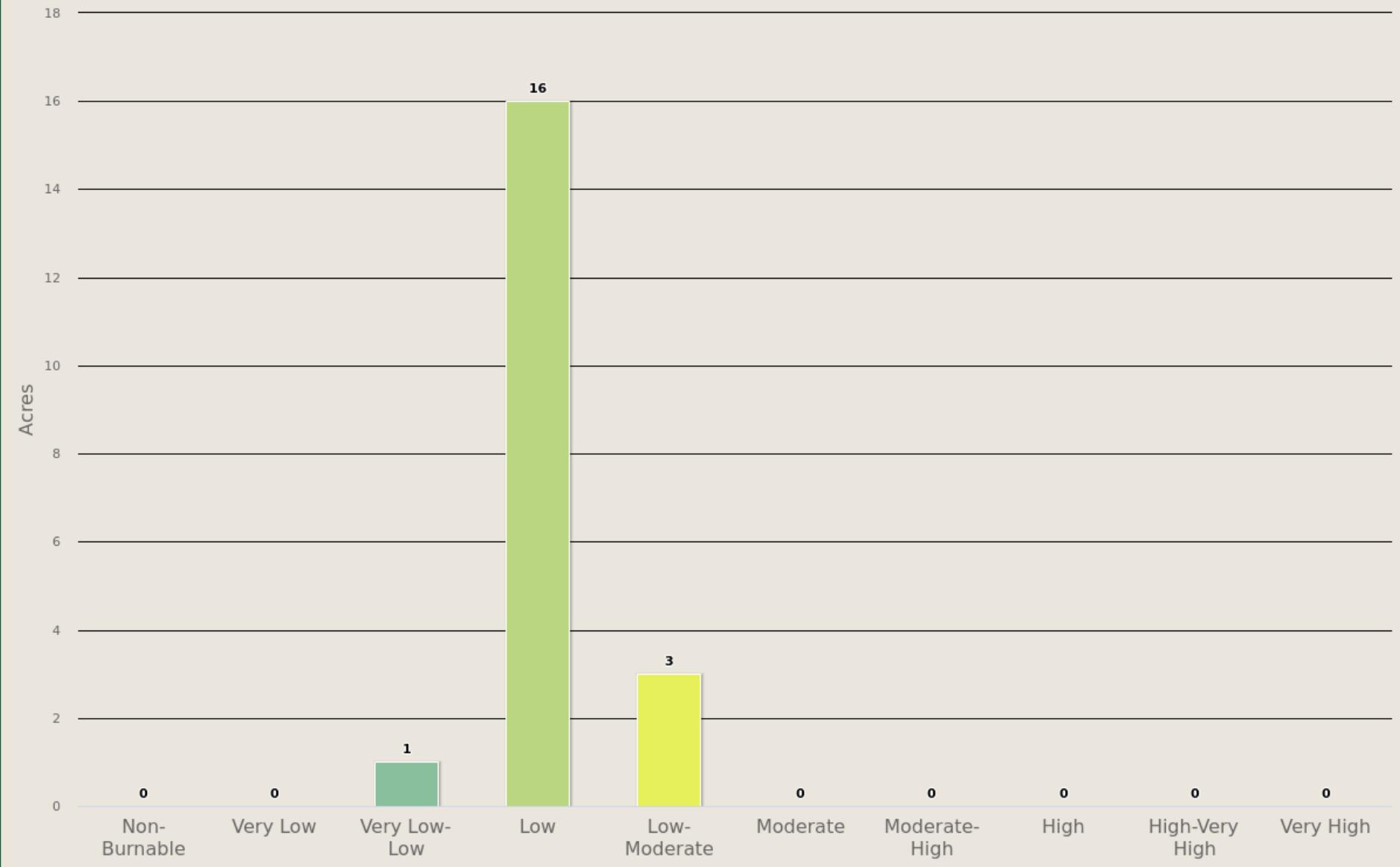
To aid in the use of Burn Probability for planning activities, the output values are categorized into 10 (ten) classes. These are given general descriptions from Lowest to Highest Probability.

A more detailed description of the risk assessment algorithms is provided in the Colorado WRA Final Report, which can be downloaded from [www.ColoradoForestAtlas.org](http://www.ColoradoForestAtlas.org).

Burn Probability Class	Acres	Percent
Non-Burnable	0	0 %
Very Low	0	0 %
Very Low-Low	1	5.5 %
Low	16	79.1 %
Low-Moderate	3	15.4 %
Moderate	0	0 %
Moderate-High	0	0 %
High	0	0 %
High-Very High	0	0 %
Very High	0	0 %
Total	20	100 %

## Skyfall Subdivision Filing No. 1

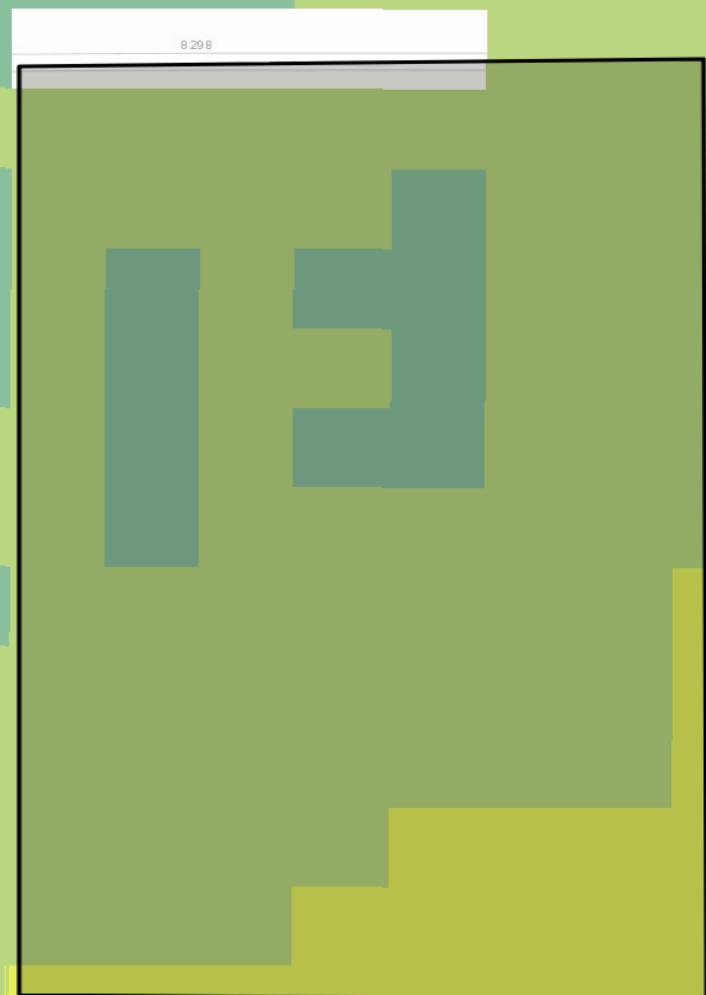
Burn Probability



**Skyfall Subdivision Filing No. 1**

**Burn Probability**

- Non-Burnable
- Very Low
- Very Low-Low
- Low
- Low-Moderate
- Moderate
- Moderate-High
- High
- High-Very High
- Very High



300 ft



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# Values at Risk Rating

## Description

**Represents those values or assets that would be adversely impacted by a wildfire.** The Values at Risk Rating is an overall rating that combines the risk ratings for Wildland Urban Interface (WUI), Forest Assets, Riparian Assets, and Drinking Water Importance Areas into a single measure of values-at-risk. The individual ratings for each value layer were derived using a Response Function approach.

Response functions are a method of assigning a net change in the value to a resource or asset based on susceptibility to fire at different intensity levels. A resource or asset is any of the Fire Effects input layers, such as WUI, Forest Assets, etc. These net changes can be adverse (negative) or positive (beneficial).

Calculating the Values at Risk Rating at a given location requires spatially defined estimates of the intensity of fire integrated with the identified resource value. This interaction is quantified through the use of response functions that estimate expected impacts to resources or assets at the specified fire intensity levels. The measure of fire intensity level used in the Colorado assessment is flame length for a location. Response Function outputs were derived for each input dataset and then combined to derive the Values Impacted Rating.

Different weightings are used for each of the input layers with the highest priority placed on protection of people and structures (i.e. WUI). The weightings represent the value associated with those assets.

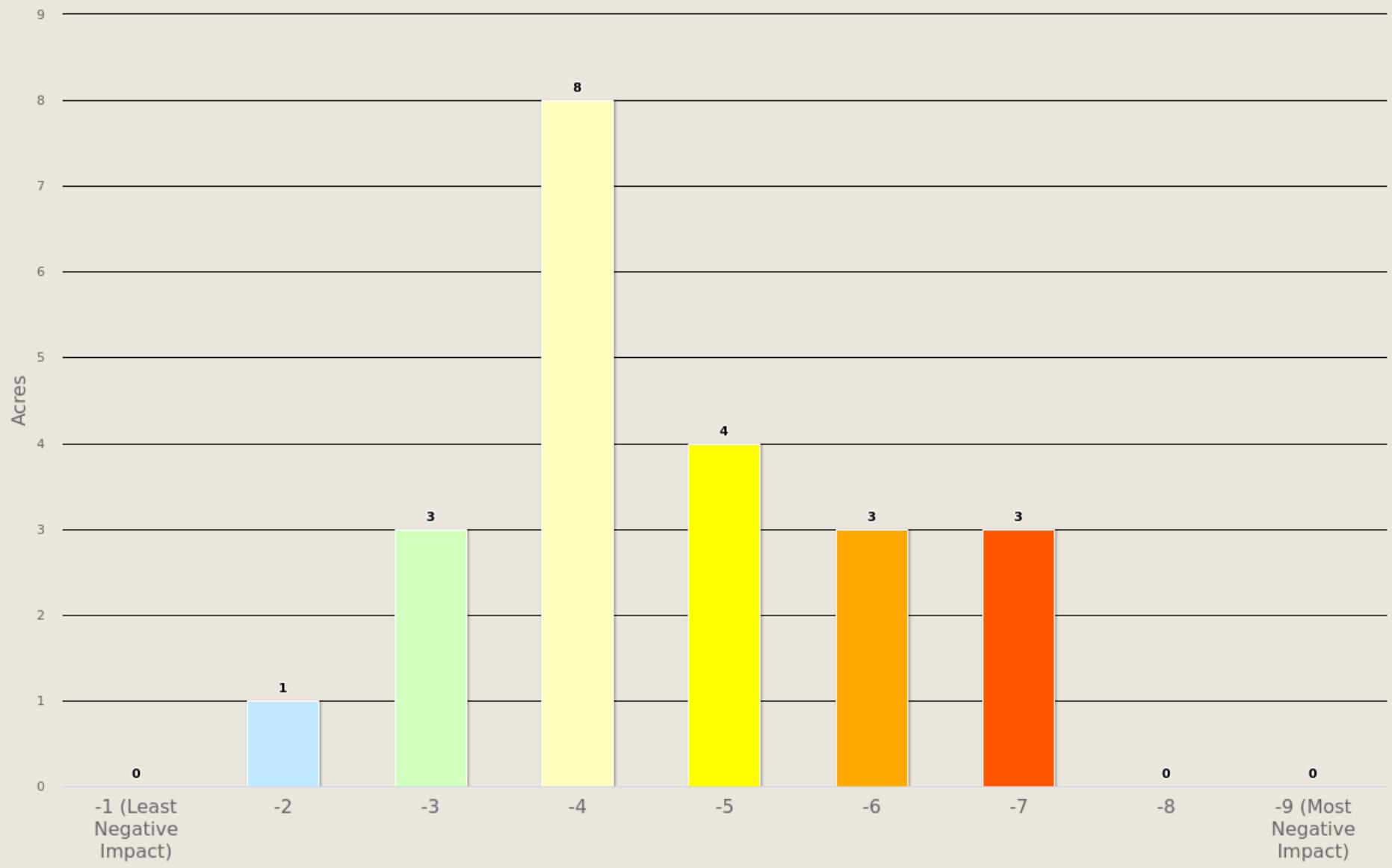
Weightings were developed by a team of experts during the assessment to reflect priorities for fire protection planning in Colorado. Refer to the Colorado WRA Final Report for more information about the layer weightings.

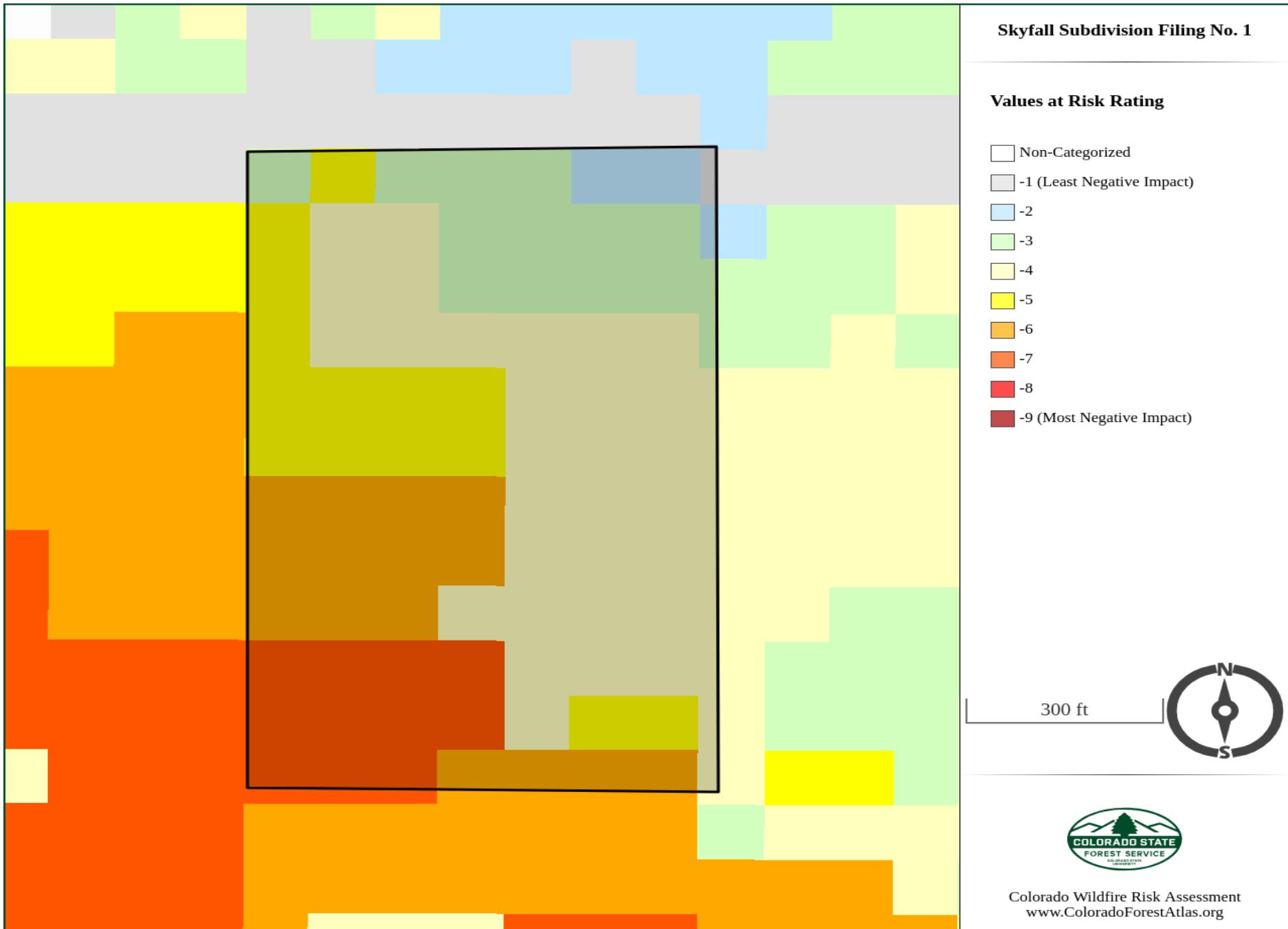
Since all areas in Colorado have the Values at Risk Rating calculated consistently, it allows for comparison and ordination of areas across the entire state. The data were derived at a 30-meter resolution.

Values at Risk Class	Acres	Percent
-1 (Least Negative Impact)	0	1.0 %
-2	1	3.1 %
-3	3	14.6 %
-4	8	37.5 %
-5	4	16.7 %
-6	3	14.6 %
-7	3	12.5 %
-8	0	0 %
-9 (Most Negative Impact)	0	0 %
Total	21	100 %

## Skyfall Subdivision Filing No. 1

Values at Risk Rating





# Suppression Difficulty Rating

## Description

Reflects the difficulty or relative cost to suppress a fire given the terrain and vegetation conditions that may impact machine operability. This layer is an overall index that combines the slope steepness and the vegetation/fuel type characterization to identify areas where it would be difficult or costly to suppress a fire due to the underlying terrain and vegetation conditions that would impact machine operability (in particular Type II dozer).

The rating was calculated based on the fireline production rates for hand crews and engines with modifications for slope, as documented in the NWCG Fireline Handbook 3, PMS 401-1.

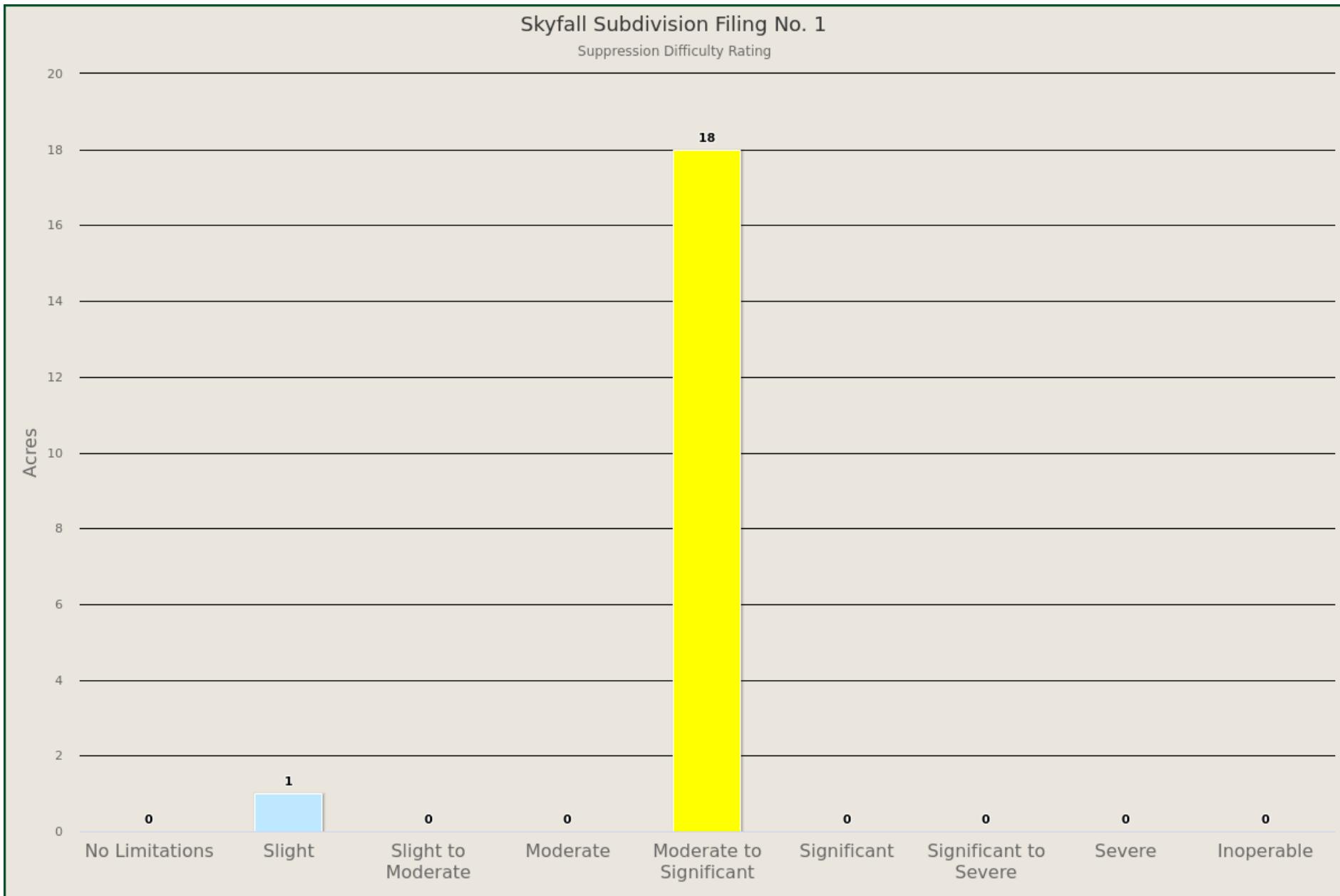
The burnable fuel models in the Colorado WRA were grouped into ten categories: Grass, Grass/Shrub, Shrub/Regeneration, Moderate Forest, Heavy Forest, Swamp/Marsh, Agriculture, Barren, Urban/Developed, Water/Ice.

Fireline production capability on six slope classes was used as the basic reference to obtain the suppression difficulty score. The response function category is assigned to each combination of fuel model group and slope category.

SDR Class	Acres	Percent
No Limitations	0	1.2 %
Slight	1	3.6 %
Slight to Moderate	0	1.2 %
Moderate	0	0 %
Moderate to Significant	18	94.0 %
Significant	0	0 %
Significant to Severe	0	0 %
Severe	0	0 %
Inoperable	0	0 %
Total	19	100%

## Skyfall Subdivision Filing No. 1

### Suppression Difficulty Rating



## Skyfall Subdivision Filing No. 1

### Suppression Difficulty

- No Limitations
- Slight
- Slight to Moderate
- Moderate
- Moderate to Significant
- Significant
- Significant to Severe
- Severe
- Inoperable

300 ft



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# Fire Occurrence

## Description

**Fire Occurrence is an ignition density that represents the likelihood of a wildfire starting based on historical ignition patterns.** Occurrence is derived by modeling historic wildfire ignition locations to create an ignition density map.

Historic fire report data were used to create the ignition points for all Colorado fires. The compiled fire occurrence database was cleaned to remove duplicate records and to correct inaccurate locations. The database was then modeled to create a density map reflecting historical fire ignition rates.

Historic fire report data were used to create the ignition points for all Colorado fires. This included both federal and non-federal fire ignition locations.

The class breaks are determined by analyzing the Fire Occurrence output values for the entire state and determining cumulative percent of acres (i.e. Class 9 has the top 1.5% of acres with the highest occurrence rate). Refer to the Colorado WRA Final Report for a more detailed description of the mapping classes and the methods used to derive these.

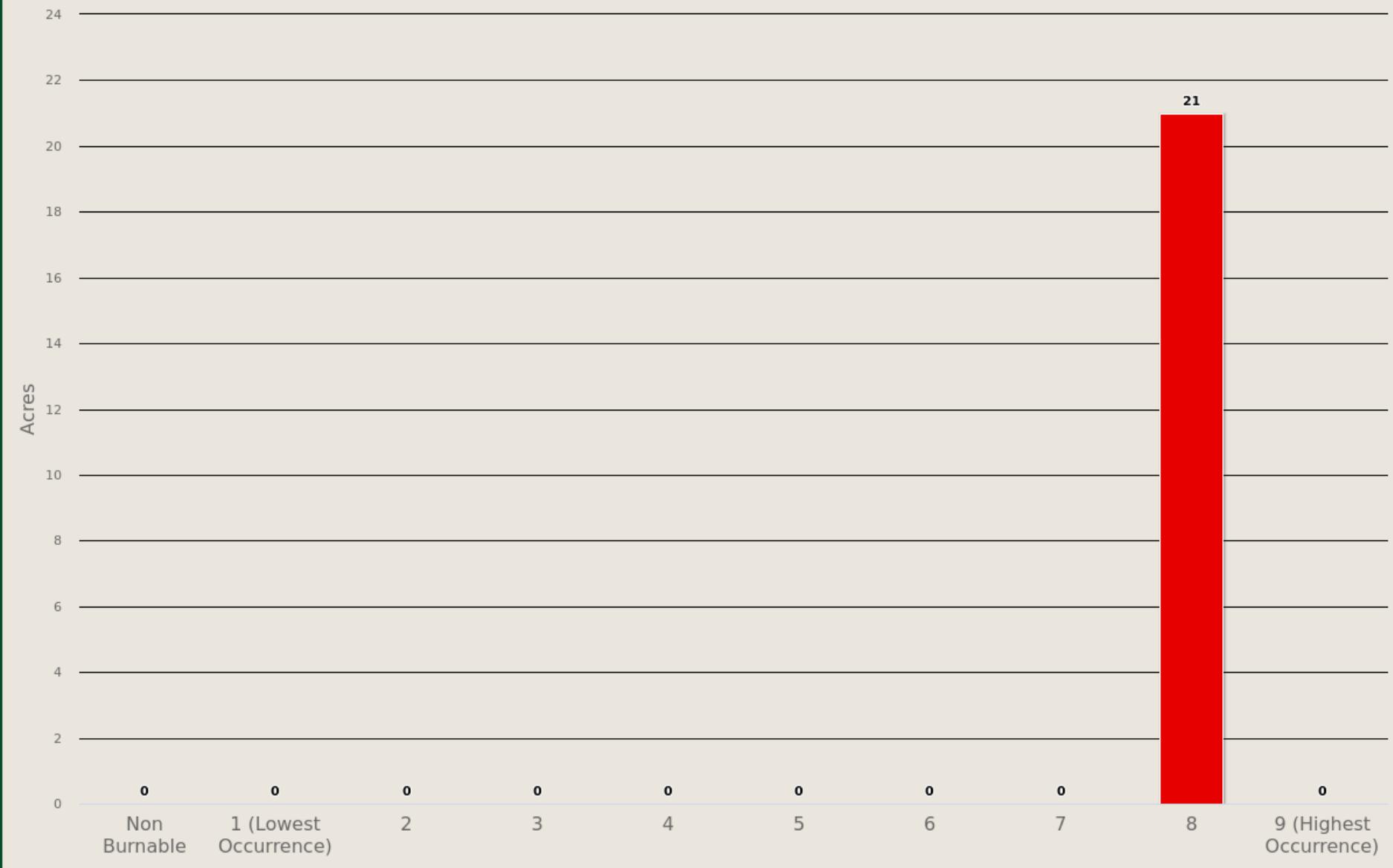
The Fire Occurrence map is derived at a 30-meter resolution. This scale of data was chosen to be consistent with the accuracy of the primary surface fuels dataset used in the assessment. While not sufficient for site specific analysis, it is appropriate for regional, county or local protection mitigation or prevention planning.

A more detailed description of the risk assessment algorithms is provided in the Colorado WRA Final Report, which can be downloaded from [www.ColoradoForestAtlas.org](http://www.ColoradoForestAtlas.org).

Fire Occurrence Class	Acres	Percent
Non Burnable	0	1.0 %
1 (Lowest Occurrence)	0	0 %
2	0	0 %
3	0	0 %
4	0	0 %
5	0	0 %
6	0	0 %
7	0	0 %
8	21	99.0 %
9 (Highest Occurrence)	0	0 %
<b>Total</b>	<b>21</b>	<b>100 %</b>

## Skyfall Subdivision Filing No. 1

### Fire Occurrence



**Skyfall Subdivision Filing No. 1**



**Fire Occurrence**

- Non Burnable
- 1 (Lowest Occurrence)
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9 (Highest Occurrence)

300 ft



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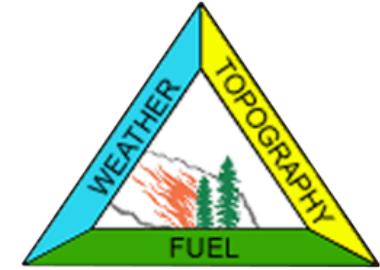
# Fire Behavior

## Description

Fire behavior is the manner in which a fire reacts to the following environmental influences:

1. Fuels
2. Weather
3. Topography

Fire behavior characteristics are attributes of wildland fire that pertain to its spread, intensity, and growth. Fire behavior characteristics utilized in the Colorado WRA include fire type, rate of spread, flame length and fireline intensity (fire intensity scale). These metrics are used to determine the potential fire behavior under different weather scenarios. Areas that exhibit moderate to high fire behavior potential can be identified for mitigation treatments, especially if these areas are in close proximity to homes, business, or other assets.



### Fuels

The Colorado WRA includes composition and characteristics for both surface fuels and canopy fuels. Assessing canopy fire potential and surface fire potential allows identification of areas where significant increases in fire behavior affects the potential of a fire to transition from a surface fire to a canopy fire.

Fuel datasets required to compute both surface and canopy fire potential include:

1. **Surface Fuels** are typically categorized into one of four primary fuel types based on the primary carrier of the surface fire: 1) grass, 2) shrub/brush, 3) timber litter, and 4) slash. They are generally referred to as fire behavior fuel models and provide the input parameters needed to compute surface fire behavior. The 2017 assessment uses the latest 2017 calibrated fuels for Colorado.
2. **Canopy Cover** is the horizontal percentage of the ground surface that is covered by tree crowns. It is used to compute wind-reduction factors and shading.
3. **Canopy Ceiling Height/Stand Height** is the height above the ground of the highest canopy layer where the density of the crown mass within the layer is high enough to support vertical movement of a fire. A good estimate of canopy ceiling height is the average height of the dominant and co-dominant trees in a stand. It is used to compute wind reduction to mid-flame height, and spotting distances from torching trees.
4. **Canopy Base Height** is the lowest height above the ground above which sufficient canopy fuel exists to vertically propagate fire (Scott & Reinhardt, 2001). Canopy base height is a property of a plot, stand or group of trees, not an individual tree. For fire modeling, canopy base height is an effective value that incorporates ladder fuels, such as tall shrubs and small trees. Canopy base height is used to determine whether a surface fire will transition to a canopy fire.



5. **Canopy Bulk Density** is the mass of available canopy fuel per unit canopy volume (Scott & Reinhardt, 2001). Canopy bulk density is a bulk property of a stand, plot or group of trees, not an individual tree. Canopy bulk density is used to predict whether an active crown fire is possible.

#### Weather

Environmental weather parameters needed to compute fire behavior characteristics include 1-hour, 10-hour and 100-hour time-lag fuel moistures, herbaceous fuel moisture, woody fuel moisture and the 20-foot, 10-minute average wind speed. To collect this information, Weather data (1988-2017) from NCEP (National Center for Environmental Prediction) was used to analyse potential weather scenarios in which assessing fire behavior and spread. In particular, the North American Regional Reanalysis (NARR) product from NCEP was selected because of it provides high resolution weather data for all of Colorado. The following percentiles (97th, 90th, 50th and 25th) were analysed for each variable in each 30km NARR point to create four weather scenarios to run the fire behavior analysis: “Extreme”, “High”, “Moderate” and “Low”. After computing the weather percentiles of the NARR variables, an IDW algorithm was used to derive 30m resolution data to match the surface fuels dataset.

The four percentile weather categories are intended to represent low, moderate, high and extreme fire weather days. Fire behavior outputs are computed for each percentile weather category to determine fire potential under different weather scenarios.

For a detailed description of the methodology, refer to the 2017 Colorado Wildfire Risk Assessment Final Report at [www.ColoradoForestAtlas.org](http://www.ColoradoForestAtlas.org).

#### Topography

Topography datasets required to compute fire behavior characteristics are elevation, slope and aspect.

## FIRE BEHAVIOR CHARACTERISTICS

Fire behavior characteristics provided in this report include:

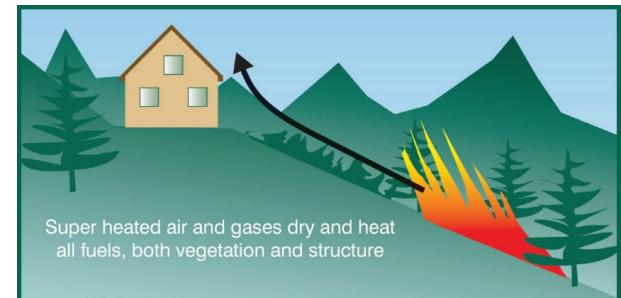
- **Characteristic Rate of Spread**
- **Characteristic Flame Length**
- **Fire Intensity Scale**
- **Fire Type – Extreme Weather**

# Characteristic Rate of Spread

**Characteristic Rate of Spread** is the typical or representative rate of spread of a potential fire based on a weighted average of four percentile weather categories. Rate of spread is the speed with which a fire moves in a horizontal direction across the landscape, usually expressed in chains per hour (ch/hr) or feet per minute (ft/min). For purposes of the Colorado WRA, this measurement represents the maximum rate of spread of the fire front. Rate of Spread is used in the calculation of Wildfire Threat in the Colorado WRA.

Rate of spread is a fire behavior output, which is influenced by three environmental factors - fuels, weather, and topography. Weather is by far the most dynamic variable as it changes frequently. To account for this variability, four percentile weather categories were created from historical weather observations to represent low, moderate, high, and extreme weather days for each 30-meter cell in Colorado. Thirty (30) meter resolution is the baseline for the Colorado WRA, matching the source surface fuels dataset.

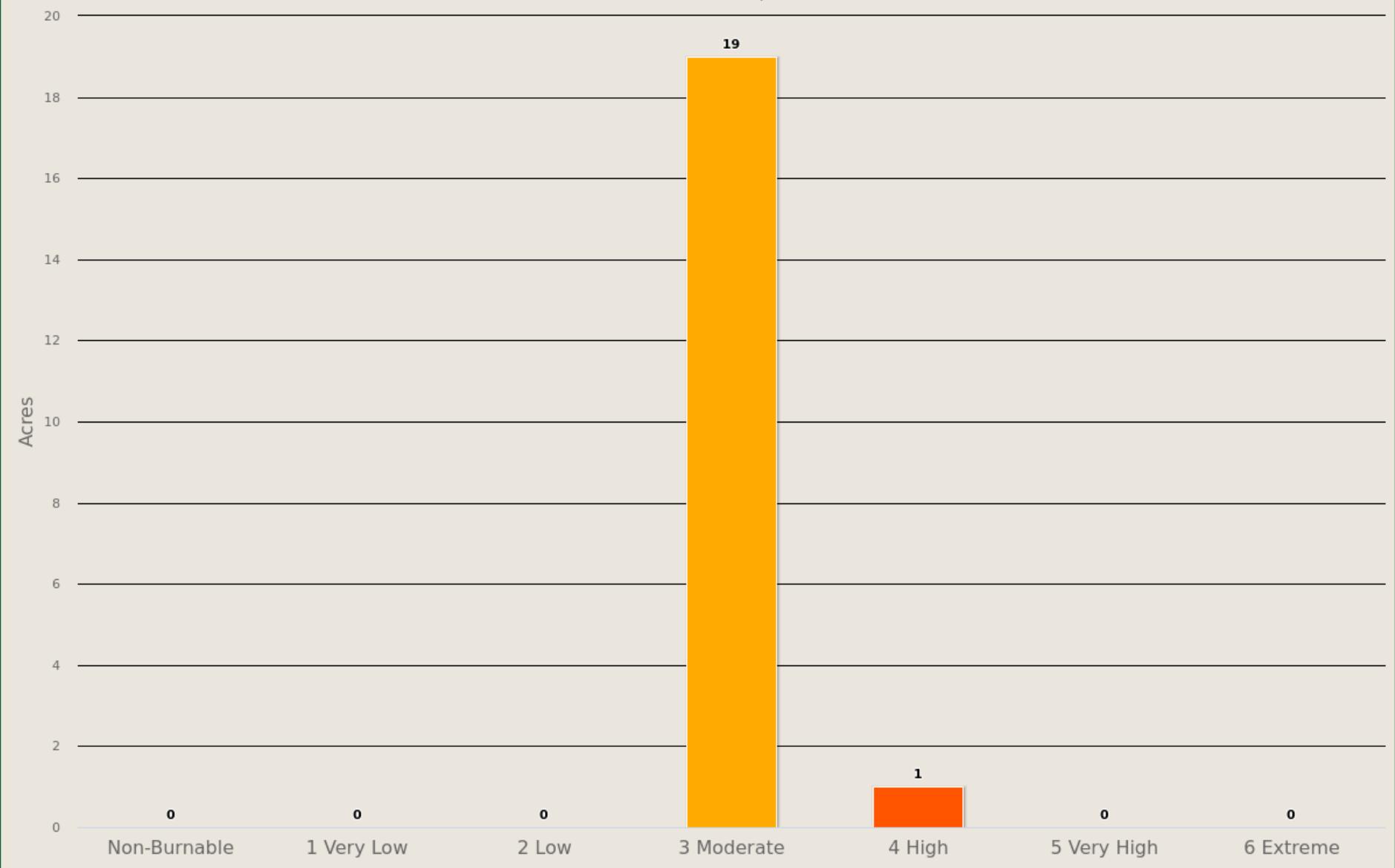
The “characteristic” output represents the weighted average for all four weather percentiles. While not shown in this report, the individual percentile weather ROS outputs are available in the Colorado WRA data.

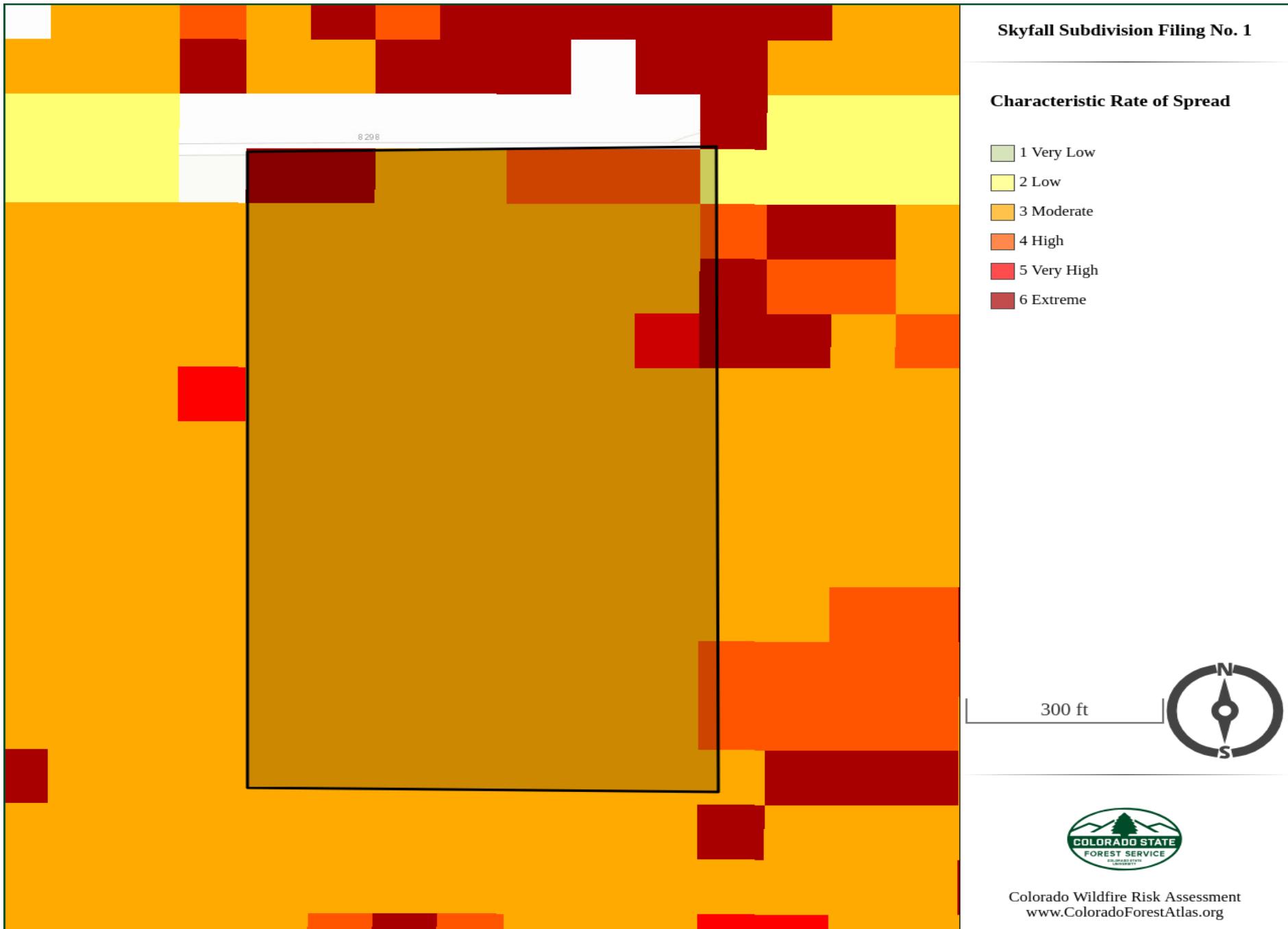


Rate of Spread	Acres	Percent
Non-Burnable	0	0 %
1 Very Low	0	0 %
2 Low	0	0 %
3 Moderate	19	90.6 %
4 High	1	6.2 %
5 Very High	0	1.0 %
6 Extreme	0	2.1 %
<b>Total</b>	<b>21</b>	<b>100 %</b>

## Skyfall Subdivision Filing No. 1

Characteristic Rate of Spread



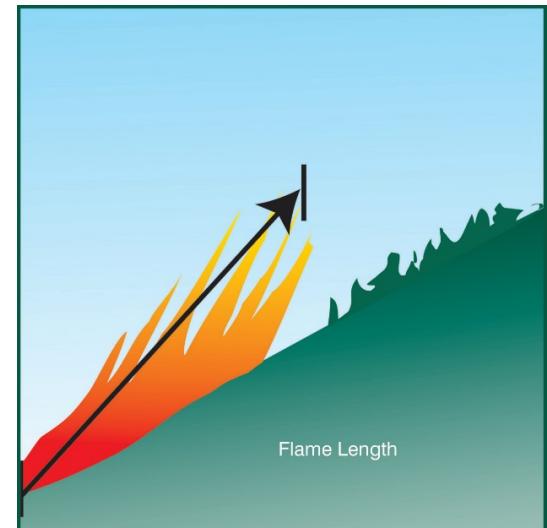


# Characteristic Flame Length

**Characteristic Flame Length** is the typical or representative flame length of a potential fire based on a weighted average of four percentile weather categories. Flame Length is defined as the distance between the flame tip and the midpoint of the flame depth at the base of the flame, which is generally the ground surface. It is an indicator of fire intensity and is often used to estimate how much heat the fire is generating. Flame length is typically measured in feet (ft). Flame length is the measure of fire intensity used to generate the Fire Effects outputs for the Colorado WRA.

Flame length is a fire behavior output, which is influenced by three environmental factors - fuels, weather, and topography. Weather is by far the most dynamic variable as it changes frequently. To account for this variability, four percentile weather categories were created from historical weather observations to represent low, moderate, high, and extreme weather days for each 30-meter cell in Colorado.

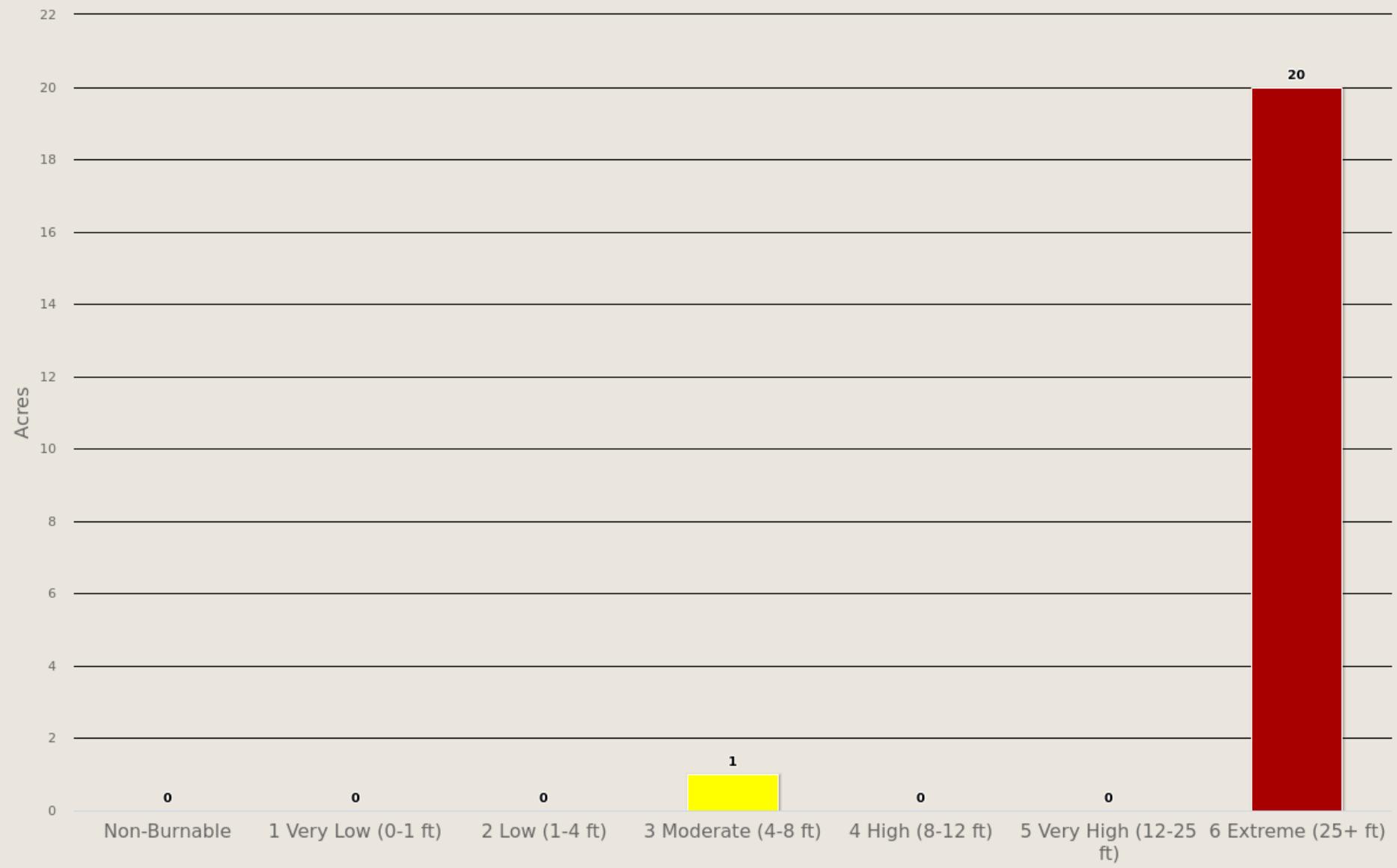
This output represents the weighted average for all four weather percentiles. While not shown in this report, the individual percentile weather Flame Length outputs are available in the Colorado WRA data.



Flame Length	Acres	Percent
Non-Burnable	0	0 %
1 Very Low (0-1 ft)	0	0 %
2 Low (1-4 ft)	0	1.0 %
3 Moderate (4-8 ft)	1	5.2 %
4 High (8-12 ft)	0	0 %
5 Very High (12-25 ft)	0	0 %
6 Extreme (25+ ft)	20	93.8 %
<b>Total</b>	<b>21</b>	<b>100%</b>

## Skyfall Subdivision Filing No. 1

Characteristic Flame Length

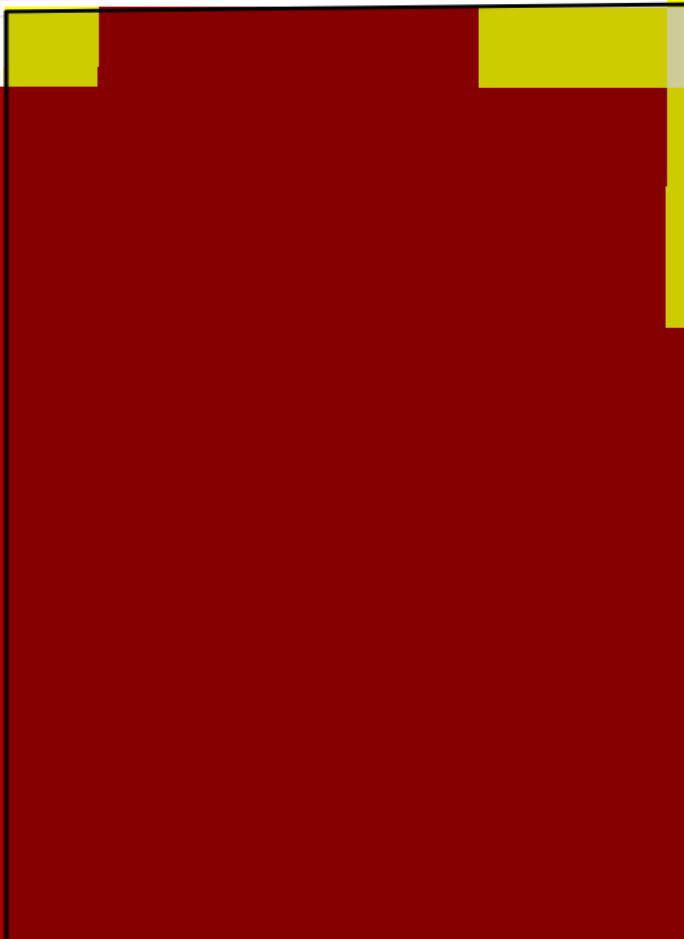


**Skyfall Subdivision Filing No. 1**

**Characteristic Flame Length**

- [Light Green] Non-Burnable
- [Yellow] 1 Very Low (0-1 ft)
- [Light Yellow] 2 Low (1-4 ft)
- [Orange] 3 Moderate (4-8 ft)
- [Red] 4 High (8-12 ft)
- [Dark Red] 5 Very High (12-25 ft)

8298



300 ft



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# Fire Intensity Scale

## Description

**Fire Intensity Scale (FIS) specifically identifies areas where significant fuel hazards and associated dangerous fire behavior potential exist.** Similar to the Richter scale for earthquakes, FIS provides a standard scale to measure potential wildfire intensity. FIS consist of five (5) classes where the order of magnitude between classes is ten-fold. The minimum class, Class 1, represents very low wildfire intensities and the maximum class, Class 5, represents very high wildfire intensities.

### 1. Class 1, Lowest Intensity:

Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non-specialized equipment.

### 2. Class 2, Low:

Small flames, usually less than two feet long; small amount of very short-range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.

### 3. Class 3, Moderate:

Flames up to 8 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.

### 4. Class 4, High:

Large Flames, up to 30 feet in length; short-range spotting 1. common; medium range spotting possible. Direct attack by trained firefighters, engines, and dozers is generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property.

### 5. Class 5, Highest Intensity:

Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. Indirect attack marginally effective at the head of the fire. Great potential for harm or damage to life and property.

Burn Probability and Fire Intensity Scale are designed to complement each other. The Fire Intensity Scale does not incorporate historical occurrence information. It only evaluates the potential fire behavior for an area, regardless if any fires have occurred there in the past. This additional information allows mitigation planners to quickly identify areas where dangerous fire behavior potential exists in relationship to nearby homes or other valued assets.

Since all areas in Colorado have fire intensity scale calculated consistently, it allows for comparison and ordination of areas across the entire state. For example, a high fire intensity area in Eastern Colorado is equivalent to a high fire intensity area in Western Colorado.

Fire intensity scale is a fire behavior output, which is influenced by three environmental factors - fuels, weather, and topography. Weather is by far the most dynamic variable as it changes frequently.

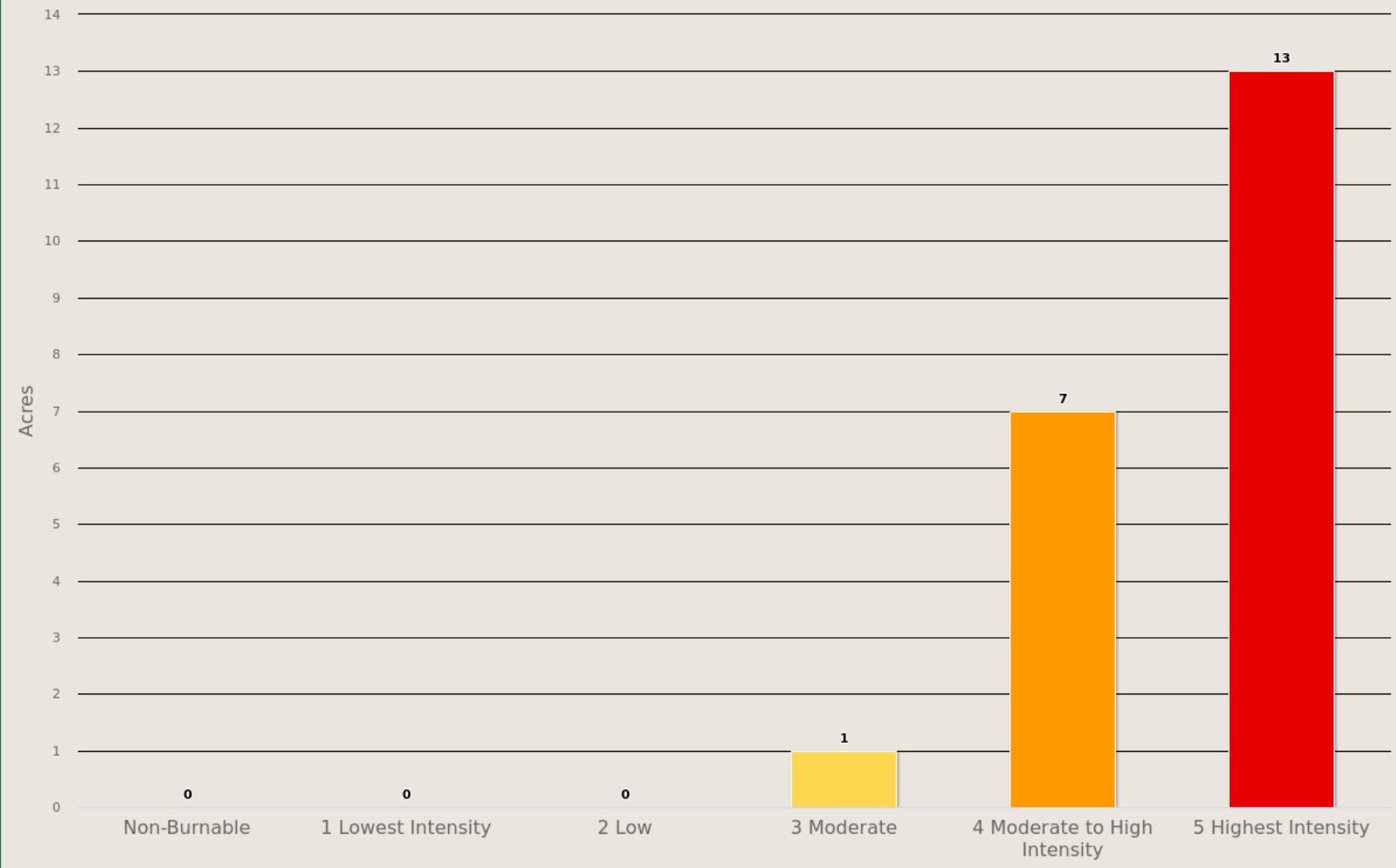
To account for this variability, four percentile weather categories were created from historical weather observations to represent low, moderate, high, and extreme weather days for each 30-meter cell in Colorado. The FIS represents the weighted average for all four weather percentiles.

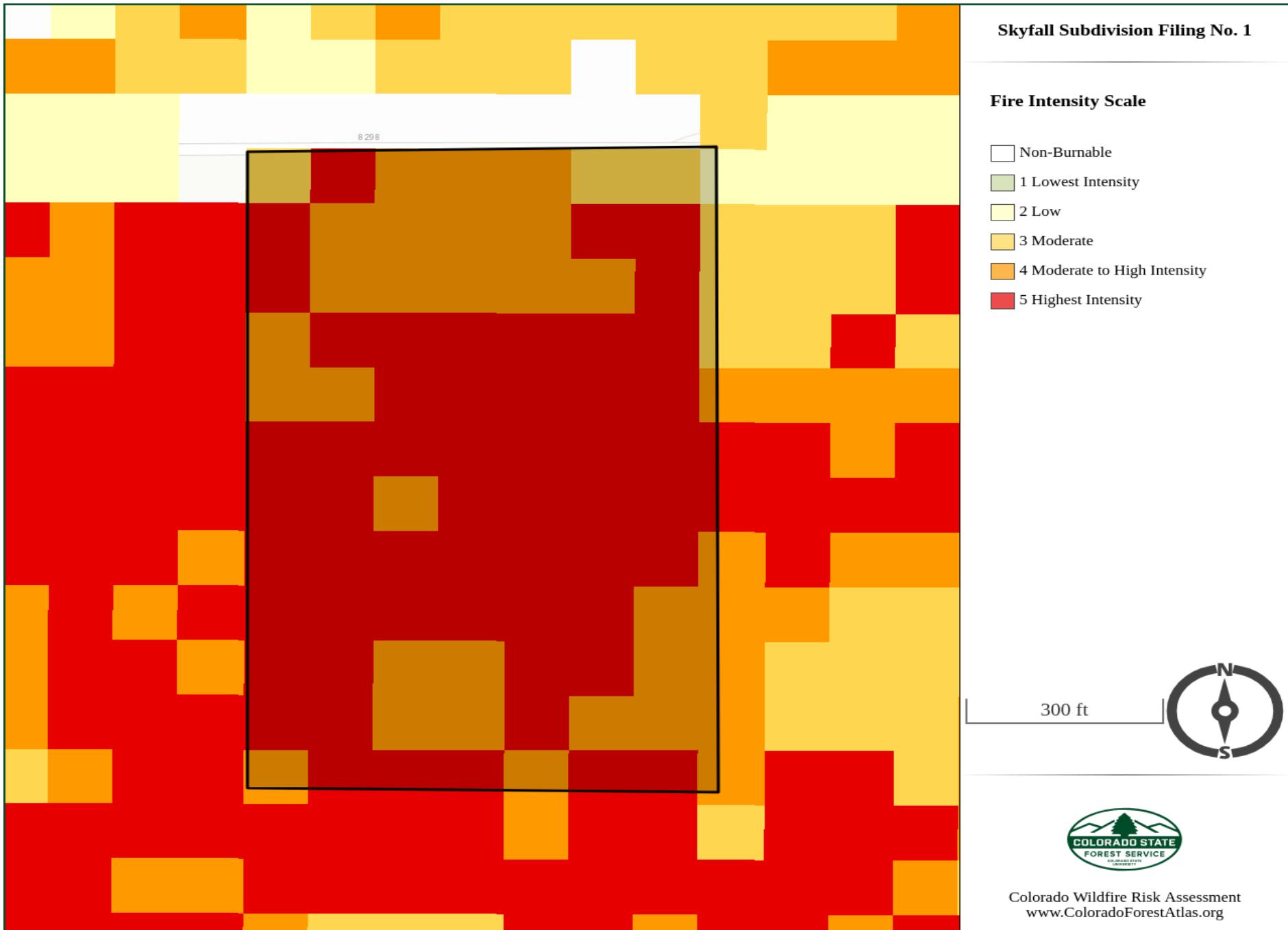
The fire intensity scale map is derived at a 30-meter resolution. This scale of data was chosen to be consistent with the accuracy of the primary surface fuels dataset used in the assessment. While not appropriate for site specific analysis, it is appropriate for regional, county or local planning efforts.

FIS Class	Acres	Percent
Non-Burnable	0	0 %
1 Lowest Intensity	0	0 %
2 Low	0	1.0 %
3 Moderate	1	5.2 %
4 Moderate to High Intensity	7	31.2 %
5 Highest Intensity	13	62.5 %
<b>Total</b>	<b>21</b>	<b>100%</b>

## Skyfall Subdivision Filing No. 1

Fire Intensity Scale





# Fire Type – Extreme Weather

**Fire Type – Extreme** represents the potential fire type under the extreme percentile weather category. The extreme percentile weather category represents the average weather based on the top three percent fire weather days in the analysis period. It is not intended to represent a worst-case scenario weather event. Accordingly, the potential fire type is based on fuel conditions, extreme percentile weather, and topography.

Canopy fires are very dangerous, destructive and difficult to control due to their increased fire intensity. From a planning perspective, it is important to identify where these conditions are likely to occur on the landscape so that special preparedness measure can be taken if necessary. Typically canopy fires occur in extreme weather conditions. The Fire Type – Extreme layer shows the footprint of where these areas are most likely to occur. However, it is important to note that canopy fires are not restricted to these areas. Under the right conditions, it can occur in other canopied areas.

There are two primary fire types – surface fire and canopy fire. Canopy fire can be further subdivided into passive canopy fire and active canopy fire. A short description of each of these is provided below.

## Surface Fire

A fire that spreads through surface fuel without consuming any overlying canopy fuel. Surface fuels include grass, timber litter, shrub/brush, slash and other dead or live vegetation within about 6 feet of the ground.



## Passive Canopy Fire

A type of crown fire in which the crowns of individual trees or small groups of trees burn, but solid flaming in the canopy cannot be maintained except for short periods (Scott & Reinhardt, 2001).



## Active Canopy Fire

A crown fire in which the entire fuel complex (canopy) is involved in flame, but the crowning phase remains dependent on heat released from surface fuel for continued spread (Scott & Reinhardt, 2001).

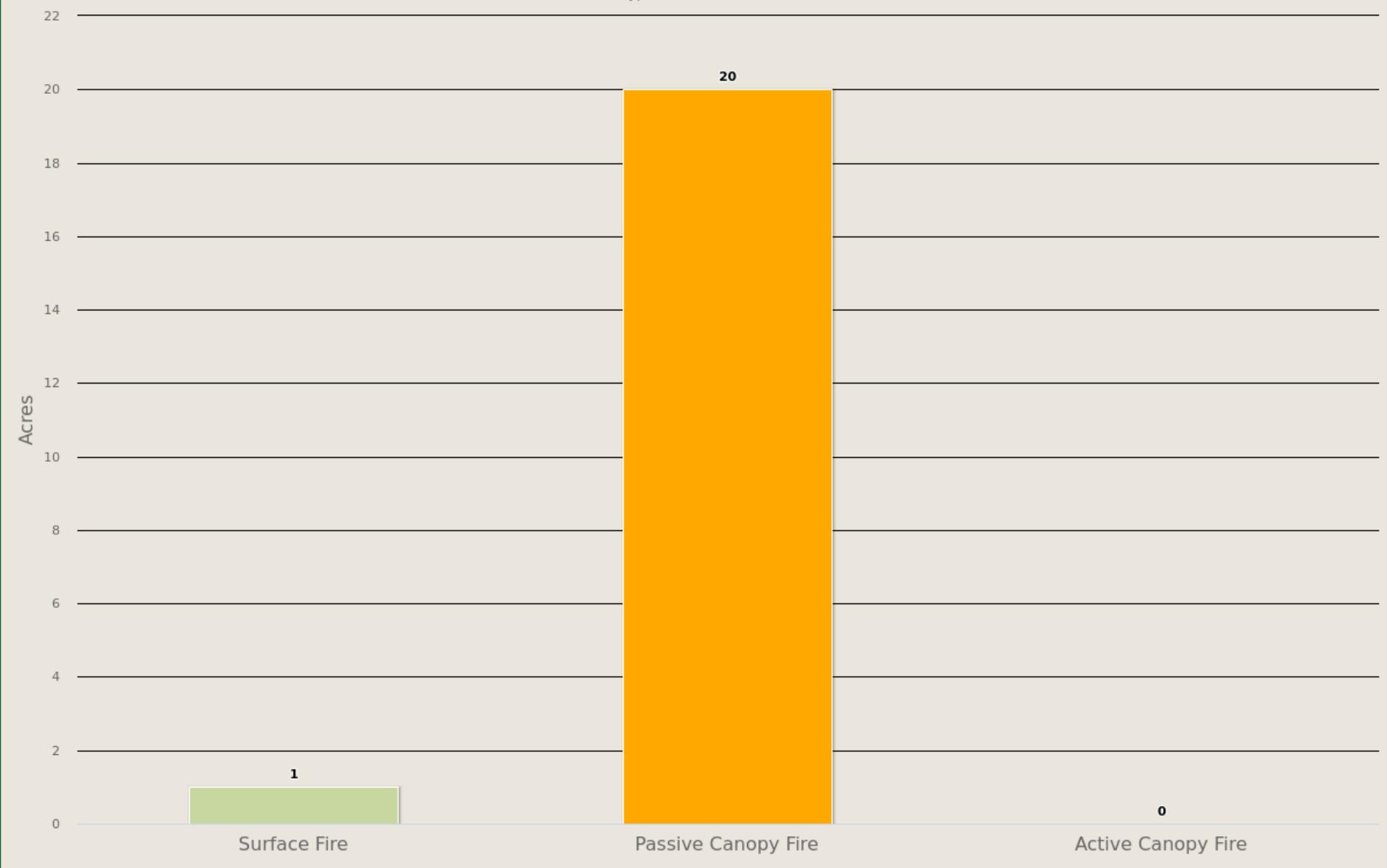
The Fire Type - Extreme Weather map is derived at a 30-meter resolution. This scale of data was chosen to be consistent with the accuracy of the primary surface fuels dataset used in the assessment. While not appropriate for site specific analysis, it is appropriate for regional, county or local planning efforts.



Fire Type - Extreme Weather	Acres	Percent
Surface Fire	1	6.2 %
Passive Canopy Fire	20	92.7 %
Active Canopy Fire	0	1.0 %
<b>Total</b>	<b>21</b>	<b>100 %</b>

## Skyfall Subdivision Filing No. 1

Fire Type - Extreme Weather

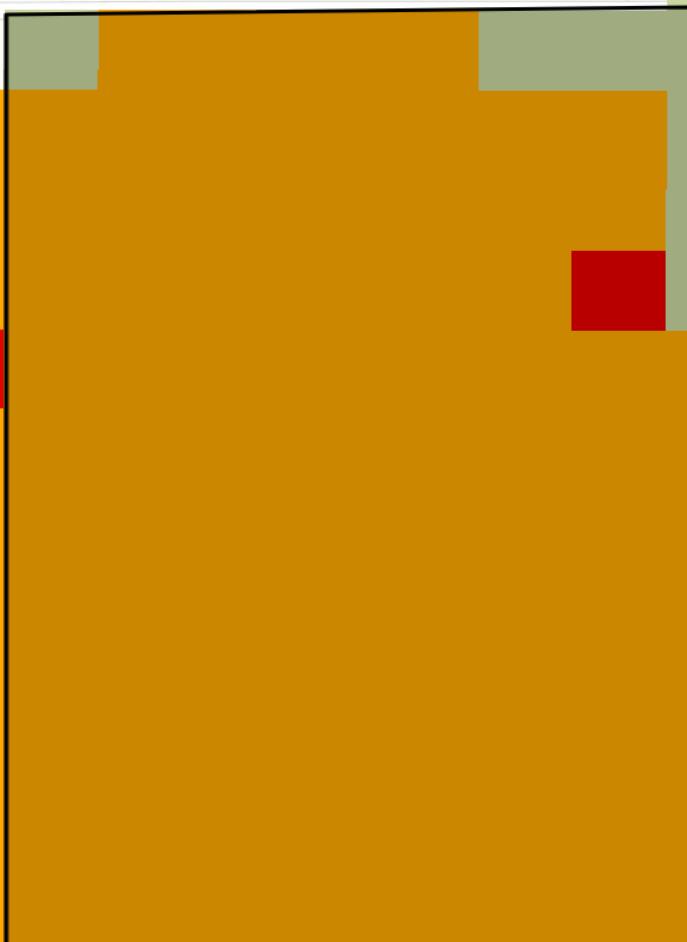


**Skyfall Subdivision Filing No. 1**

**Fire Type Extreme Weather**

- Surface Fire
- Passive Canopy Fire
- Active Canopy Fire

8298



300 ft



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# Surface Fuels

## Description

Surface fuels, or fire behavior fuel models as they are technically referred to, contain the parameters required by the Rothermel (1972) surface fire spread model to compute surface fire behavior characteristics, including rate of spread, flame length, fireline intensity and other fire behavior metrics. As the name might suggest, surface fuels account only for surface fire potential. Canopy fire potential is computed through a separate but linked process. The Colorado WRA accounts for both surface and canopy fire potential in the fire behavior outputs. However, only surface fuels are shown in this risk report.

Surface fuels typically are categorized into one of four primary fuel types based on the primary carrier of the surface fire: 1) grass, 2) shrub/brush, 3) timber litter, and 4) slash. Two standard fire behavior fuel model sets have been published. The Fire Behavior Prediction System 1982 Fuel Model Set (Anderson, 1982) contains 13 fuel models, and the Fire Behavior Prediction System 2005 Fuel Model Set (Scott & Burgan, 2005) contains 40 fuel models. The Colorado WRA uses fuel models from the 2005 Fuel Model Set.

The 2017 Colorado Surface Fuels were derived by enhancing the baseline LANDFIRE 2014 products with modifications to reflect local conditions and knowledge. A team of fuels and fire behavior experts, led by the CSFS, conducted a detailed calibration of the LANDFIRE 2014 fuels datasets. This calibration involved correcting LANDFIRE mapping zone seamlines errors; adding recent disturbances from 2013 to 2017 for fires, insect and disease, and treatments; correcting fuels for high elevations; adjusting fuels for oak-shrublands and pinyon-juniper areas; and modifying SH7 fuel designations. This calibration effort resulted in an accurate and up-to-date surface fuels dataset that is the basis for the fire behavior and risk calculations in the 2017 Colorado Wildfire Risk Assessment Update.

A detailed description of the fuels calibration methods and results is provided in the CSFS 2017 Fuels Calibration Final Report (July 2018).



Unmanaged forest with dead and downed trees and branches

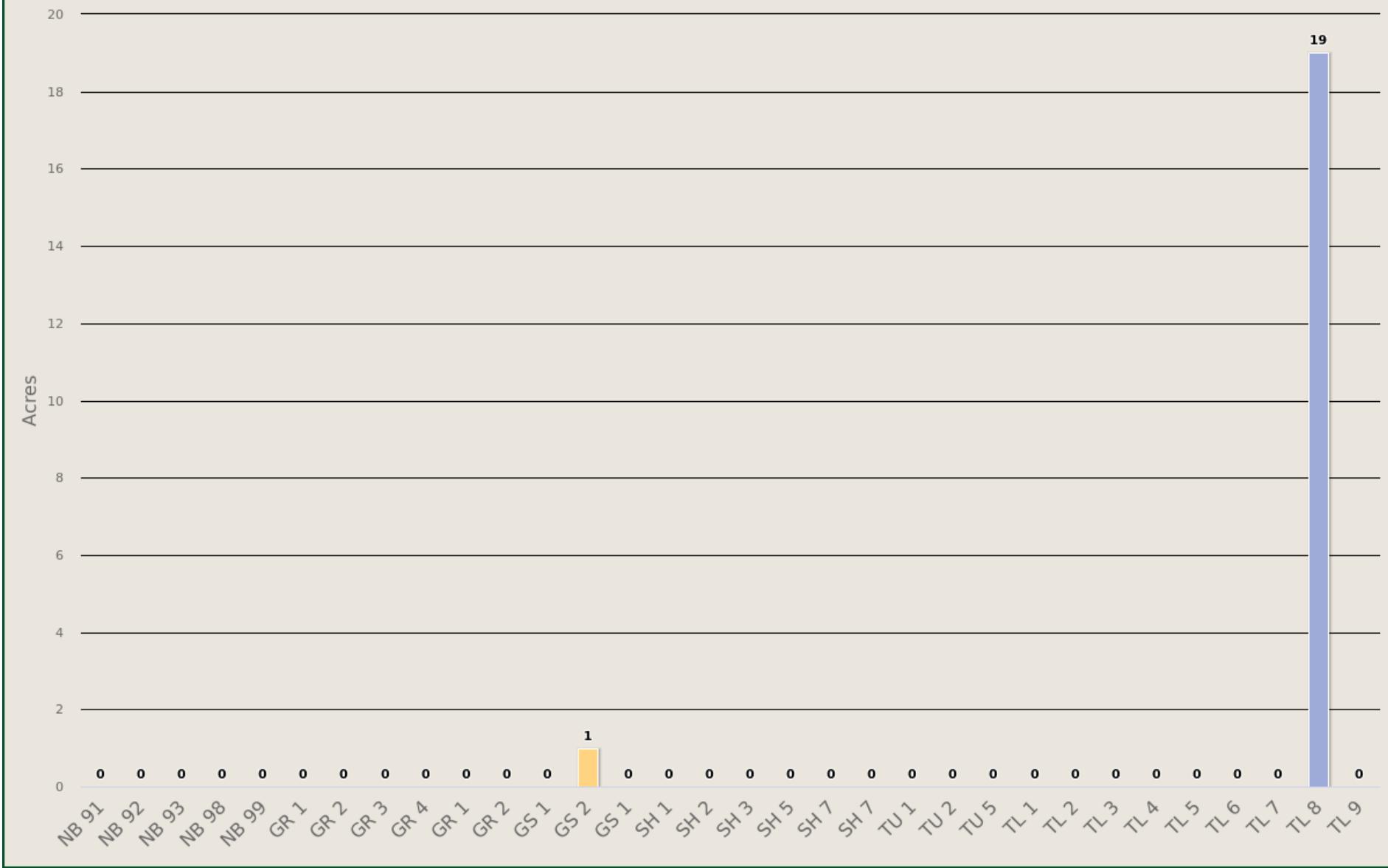


Slash on the ground indicates that forest management treatments have occurred in this area

Surface Fuels	Description	Acres	Percent
NB 91	Urban/Developed	0	0 %
NB 92	Snow/Ice	0	0 %
NB 93	Agriculture	0	0 %
NB 98	Water	0	0 %
NB 99	Barren	0	0 %
GR 1	Short, sparse, dry climate grass	0	1.0 %
GR 2	Low load, dry climate grass	0	2.1 %
GR 3	Low load, very coarse, humid climate grass	0	0 %
GR 4	Moderate load, dry climate grass	0	0 %
GR 1	GT 10,000 ft elevation	0	0 %
GR 2	GT 10,000 ft elevation	0	0 %
GS 1	Low load, dry climate grass-shrub	0	0 %
GS 2	Moderate load, dry climate grass-shrub	1	6.2 %
GS 1	GT 10,000 ft elevation	0	0 %
SH 1	Low load, dry climate shrub	0	0 %
SH 2	Moderate load, dry climate shrub	0	0 %
SH 3	Moderate load, humid climate shrub	0	0 %
SH 5	High load, humid climate shrub	0	0 %
SH 7	Very high load, dry climate shrub	0	0 %
SH 7	Oak Shrubland without changes	0	0 %
TU 1	Light load, dry climate timber-grass-shrub	0	0 %
TU 2	Moderate load, humid climate timber-shrub	0	0 %
TU 5	Very high load, dry climate timber-shrub	0	0 %
TL 1	Low load, compact conifer litter	0	0 %
TL 2	Low load, broadleaf litter	0	0 %
TL 3	Moderate load, conifer litter	0	0 %
TL 4	Small downed logs	0	0 %
TL 5	High load, conifer litter	0	0 %
TL 6	Moderate load, broadleaf litter	0	0 %
TL 7	Large downed logs	0	0 %
TL 8	Long-needle litter	19	90.6 %
TL 9	Very high load, broadleaf litter	0	0 %
Total		21	100 %

## Skyfall Subdivision Filing No. 1

Surface Fuels



## Skyfall Subdivision Filing No. 1

### Surface Fuels

NB 91	SH 5
NB 92	SH 7
NB 93	SH 7
NB 98	TU 1
NB 99	TU 2
GR 1	TU 5
GR 2	TL 1
GR 3	TL 2
GR 4	TL 3
GR 1	TL 4
GR 2	TL 5
GS 1	TL 6
GS 2	TL 7
GS 1	TL 8
SH 1	TL 9
SH 2	
SH 3	

300 ft



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# Vegetation

## Description

The Vegetation map describes the general vegetation and landcover types across the state of Colorado. In the Colorado WRA, the Vegetation dataset is used to support the development of the Surface Fuels, Canopy Cover, Canopy Stand Height, Canopy Base Height, and Canopy Bulk Density datasets.

The LANDFIRE 2014 version of data products (Existing Vegetation Type) was used to compile the Vegetation data for the Colorado WRA. This reflects data current to 2014. The LANDFIRE EVT data were classified to reflect general vegetation cover types for representation with CO-WRAP.



Oak shrublands are commonly found along dry foothills and lower mountain slopes, and are often situated above Piñon-juniper.



Piñon-juniper woodlands are common in southern and southwestern Colorado.



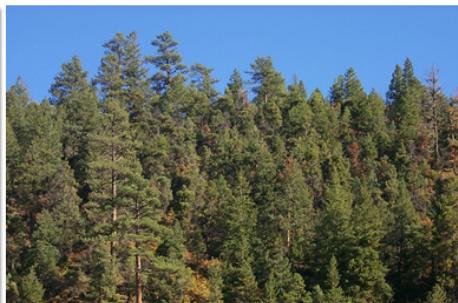
Douglas-fir understory in a ponderosa pine forest.



Grasslands occur both on Colorado's Eastern Plains and on the Western Slope.



Wildland fire threat increases in lodgepole pine as the dense forests grow old.

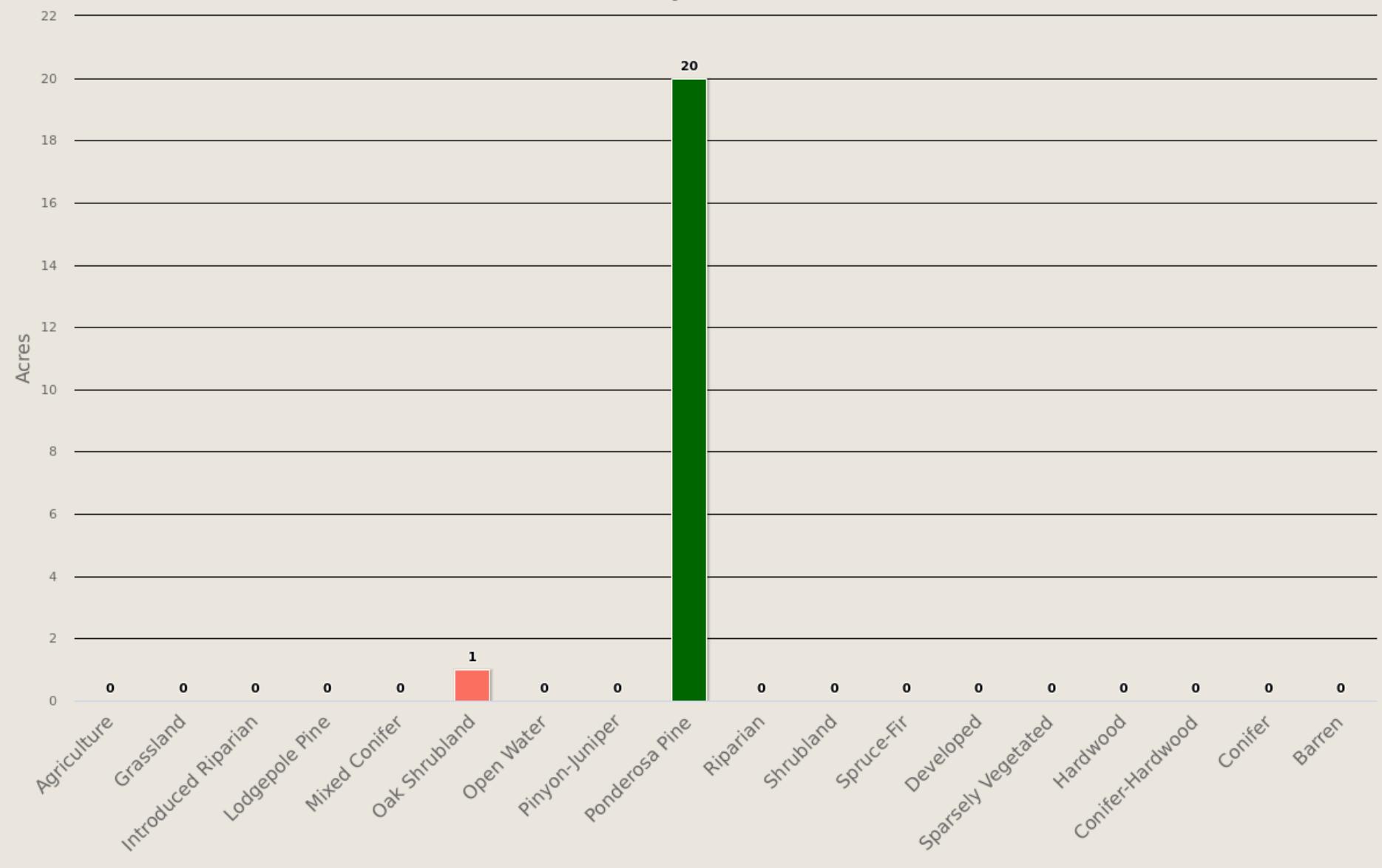


Overly dense ponderosa pine, a dominant species of the montane zone.

Vegetation Class	Acres	Percent
Agriculture	0	0 %
Grassland	0	0 %
Introduced Riparian	0	0 %
Lodgepole Pine	0	0 %
Mixed Conifer	0	0 %
Oak Shrubland	1	3.1 %
Open Water	0	0 %
Pinyon-Juniper	0	0 %
Ponderosa Pine	20	93.8 %
Riparian	0	0 %
Shrubland	0	2.1 %
Spruce-Fir	0	0 %
Developed	0	1.0 %
Sparsely Vegetated	0	0 %
Hardwood	0	0 %
Conifer-Hardwood	0	0 %
Conifer	0	0 %
Barren	0	0 %
<b>Total</b>	<b>21</b>	<b>100 %</b>

## Skyfall Subdivision Filing No. 1

### Vegetation



## Skyfall Subdivision Filing No. 1

### Vegetation

- Agriculture
- Barren
- Grassland
- Introduced Riparian
- Lodgepole Pine
- Mixed Conifer
- Oak Shrubland
- Open Water
- Pinyon-Juniper
- Ponderosa Pine
- Riparian
- Shrubland
- Spruce-Fir
- Developed
- Sparsely Vegetated
- Hardwood
- Conifer-Hardwood
- Conifer

300 ft



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# Drinking Water Importance Areas

## Description

**Drinking Water Importance Areas** is the measure of quality and quantity of public surface drinking water categorized by watershed. This layer identifies an index of surface drinking water importance, reflecting a measure of water quality and quantity, characterized by Hydrologic Unit Code 12 (HUC 12) watersheds. The Hydrologic Unit system is a standardized watershed classification system developed by the USGS. Areas that are a source of drinking water are of critical importance and adverse effects from fire are a key concern.

The U.S. Forest Service Forests to Faucets (F2F) project is the primary source of the drinking water data set. This project used GIS modeling to develop an index of importance for supplying drinking water using HUC 12 watersheds as the spatial resolution. Watersheds are ranked from 1 to 100 reflecting relative level of importance, with 100 being the most important and 1 the least important.

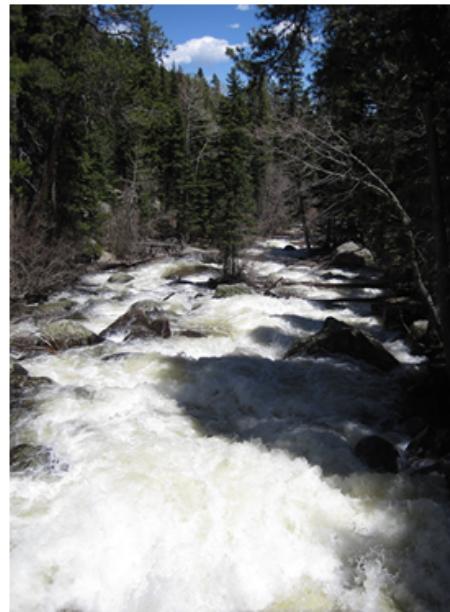
Several criteria were used in the F2F project to derive the importance rating including water supply, flow analysis, and downstream drinking water demand. The final model of surface drinking water importance used in the F2F project combines the drinking water protection model, capturing the flow of water and water demand, with a model of mean annual water supply.

The values generated by the drinking water protection model are simply multiplied by the results of the model of mean annual water supply to create the final surface drinking water importance index.

Water is critical to sustain life. Human water usage has further complicated nature's already complex aquatic system. Plants, including trees, are essential to the proper functioning of water movement within the environment. Forests receive precipitation, utilize it for their sustenance and growth, and influence its storage and/or passage to other parts of the environment.

Four major river systems – the Platte, Colorado, Arkansas and Rio Grande – originate in the Colorado mountains and fully drain into one-third of the landmass of the lower 48 states. Mountain snows supply 75 percent of the water to these river systems.

Approximately 40 percent of the water comes from the highest 20 percent of the land, most of which lies in national forests. National forests yield large portions of the total water in these river systems. The potential is great for forests to positively and negatively influence the transport of water over such immense distances.



Virtually all of Colorado's drinking water comes from snowmelt carried at some point by a river.

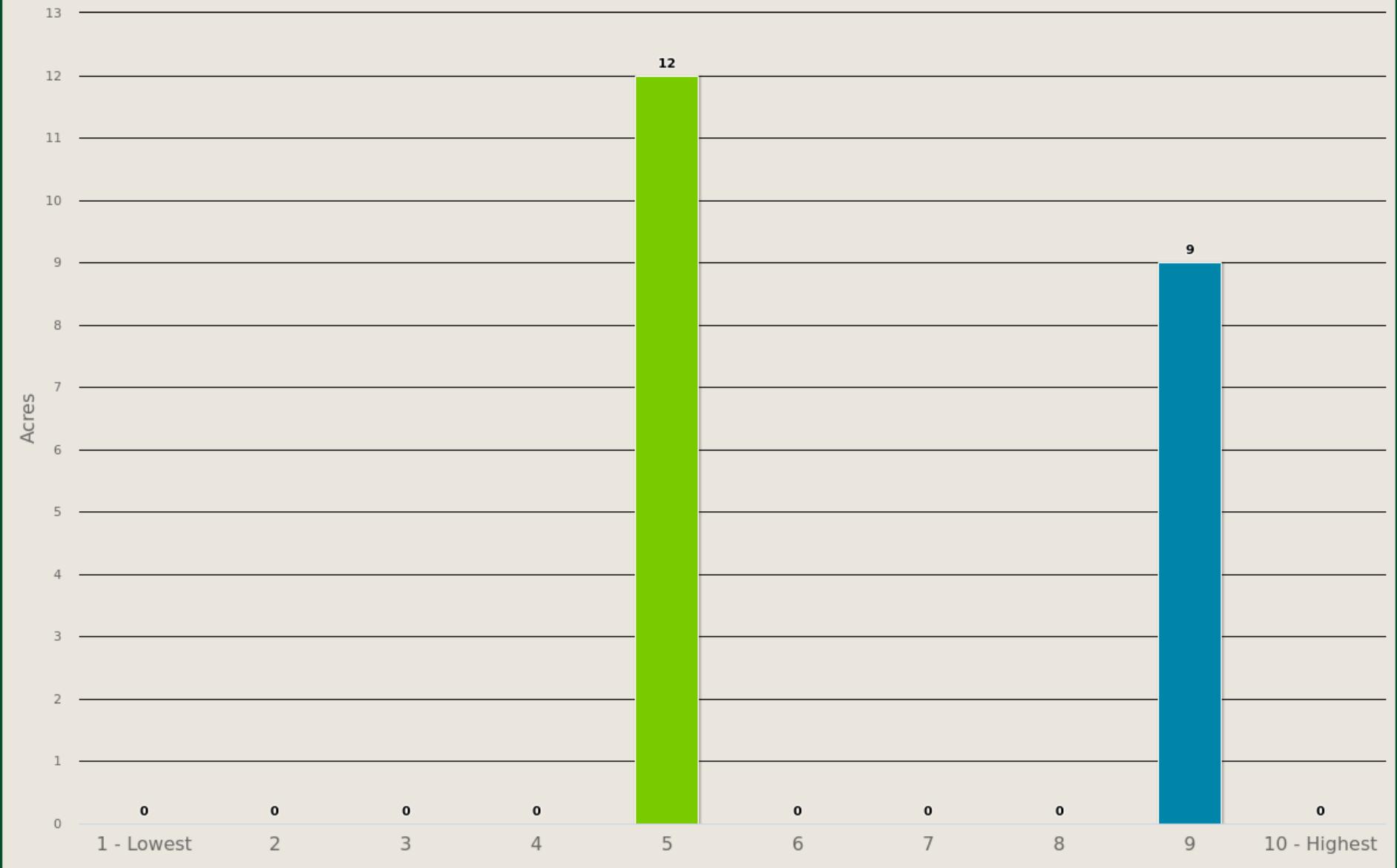


The headwaters of the Animas River begin near Silverton, CO at elevations greater than 12,000 feet.

Drinking Water Class	Acres	Percent
1 - Lowest	0	0 %
2	0	0 %
3	0	0 %
4	0	0 %
5	12	57.3 %
6	0	0 %
7	0	0 %
8	0	0 %
9	9	42.7 %
10 - Highest	0	0 %
Total	21	100%

## Skyfall Subdivision Filing No. 1

### Drinking Water Importance Areas



**Drinking Water Importance Areas**

- 1 - Lowest
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 - Highest

300 ft



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# Drinking Water Risk Index

## Description

**Drinking Water Risk Index is a measure of the risk to DWIAs based on the potential negative impacts from wildfire.**

In areas that experience low-severity burns, fire events can serve to eliminate competition, rejuvenate growth and improve watershed conditions. But in landscapes subjected to high, or even moderate-burn severity, the post-fire threats to public safety and natural resources can be extreme.

High-severity wildfires remove virtually all forest vegetation – from trees, shrubs and grasses down to discarded needles, decomposed roots and other elements of ground cover or duff that protect forest soils. A severe wildfire also can cause certain types of soil to become hydrophobic by forming a waxy, water-repellent layer that keeps water from penetrating the soil, dramatically amplifying the rate of runoff.

The loss of critical surface vegetation leaves forested slopes extremely vulnerable to large-scale soil erosion and flooding during subsequent storm events. In turn, these threats can impact the health, safety and integrity of communities and natural resources downstream. The likelihood that such a post-fire event will occur in Colorado is increased by the prevalence of highly erodible soils in several parts of the state, and weather patterns that frequently bring heavy rains on the heels of fire season.

In the aftermath of the 2002 fire season, the Colorado Department of Health estimated that 26 municipal water storage facilities were shut down due to fire and post-fire impacts.

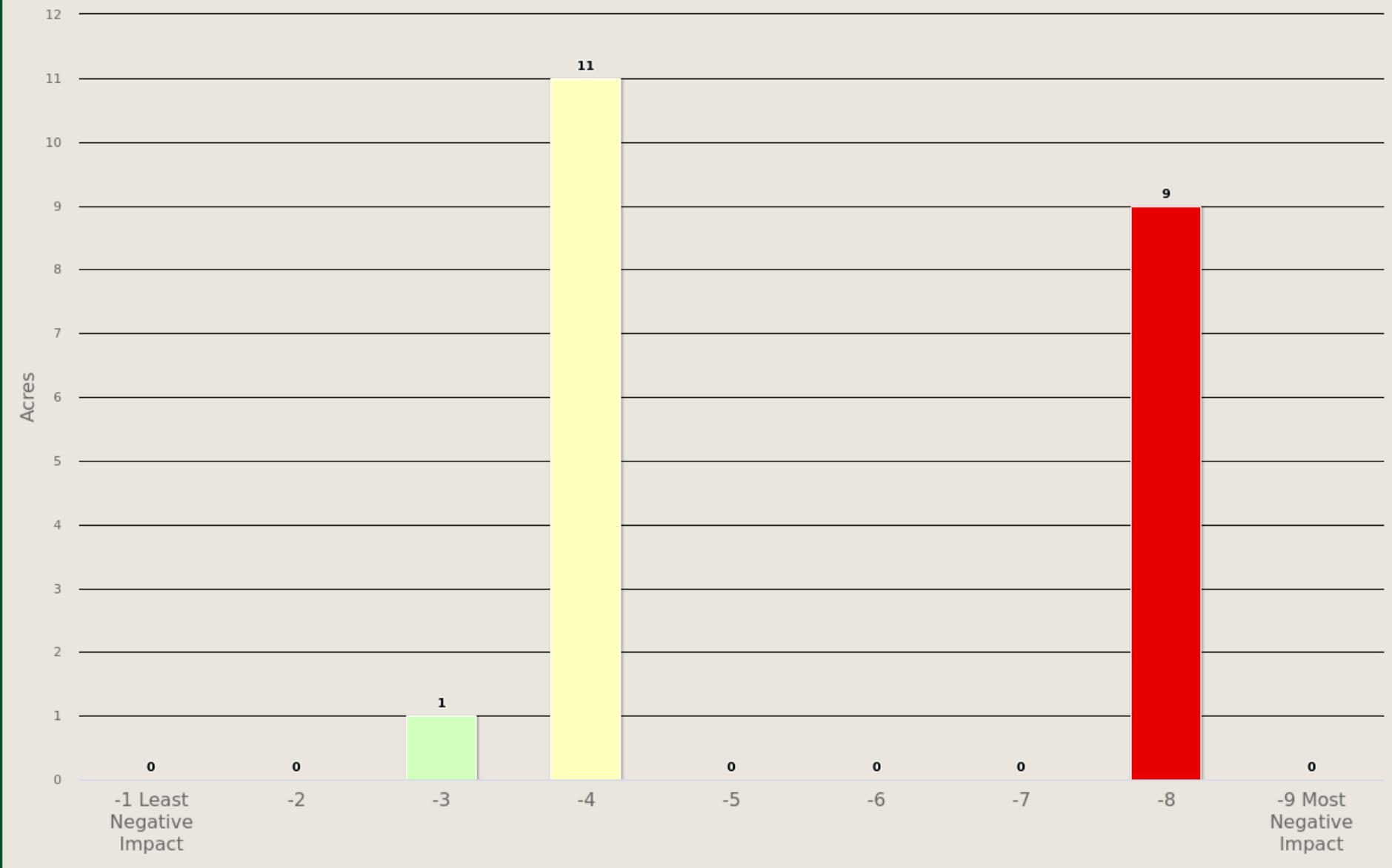
The potential for severe soil erosion is a consequence of wildfire because as a fire burns, it destroys plant material and the litter layer. Shrubs, forbs, grasses, trees and the litter layer disperse water during severe rainstorms. Plant roots stabilize the soil, and stems and leaves slow the water to give it time to percolate into the soil profile. Fire can destroy this soil protection.

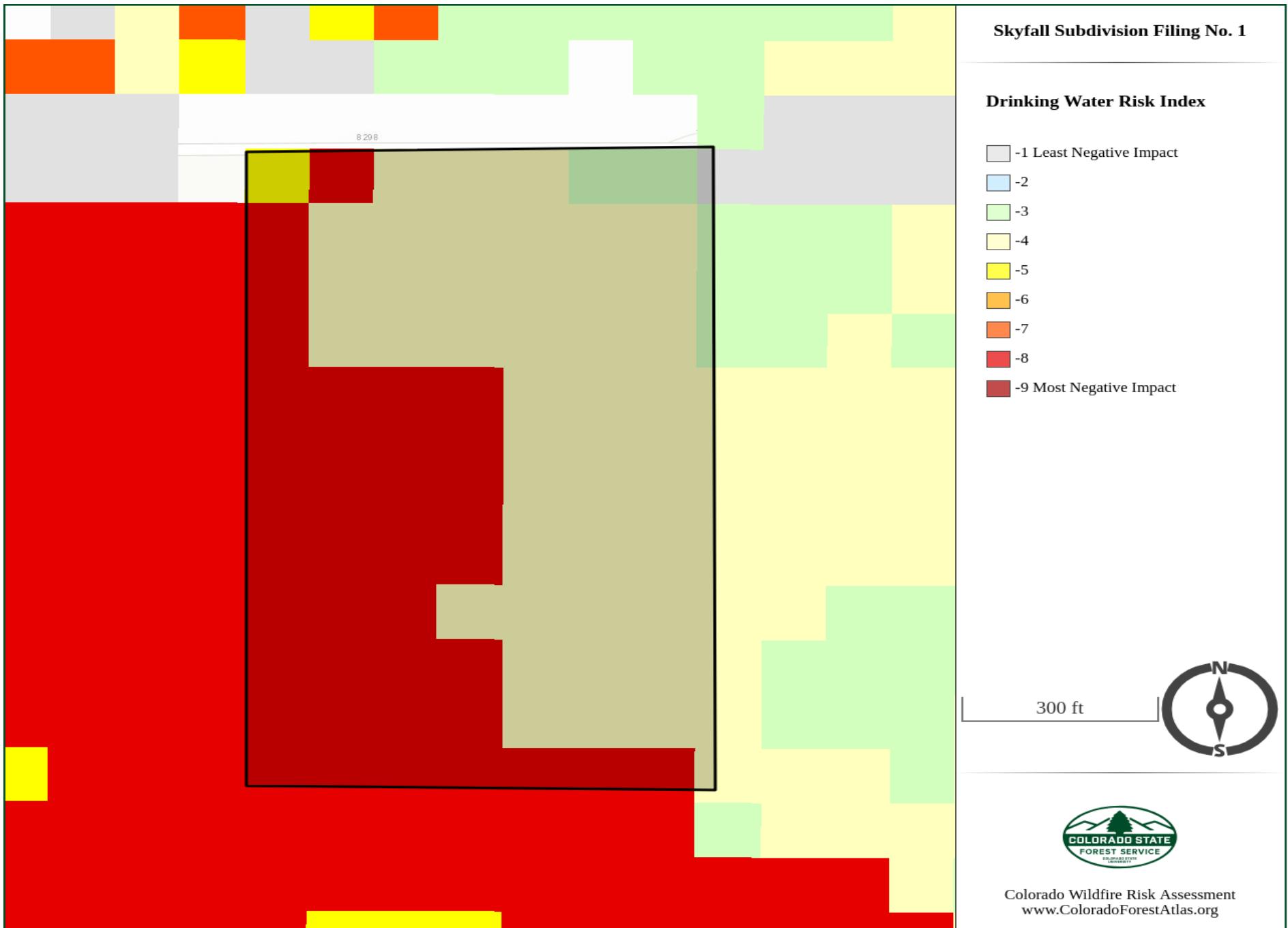
The range of values is from -1 to -9, with -1 representing the least negative impact and -9 representing the most negative impact.

Class	Acres	Percent
-1 Least Negative Impact	0	1.0 %
-2	0	0 %
-3	1	3.1 %
-4	11	53.1 %
-5	0	2.1 %
-6	0	0 %
-7	0	0 %
-8	9	40.6 %
-9 Most Negative Impact	0	0 %
<b>Total</b>	<b>21</b>	<b>100 %</b>

# Skyfall Subdivision Filing No. 1

## Drinking Water Risk Index





# Riparian Assets

## Description

**Riparian Assets are forested riparian areas characterized by functions of water quantity and quality, and ecology.** This layer identifies riparian areas that are important as a suite of ecosystem services, including both terrestrial and aquatic habitat, water quality, water quantity, and other ecological functions. Riparian areas are considered an especially important element of the landscape in the west. Accordingly, riparian assets are distinguished from other forest assets so they can be evaluated separately.

The process for defining these riparian areas involved identifying the riparian footprint and then assigning a rating based upon two important riparian functions – water quantity and quality, and ecological significance. A scientific model was developed by the West Wide Risk Assessment technical team with in-kind support from CAL FIRE state representatives. Several input datasets were used in the model including the National Hydrography Dataset and the National Wetland Inventory.



The National Hydrography Data Set (NHD) was used to represent hydrology. A subset of streams and water bodies, which represents perennial, intermittent, and wetlands, was created. The NHD water bodies dataset was used to determine the location of lakes, ponds, swamps, and marshes (wetlands).

To model water quality and quantity, erosion potential (K-factor) and annual average precipitation was used as key variables. The Riparian Assets data are an index of class values that range from 1 to 3 representing increasing importance of the riparian area as well as sensitivity to fire-related impacts on the suite of ecosystem services.

Riparian Assets Class	Acres	Percent
Least Sensitive to Wildland fires	0	0 %
2	0	0 %
Most Sensitive to Wildland fires	0	0 %
<b>Total</b>	<b>0</b>	<b>0 %</b>

# Skyfall Subdivision Filing No. 1

Riparian Assets

Acres



0

0

0

Least Sensitive to Wildland fires

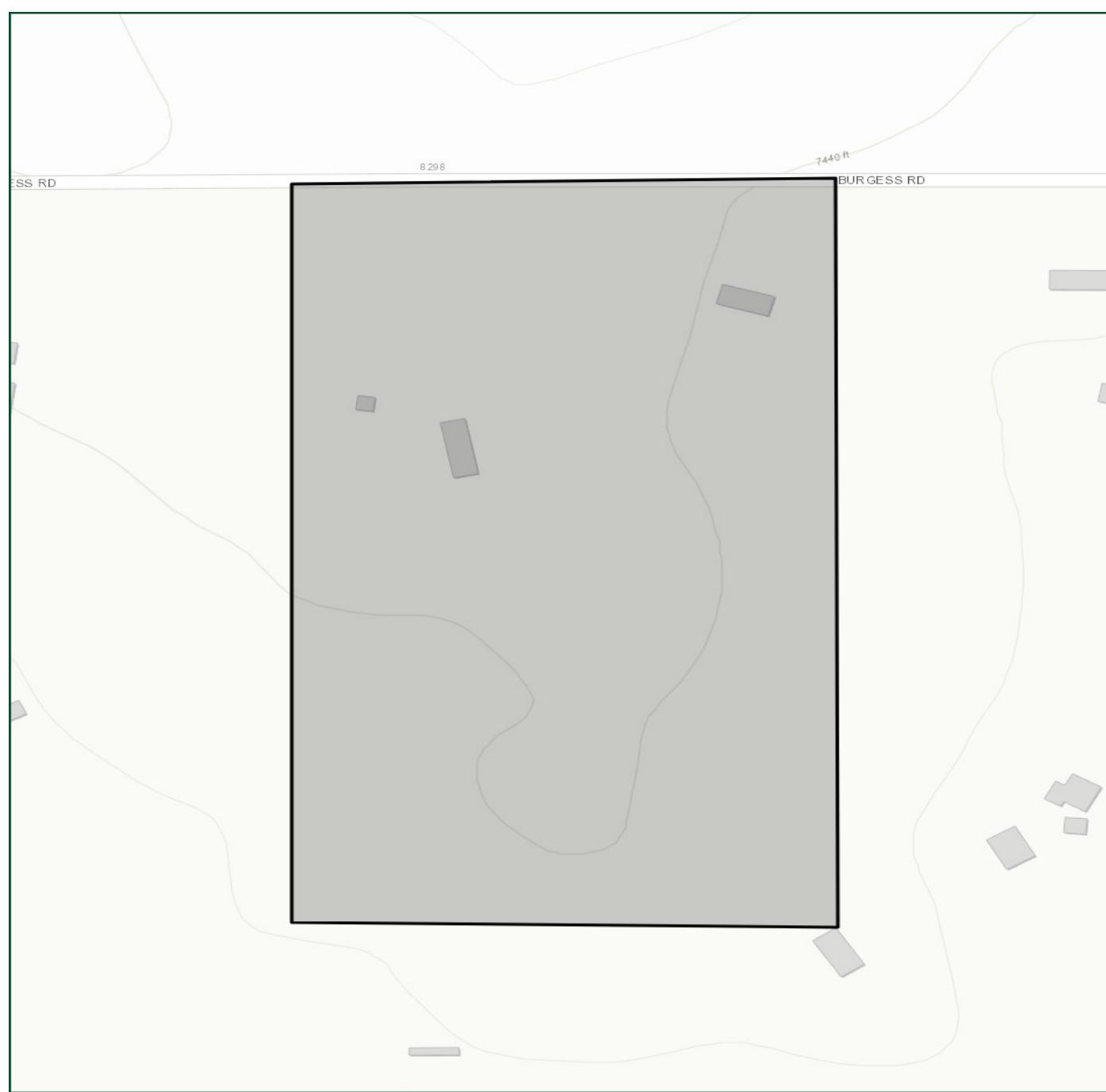
2

Most Sensitive to Wildland fires

## Skyfall Subdivision Filing No. 1

### Riparian Assets

- Least Sensitive to Wildland fires
- 2
- Most Sensitive to Wildland fires



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# Riparian Assets Risk Index

## Description

**Riparian Assets Risk Index is a measure of the risk to riparian areas based on the potential negative impacts from wildfire.** This layer identifies those riparian areas with the greatest potential for adverse effects from wildfire.

The range of values is from -1 to -9, with -1 representing the least negative impact and -9 representing the most negative impact.

The risk index has been calculated by combining the Riparian Assets data with a measure of fire intensity using a Response Function approach. Those areas with the highest negative impact (-9) represent areas with high potential fire intensity and high importance for ecosystem services. Those areas with the lowest negative impact (-1) represent those areas with low potential fire intensity and a low importance for ecosystem services.

This risk output is intended to supplement the Drinking Water Risk Index by identifying wildfire risk within the more detailed riparian areas.

Riparian Assets Risk Class	Acres	Percent
-1 (Least Negative Impact)	0	0 %
-2	0	0 %
-3	0	0 %
-4	0	0 %
-5	0	0 %
-6	0	0 %
-7	0	0 %
-8	0	0 %
-9 (Most Negative Impact)	0	0 %
Total	0	0 %

# Skyfall Subdivision Filing No. 1

Riparian Assets Risk Index

Acres

0 0 0 0 0 0 0 0 0

-1 (Least  
Negative  
Impact)

-2

-3

-4

-5

-6

-7

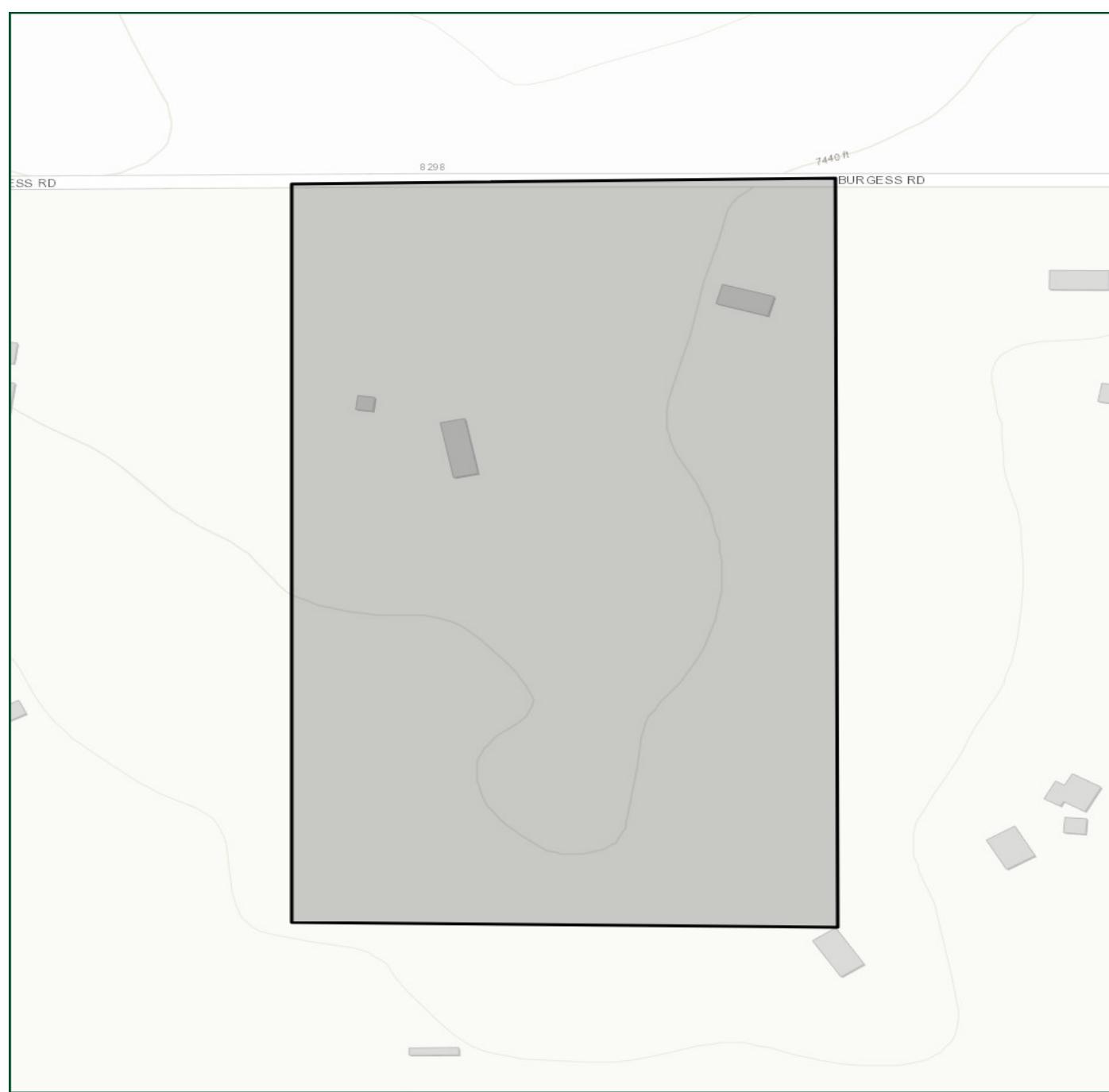
-8

-9 (Most  
Negative  
Impact)

## Skyfall Subdivision Filing No. 1

### Riparian Assets Risk Index

- 1 (Least Negative Impact)
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9 (Most Negative Impact)



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# Forest Assets

## Description

**Forest Assets are forested areas categorized by height, cover, and susceptibility/response to fire.** This layer identifies forested land categorized by height, cover and susceptibility or response to fire. Using these characteristics allows for the prioritization of landscapes reflecting forest assets that would be most adversely affected by fire. The rating of importance or value of the forest assets is relative to each state's interpretation of those characteristics considered most important for their landscapes.

Canopy cover from LANDFIRE 2014 was re-classified into two categories, open or sparse and closed. Areas classified as open or sparse have a canopy cover less than 60%. Areas classified as closed have a canopy cover greater than 60%.

Canopy height from LANDFIRE 2014 was re-classified into two categories, 0-10 meters and greater than 10 meters.

Response to fire was developed from the LANDFIRE 2014 existing vegetation type (EVT) dataset. There are over 1,000 existing vegetation types in the project area. Using a crosswalk defined by project ecologists, a classification of susceptibility and response to fire was defined and documented by fire ecologists into the three fire response classes.

These three classes are sensitive, resilient and adaptive.

- **Sensitive** = These are tree species that are intolerant or sensitive to damage from fire with low intensity.
- **Resilient** = These are tree species that have characteristics that help the tree resist damage from fire and whose adult stages can survive low intensity fires.
- **Adaptive** = These are tree species adapted with the ability to regenerate following fire by sprouting or serotinous cones

The range of values is from -1 to -9, with -1 representing the least negative impact and -9 representing the most negative impact.

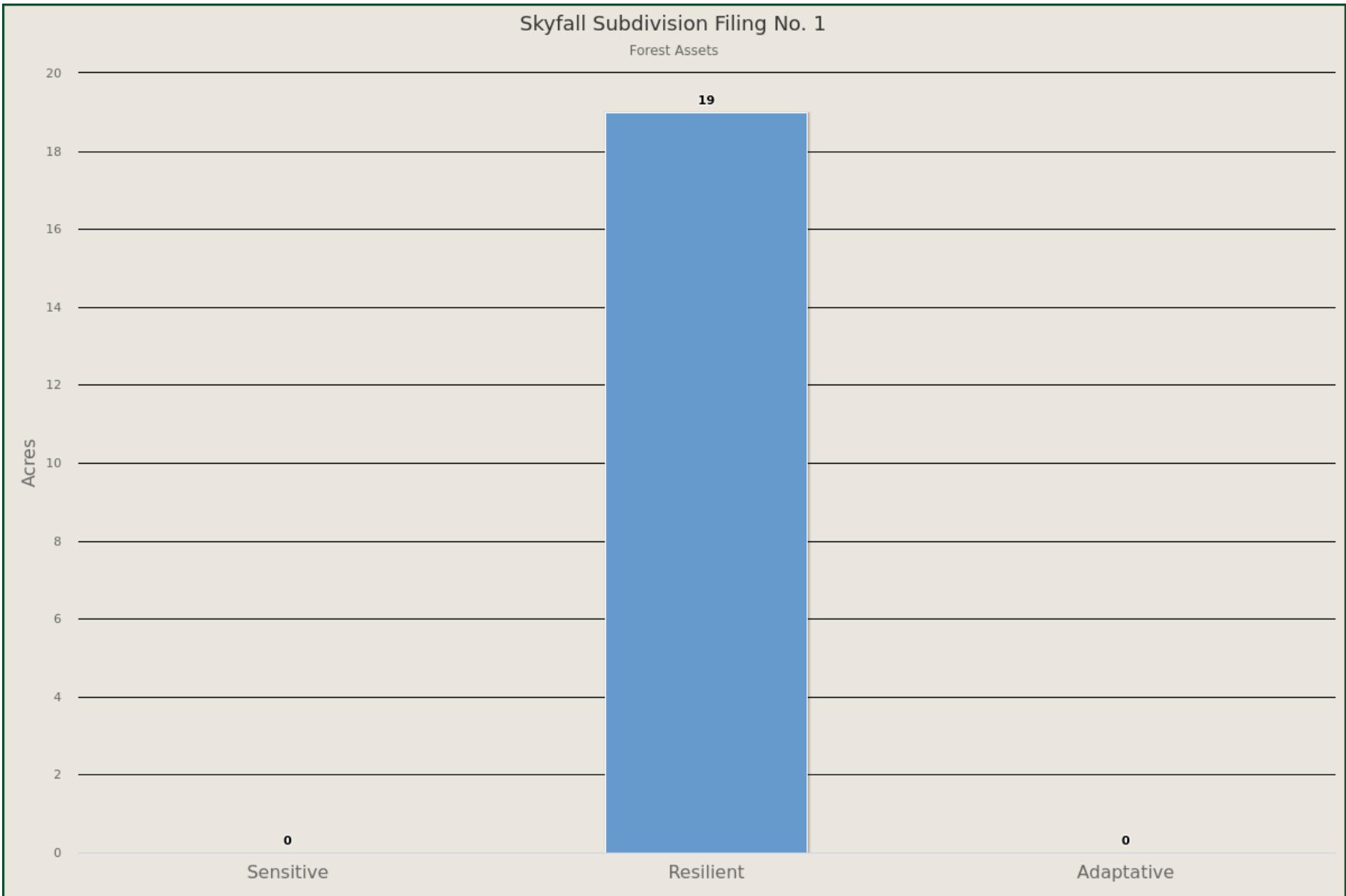
The risk index has been calculated by combining the Forest Assets data with a measure of fire intensity using a Response Function approach. Those areas with the highest negative impact (-9) represent areas with high potential fire intensity and low resilience or adaptability to fire. Those areas with the lowest negative impact (-1) represent those areas with low potential fire intensity and high resilience or adaptability to fire.

This risk output is intended to provide an overall forest index for potential impact from wildfire. This can be applied to consider aesthetic values, ecosystem services, or economic values of forested lands.

Forest Assets	Acres	Percent
Sensitive	0	0 %
Resilient	19	100.0 %
Adaptative	0	0 %
<b>Total</b>	<b>19</b>	<b>100 %</b>

## Skyfall Subdivision Filing No. 1

### Forest Assets



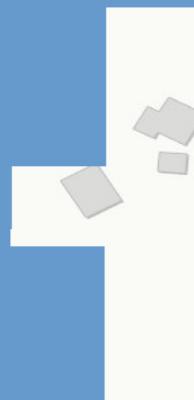
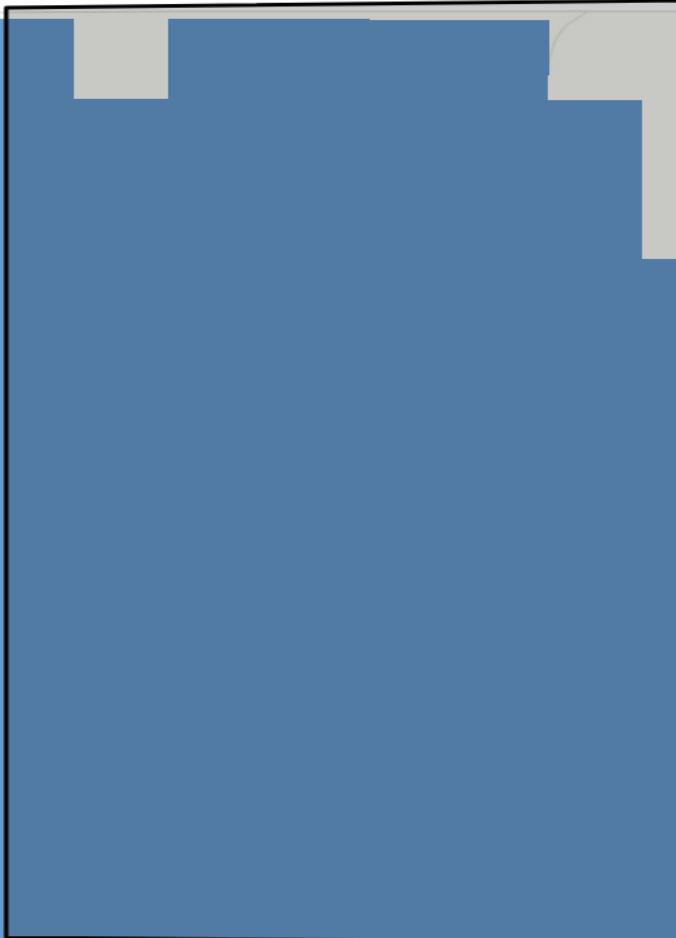
## Skyfall Subdivision Filing No. 1

### Forest Assets

- Sensitive
- Resilient
- Adaptive

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BURG



300 ft



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# Forest Assets Risk Index

## Description

**Forest Assets Risk Index is a measure of the risk to forested areas based on the potential negative impacts from wildfire.** This layer identifies those forested areas with the greatest potential for adverse effects from wildfire.

The range of values is from -1 to -9, with -1 representing the least negative impact and -9 representing the most negative impact.

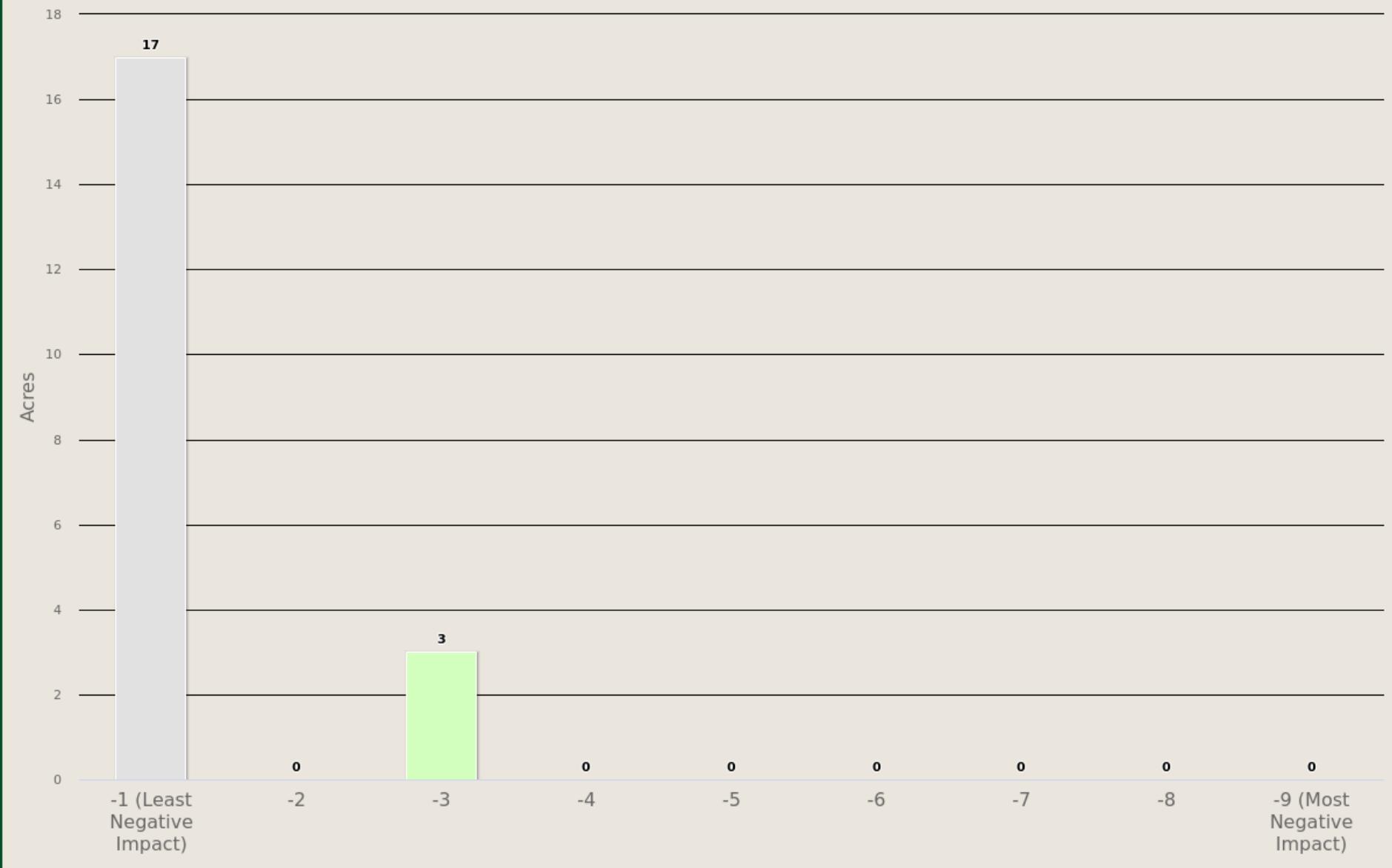
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This risk output is intended to provide an overall forest index for potential impact from wildfire. This can be applied to consider aesthetic values, ecosystem services, or economic values of forested lands.

Forest Assets Risk Class	Acres	Percent
-1 (Least Negative Impact)	17	84.4 %
-2	0	0 %
-3	3	15.6 %
-4	0	0 %
-5	0	0 %
-6	0	0 %
-7	0	0 %
-8	0	0 %
-9 (Most Negative Impact)	0	0 %
<b>Total</b>	<b>20</b>	<b>100 %</b>

# Skyfall Subdivision Filing No. 1

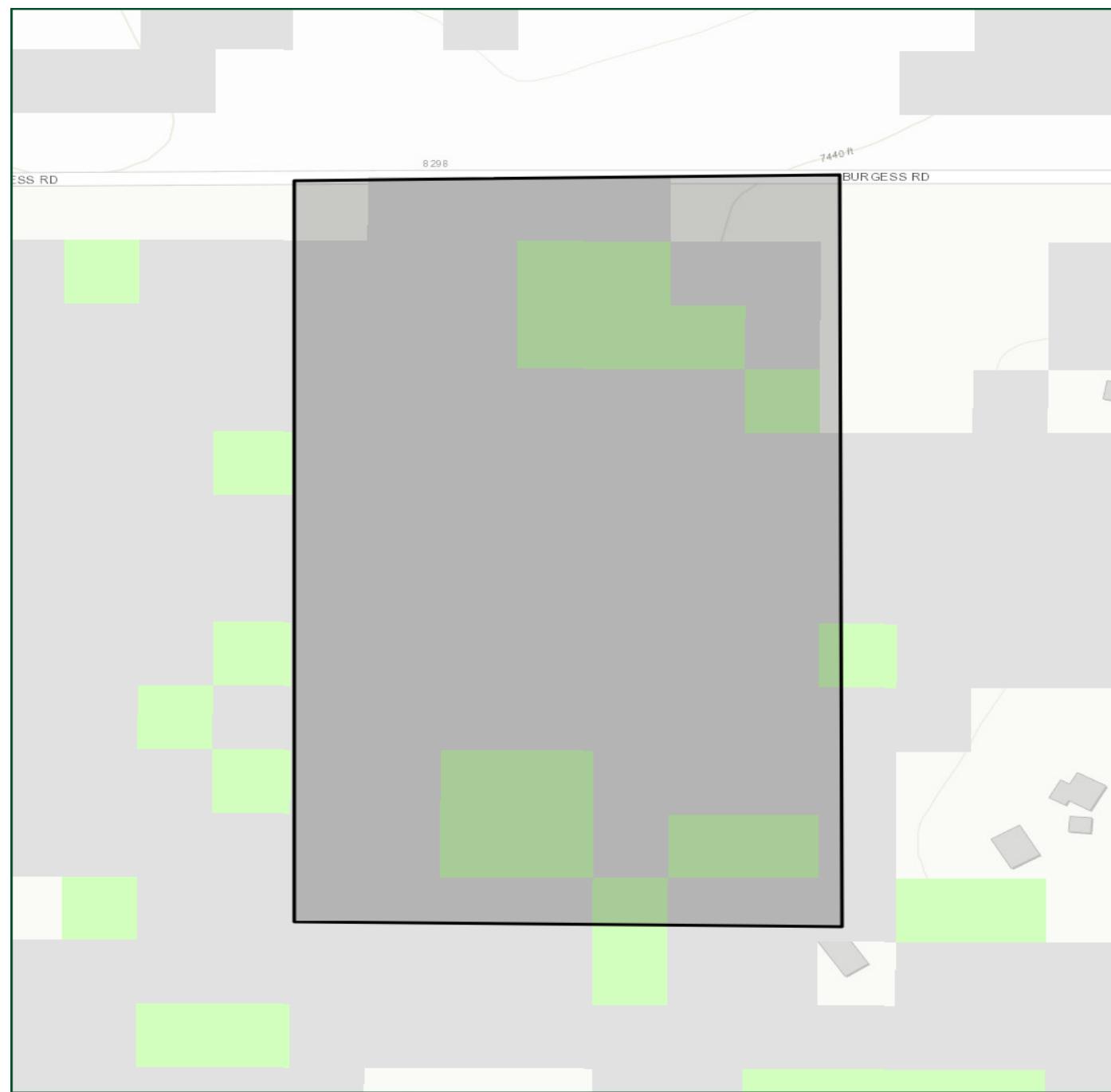
## Forest Assets Risk Index



## Skyfall Subdivision Filing No. 1

### Forest Assets Risk Index

- 1 (Least Negative Impact)
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9 (Most Negative Impact)



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# THE HOME IGNITION ZONE



A guide to preparing your home  
for wildfire and creating defensible space

*Formerly Quick Guide FIRE 2012-1: Protecting Your Home From Wildfire*



# Reducing Your Home's Wildfire Risk Begins With You

## WHY?

Homeowners have the ultimate responsibility to proactively prepare their property for wildfire. By creating and maintaining the home ignition zone, residents can improve the likelihood of their home surviving a wildfire and reduce the negative impacts wildfires can have on their property.

In Colorado, if you live in the wildland-urban interface, it is not a matter of *if* a wildfire will impact your home and property, but *when*.

If your home is located in or near the natural vegetation of Colorado's grasslands, shrublands, foothills or mountains, you live in the wildland-urban interface — also known as the WUI — and are inherently at risk from a wildfire. This includes any areas where structures and other human developments meet or intermingle with wildland vegetative fuels.

Wildfires are a natural part of Colorado's varied ecosystems. Planning ahead and taking actions to reduce the risk of wildfires can increase the likelihood your home survives when wildfires occur.

As more people choose to live in

wildfire-prone areas, additional homes and lives are potentially threatened every year. Firefighters always do their best to protect residents, but **ultimately, it is your responsibility to protect your property and investments from wildfire.**

This guide focuses on actions that are effective in reducing wildfire hazards on your property. It is important to recognize that these efforts should always begin with the home or structure itself and progress outwards.

Also, remember that taking wildfire risk reduction steps 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. Other actions may just need to be

addressed annually or only once.

While you may not be able to accomplish all of these actions at once to prepare your home and property for wildfire, each completed activity will improve the safety of your home during a wildfire. However, it is important to remember there are no guarantees when it comes to wildfire. Implementing risk reduction actions does not guarantee your home will survive a wildfire, but it does improve the odds.

Knowing that wildfire impacts are inevitable, it is not only important for individuals to work on their own homes, but also for residents to work together to increase their community's resilience to wildfire. To become fire adapted, actions must not only be taken before a wildfire

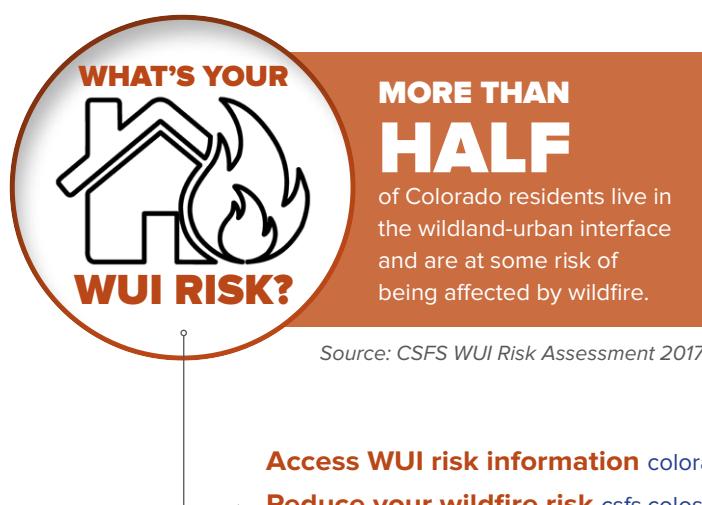


As the 416 Fire burned near Durango in 2018, firefighters conducted burnouts near homes in the fire's path to eliminate fuel for the main fire and provide a secure control line. The work done by homeowners to create the defensible space buffer visible here gave firefighters the option to safely conduct the operation. Photo: Jerry McBride, Durango Herald

arrives but during and after a fire.

The National Cohesive Wildland Fire Management Strategy defines a fire-adapted community as “a human community consisting of informed and prepared citizens collaboratively planning and taking action to safely coexist with wildland fire.”

In order to increase the likelihood homes and infrastructure survive a wildfire, all landowners must work together to reduce fire hazards within and adjacent to communities. This includes work on individual home sites and common areas within communities. Every community member has a role in fire adaptation, from civic leaders, to developers, to first responders, to homeowners and land management agencies.



**Access WUI risk information** [coloradoforestatlas.org](http://coloradoforestatlas.org)

**Reduce your wildfire risk** [csfs.colostate.edu](http://csfs.colostate.edu)

**Protect your community** [fireadaptednetwork.org](http://fireadaptednetwork.org)

# What Is the Home Ignition Zone?

## HOME IGNITION ZONE (HIZ)

is the home and the area around the home (or structure). The HIZ takes into account both the potential of the structure to ignite and the quality of defensible space surrounding it.

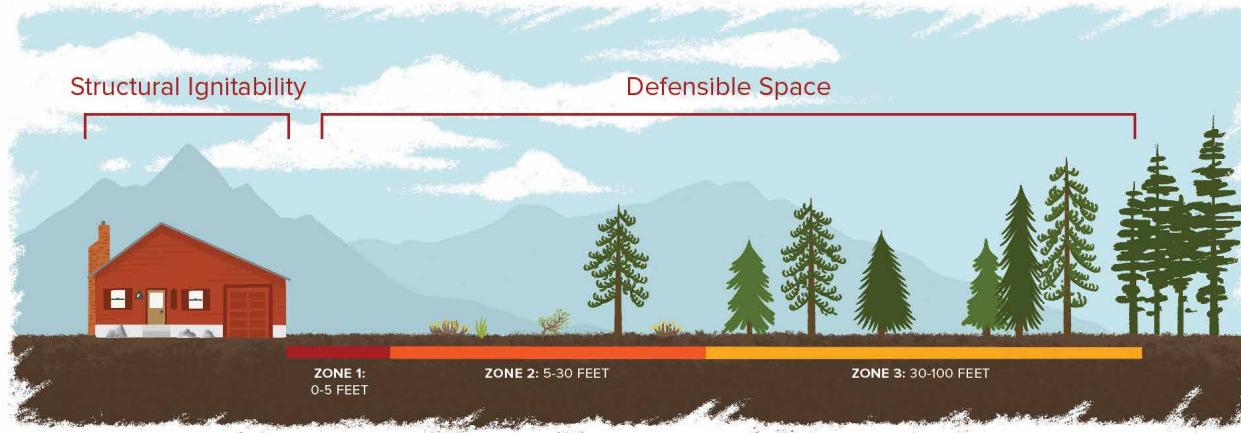


Illustration: Bonnie Palmatory, Colorado State University

The two primary determinants of a home's ability to survive a wildfire include the structure's ignitability and the quality of the surrounding defensible space. Together, these two factors create a concept called the home ignition zone, or

HIZ. It includes the structure and the space immediately surrounding it.

The space around the home is divided into three distinct spaces of management, zones 1, 2 and 3. Pages 8-9 outline specific goals and critical steps to manage your

property within each of these zones.

To reduce wildfire hazards to your home and property, the most effective proactive steps to take are to minimize the ability of the home to ignite and to reduce or eliminate nearby fuel.

## METHODS OF HOME IGNITION

### 1. EMBER IGNITION

Embers (firebrands) are small pieces of burning material that can be transported by wind more than a mile ahead of a wildfire's flaming front. Embers can vary greatly in size, but even the smallest can start new fires (known as spot fires) on any ignitable surface they encounter, inside or outside a home. This is the most common source of home ignition during wildfires.

Flammable horizontal or nearly horizontal surfaces, such as wooden decks or shake-shingle roofs, are at greater risk for ignition from burning embers.

Many homes in the wildland-urban interface have burned because of airborne embers, so addressing structural ignitability is critical even if it appears difficult for fire to spread in the area surrounding a home.

### 2. SURFACE FIRE/ DIRECT FLAME CONTACT

If fuels are adjacent to a home, direct flame contact can ignite the house. Ensuring no such fuels exist within 5 feet of a home, particularly near windows or under decks, greatly minimizes this possibility.

### 3. RADIANT HEAT

Radiant heat is what you feel on your hands while warming them next to a campfire. This same type of heat transfer can ignite a home, whether the source of the heat is a crown fire in treetops or an adjacent home that has caught fire.



*Flying embers are the most common source of home ignition during wildfires. Preparing homes for their impact is critical. Embers can ignite leaf litter in gutters and on roofs, as well as shrubs and mulch at the base of the house, as seen in this controlled ember shower experiment. Photo: Insurance Institute for Business & Home Safety*

# 3

## Factors Determine Wildfire Behavior

1. FUELS
2. WEATHER
3. TOPOGRAPHY

Of the three things wildfires need to start and spread, humans cannot change weather or topography, so we must concentrate on altering fuels in order to have any control over a disturbance as dynamic as wildfire.

Fuels can include vegetation like trees, brush and grass; but when near homes, fuels also include propane tanks, woodpiles, sheds and even homes themselves.

# What Is Defensible Space?

## DEFENSIBLE SPACE

is the area around a home [or structure] that has been modified to reduce fire hazard by creating space between potential fuel sources.

**F**irefighters may not be present at your home during a wildfire — they are trained to protect structures only when the situation is safe for them. You should prepare your home and property to withstand wildfire without firefighter intervention. Having an effective defensible space combined with reducing structural ignitability is the best way to improve your home's chance of survival.

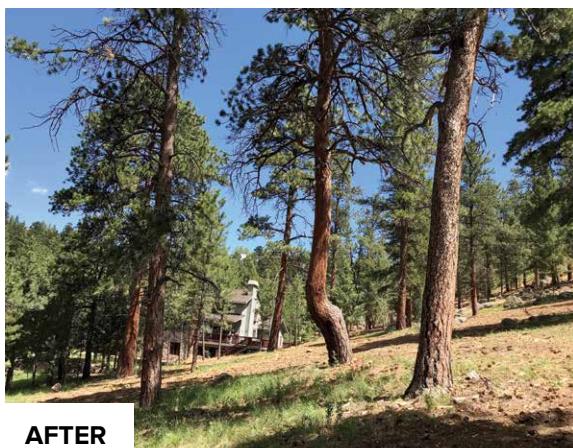
Defensible space is the area around a home or other structure that has been modified to reduce

fire hazard by creating a disconnected fuel load both vertically and horizontally. In this area, natural and manmade fuels are treated, removed or reduced to slow the spread of wildfire and alter fire behavior.

Establishing defensible space reduces the likelihood of a home igniting by direct flame contact or by radiant heat exposure. It also helps limit local production of embers and reduces the chance a structure fire will spread to neighboring homes or surrounding vegetation.

## CREATING AN EFFECTIVE DEFENSIBLE SPACE

involves establishing a series of management zones. Develop these zones around each building on your property, including detached garages, storage buildings, barns and other structures.



A Colorado State Forest Service forest management project near Evergreen cleared dense trees in a residential area to reduce wildfire risk. The same tree with a crooked trunk in the center of these photos shows how tree thinning can be a useful tool to protect property, decrease fire intensity and boost forest health. Photo: Emma Brokl, CSFS

Recognize that fuel continuity and density play a critical role in wildfire behavior.

As you plan defensible space for your property, you can contact your nearest Colorado State Forest Service field office for guidance, or consult a forester, fire department staff or community organization appropriately trained in wildfire mitigation practices.



East Troublesome Fire.  
Photo: Zach Wehr, CSFS



**Top left:** Hardening your home can include choosing noncombustible building materials like stucco paired with a stone facade. This house near Salida shows you don't have to sacrifice curb appeal to reduce the ignitability of your house. Photo: CSFS

**Top right:** Preparing your home for wildfire can be accomplished as weekend projects, such as clearing vegetation from around your home's perimeter and adding noncombustible material near the foundation that won't ignite if embers land there. Photo: Wildfire Partners

**Bottom:** A metal roof and noncombustible exterior window coverings add layers of protection against wildfire, in addition to the well-maintained defensible space that surrounds this home. Photo: Wildfire Partners



## MORE ONLINE

This guide provides only basic information about structural ignitability.

The National Fire Protection Association (NFPA) and the Insurance Institute for Business & Home Safety (IBHS) together produce Wildfire Research Fact Sheets that provide additional valuable information.

A screenshot of a Wildfire Research Fact Sheet titled "Attic and Crawl Space Vents". The page features a large image of a house with smoke rising from it. The text discusses how vents can allow embers to enter attics and crawl spaces, and provides recommendations for venting to prevent ignition. Logos for NFPA and IBHS are visible at the bottom.

Visit the "Protect Your Home" section at the CSFS website, [csfs.colostate.edu/wildfire-mitigation](http://csfs.colostate.edu/wildfire-mitigation), for links to these and other structural ignitability resources.

# Harden Your Home Against the Threat of Wildfire

## STRUCTURAL IGNITABILITY

is the likelihood the materials in and on your home will ignite during a wildfire.

The practice of reducing structural ignitability is commonly called “home hardening.”

**T**he ideal time to address home ignition risk is when the structure is in the design phase.

For existing homes, steps must be taken to reduce the structural ignitability in order to improve the likelihood of the home surviving a wildfire. The practice of reducing structural ignitability is commonly called home hardening.

### BEST PRACTICES TO REDUCE STRUCTURAL IGNITABILITY

- Ensure the roof has a Class A fire rating
- Remove all leaves, needles and other debris from all decks, roofs and gutters
- Screen attic, roof, eaves and foundation vents with 1/8-inch metal mesh
- Screen or wall-in stilt foundations and decks with 1/8-inch metal mesh
- Use tempered glass for windows; two or more panes are recommended
- Create 6 inches of vertical clearance between the ground and home siding
- Replace combustible fencing or gates, at least within 5 feet of the home

## STRUCTURAL COMPONENTS TO CONSIDER

### WINDOWS

Windows can fail either from glass breaking or frames melting before a building ignites, providing a direct path for airborne embers to reach the building’s interior. Metal screens should be installed. Windows with multiple panes provide greater protection than single-paned windows.

### VENTS

Vents that are not screened or are screened with a gap that exceeds 1/8 of an inch can be a direct entry point for embers to infiltrate a home and ignite it from the inside. Metal mesh screen that is 1/8-inch is small enough that most embers will be extinguished before making it inside.

SOURCE NFPA/IBHS Wildfire Research Fact Sheet — Attic and Crawl Space Vents

### EXTERIOR WALLS

The exterior walls of a home or other structure are affected most by radiant heat from a fire and, if defensible space is not adequate, by direct contact with flames. Fiber cement board, brick, stucco or other fire resistant materials are recommended.

### ROOF

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, choose only fire-resistant roofing materials. Wood and shake-shingle roofs are strongly discouraged because they are highly flammable and are prohibited in some areas of the state. Metal sheets, concrete or shingles made from asphalt, tile, clay, stone or metal are all recommended roofing materials. It is critical to keep the roof and gutters clear of flammable debris.

SOURCE NFPA/IBHS Wildfire Research Fact Sheet — Roofing Materials

### ROOF EXTENSION

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

SOURCE NFPA/IBHS Wildfire Research Fact Sheet — Under-Eave Construction

### DECKS/FENCES

Some decks and fences are readily combustible, whether made of synthetic (plastic/composite) or natural materials (wood). Many deck designs allow embers to accumulate between board gaps and at joists below deck boards. Embers can also fall through decks and may easily ignite flammable materials beneath, making it critical to remove all materials from underneath the deck. Regardless of how fuels below decks may ignite, these burning materials can readily ignite the deck and threaten the home.

Fencing material that attaches to the home must be considered a direct extension of the structure and should be made of a noncombustible material, at least where it is immediately adjacent to a home.

SOURCE NFPA/IBHS Wildfire Research Fact Sheets — Fencing | Decks

# TO MANAGE YOUR HOME, LEARN THE THREE ZONES

**ZONE 1****0-5 FEET FROM THE HOME**

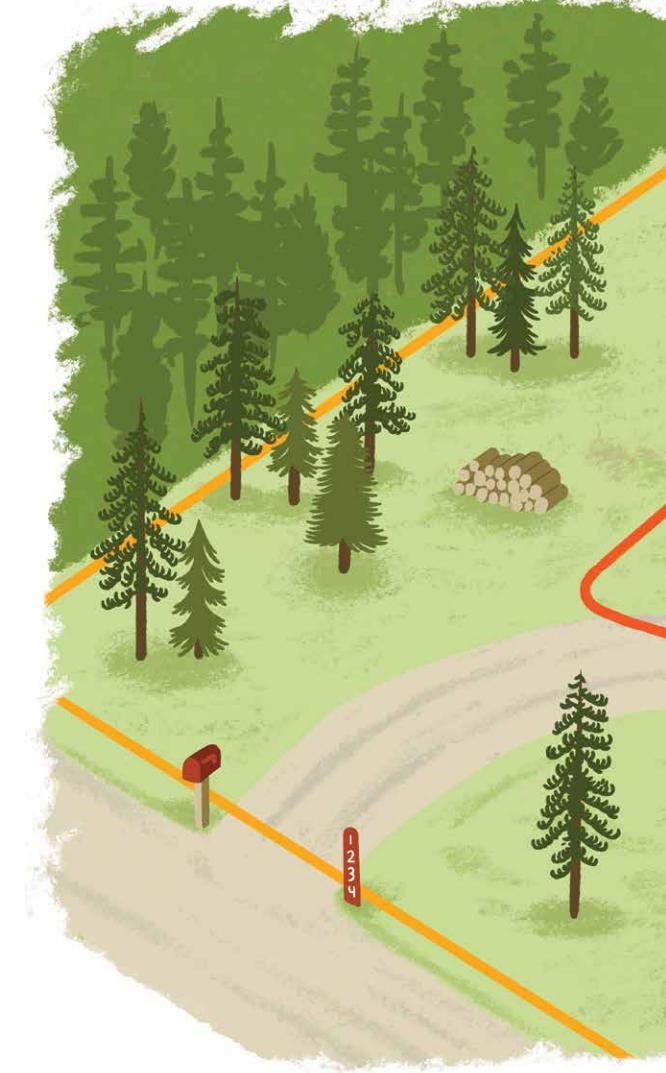
The area nearest the home. This zone requires the most vigilant work in order to reduce or eliminate ember ignition and direct flame contact with your home.

**ZONE 2****5-30 FEET FROM THE HOME**

The area transitioning away from the home where fuels should be reduced. This zone is designed to minimize a fire's intensity and its ability to spread while significantly reducing the likelihood a structure ignites because of radiant heat.

**ZONE 3****30-100 FEET FROM THE HOME**

The area farthest from the home. It extends 100 feet from the home on relatively flat ground. Efforts in this zone are focused on ways to keep fire on the ground and to get fire that may be active in tree crowns (crown fire) to move to the ground (surface fire), where it will be less intense.

**ZONE 1**

**GOAL:** This zone is designed to prevent flames from coming in direct contact with the structure. Use nonflammable, hard surface materials in this zone, such as rock, gravel, sand, cement, bare earth or stone/concrete pavers.

**CRITICAL STEPS**

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

**ZONE 2**

**GOAL:** This zone is designed to give an approaching fire less fuel, which will help reduce its intensity as it gets nearer to your home or any structures.

**CRITICAL STEPS**

- Mow grasses to 4 inches tall or less.
- Avoid large accumulations of surface fuels such as logs, branches, slash and mulch.
- Remove enough trees to create at least 10 feet\* of space between crowns. Measure from the outermost branch of one tree to the nearest branch on the next tree.
- Small groups of two or three trees may be left in some areas of Zone 2. Spacing of 30 feet\* should be maintained between remaining tree groups to ensure fire doesn't jump from one group to another.
- Remove ladder fuels under remaining trees. This is any vegetation that can bring fire from the ground up into taller fuels.
- Prune tree branches to a height of 6-10 feet from the ground or a third of the total height of the tree, whichever is less.
- Remove stressed, diseased, dead or dying trees and shrubs.

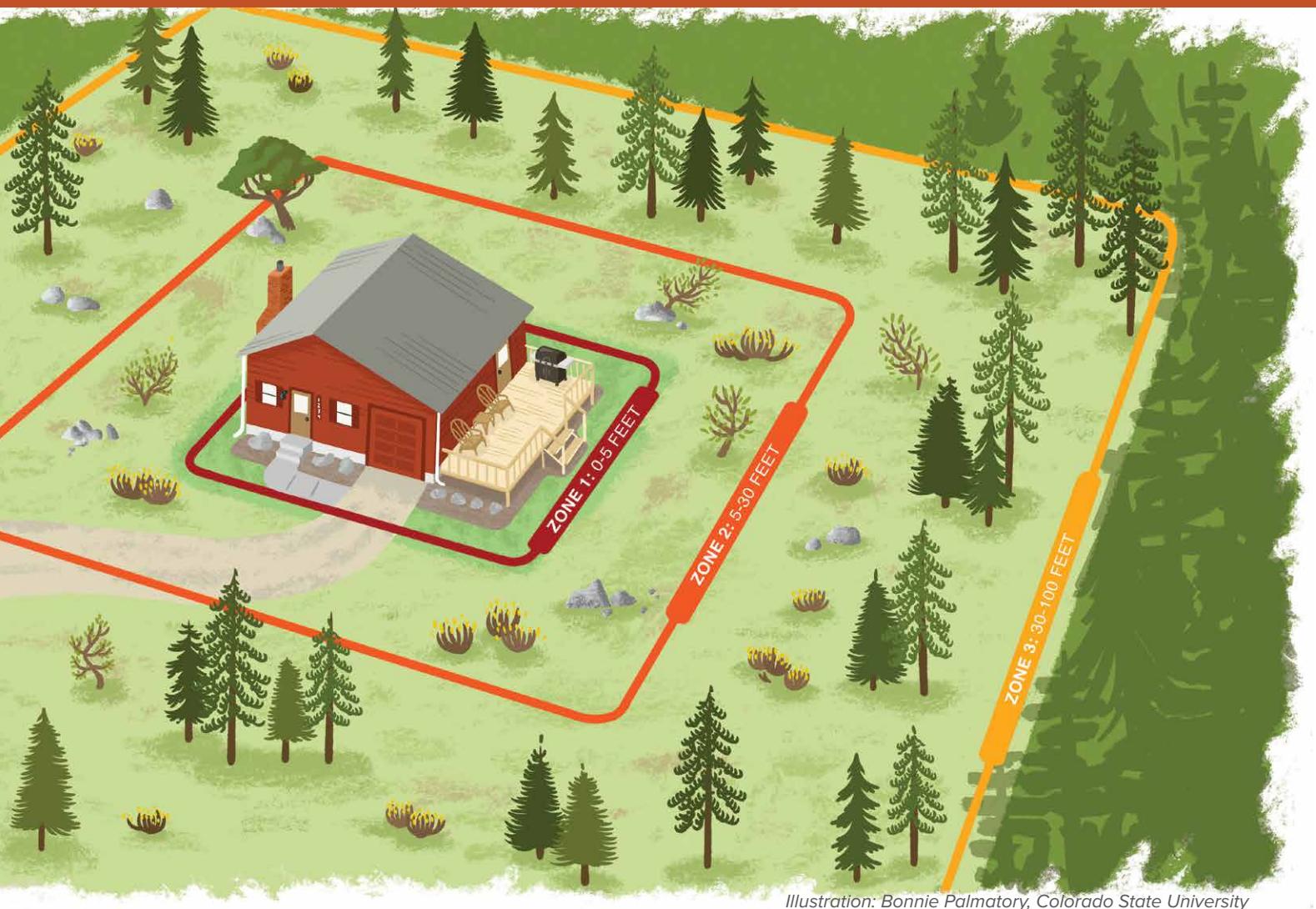


Illustration: Bonnie Palmatory, Colorado State University

This reduces the amount of vegetation available to burn and improves forest health.

- Common ground junipers should be removed whenever possible because they are highly flammable and tend to hold a layer of flammable material beneath them.
- You can keep isolated shrubs in Zone 2, as long as they are not growing under trees. Keep shrubs at least 10 feet\* away from the edge of tree branches.
- Periodically prune and maintain shrubs to prevent excessive growth. Remove dead stems annually.
- Spacing between clumps of shrubs should be at least 2 ½ times\* their mature height. Each clump should have a diameter no more than twice the mature height of the vegetation. Example: For shrubs that grow 6 feet tall, space clumps 15 feet apart or more (measured from the edge of the crowns of vegetation clumps). Each clump of these shrubs should not exceed 12 feet in diameter.

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

## ZONE 3

**GOAL:** This zone focuses on mitigation that keeps fire on the ground, but it's also a space to make choices that can improve forest health. Healthy forests include trees of multiple ages, sizes and species, where adequate growing room is maintained over time.

If the distance of 100 feet to the edge of Zone 3 stretches beyond your property lines, it's encouraged to work with adjoining property owners to complete an appropriate defensible space. If your house is on steep slopes or has certain topographic considerations, this zone may be larger.

### STEPS TO CONSIDER

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

# Make Home Ignition Zone Maintenance a Priority

## WHY?

The home ignition zone requires regular, ongoing maintenance to be effective. Your home is located in a dynamic environment — trees, grasses and shrubs continue to grow, die and drop leaves each season, and there are ongoing maintenance needs on any structures on your property.

## HOME IGNITION ZONE CHECKLIST

### PREPARE YOUR HOME FOR WILDFIRE WITH THESE STEPS

#### TOP PRIORITIES

- CLEAR** roof, deck and gutters of pine needles and other debris.\*
- MOW** grass and weeds to a height of 4 inches or less.\*
- RAKE AND REMOVE** all pine needles and other flammable debris from 5 feet around the foundation of your home and deck.\*
- TREAT** or mow shrubs that re-sprout aggressively (such as Gambel oak) every 3-5 years or more depending on growth rates.
- REMOVE** branches that hang over the roof and chimney.
- DISPOSE** of slash from thinning trees and shrubs by chipping, hauling to a disposal site or piling in open areas for burning later. *Any accumulation of slash that's chipped or otherwise should be 30 feet or more from the home.\**
- AVOID** creating continuous areas of wood chips on the ground when chipping logs and/or slash. Break up the layer of wood chips by adding nonflammable material, or allow for wide gaps of at least 3 feet between chip accumulations.

\* Address as needed, more than once a year.

#### FIREWOOD

- Keep firewood stacked uphill from (or at the same elevation as) any structures, and keep the woodpile at least 30 feet away from the home.
- Do not stack firewood between remaining trees, underneath the deck or on the deck.
- Remove flammable vegetation within 10 feet of woodpiles.

#### PROPANE TANKS

- Keep aboveground tanks at least 30 feet from the home, preferably on the same elevation as the house.
- Remove flammable vegetation within 10 feet of all propane tanks and gas meters.

#### DRIVEWAYS

- Maintain at least 10 feet between tree crowns, thinning them a minimum of 30 feet back from each side of the driveway from the house to the main access road.
- Remove ladder fuels beneath trees after thinning.
- Remove any shrubs that are within 10 feet of the outer edge of tree crowns.
- Space shrubs apart at least  $2\frac{1}{2}$  times their mature height, as measured from the edge of the shrubs.
- Post signs at the end of the driveway with your house number that are noncombustible, reflective and easily visible to emergency responders.

#### SOLUTIONS FOR MANAGING SLASH

1

Spread slash and wood chips over a large area to avoid heavy accumulations and large piles. Being close to the ground will help speed decomposition.

2

Burn slash piles, but before doing so, always contact your county sheriff's office or local fire department for current information or possible restrictions.

3

Lop and scatter slash by cutting it into small pieces (less than 24 inches long) and spreading it over a wide area, to a depth not exceeding 18 inches. Don't scatter material over 4 inches in diameter.



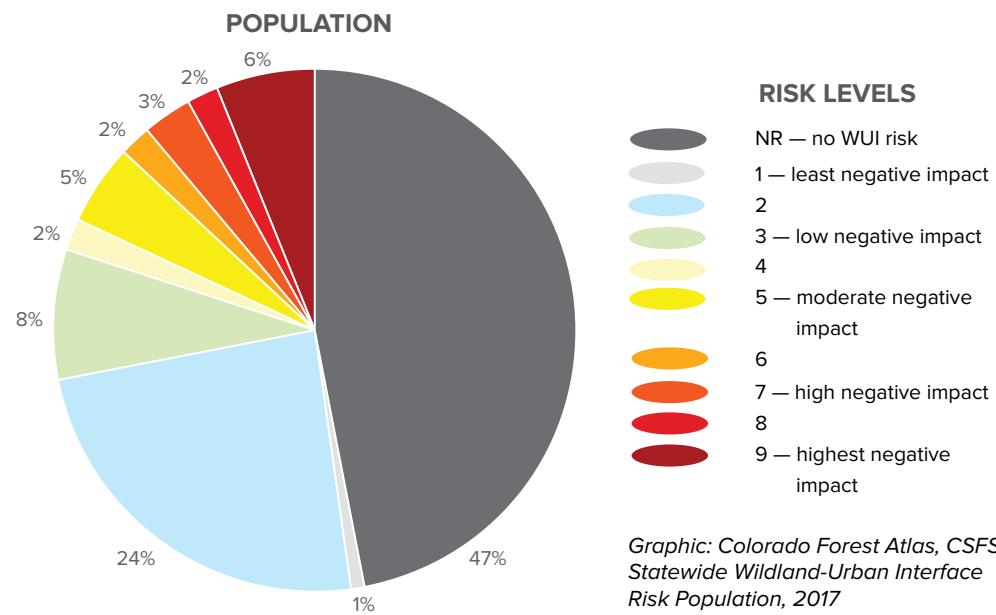
The Colorado State Forest Service works with communities to reduce wildfire risk and become recognized Firewise USA® sites, an accomplishment Piñon Ridge Estates in Chaffee County earned in 2021. CSFS forester Josh Kuehn, right, presents Craig Sommers of Piñon Ridge, with a sign for the community after residents completed the steps required for program recognition. In 2019, the Decker Fire came within a mile and a half of the neighborhood. Photo: Chaffee Chips

## More Than Half of Colorado Residents Live With Some Wildfire Risk

The wildland-urban interface (WUI) includes the portions of Colorado where human development meets wildland vegetation.

The majority of Coloradans live in the WUI, in places with at least some risk of wildfire. And that number continues to increase as more residents build homes in the WUI.

As of 2017, the WUI covered about 3.2 million acres in Colorado. By 2040, the WUI area could encompass over 9 million acres in the state, according to projections from Colorado government models.



Graphic: Colorado Forest Atlas, CSFS, Statewide Wildland-Urban Interface Risk Population, 2017

### Additional Wildfire Mitigation Resources Online

- » Colorado State Forest Service wildfire mitigation information and publications [csfs.colostate.edu/wildfire-mitigation](http://csfs.colostate.edu/wildfire-mitigation)
- » Community Wildfire Protection Planning [csfs.colostate.edu/wildfire-mitigation/community-wildfire-protection-plans](http://csfs.colostate.edu/wildfire-mitigation/community-wildfire-protection-plans)
- » Insurance Institute for Business & Home Safety [ibhs.org/risk-research/wildfire](http://ibhs.org/risk-research/wildfire)
- » Colorado Wildfire Risk Viewer and Risk Reduction Planner [coloradoforestatlas.org](http://coloradoforestatlas.org)
- » National Fire Protection Association: Firewise USA® [nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA](http://nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA)
- » Fire Adapted Communities Learning Network [fireadaptednetwork.org](http://fireadaptednetwork.org)

# Fuel Types and Arrangements

## FUEL

is any material that will burn.

**W**hether in a wildland or urban location, when fuels are abundant and there's no space between them, a fire can quickly become uncontrollable and destructive. But when fuels are scarce and separated, a fire cannot build momentum and intensity, which makes it more manageable.

The closer together the fuels are near

your home, the bigger the threat they pose.

Fuel hazard measures look at both horizontal and vertical fuels, factoring in the type, amount and arrangement of fuels (called continuity and uniformity). Horizontal continuity is how the fuels are arranged laterally across the ground or among plant canopies. Vertical continuity refers to fuels extending from the ground 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.

Mitigating wildfire hazards in the home ignition zone disrupts this fuel continuity, which helps reduce a fire's intensity and potential sources of home ignition.

## SURFACE FUELS



Colorado State Forest Service



Colorado State Forest Service



Colorado State Forest Service

### GRASSES

Grasses are perhaps the most pervasive and abundant surface fuel in Colorado. When available to burn, grasses can catch fire easily, and grass fires often spread rapidly. They also burn out quickly and do not release as much energy as fires in larger fuel types, like trees. Nonetheless, grass fuels can readily ignite structures that are directly adjacent to them.

### NEEDLES/LEAVES

Needles and leaf litter accumulate naturally in forests across the state. Long needles from pines like ponderosa and broadleaf litter from trees like aspen, cottonwood and maple do not compact as readily as other leaf types. Fire in these fuels can spread rapidly, particularly during windy conditions.

Shorter needle litter from spruce, fir and lodgepole pines compacts more readily and does not generally spread as fast.

Needles and leaves that ignite anywhere on or adjacent to a structure can cause damage and loss.

### LOGS/BRANCHES/SLASH/WOOD CHIPS (MULCH)

Naturally occurring woody material on the ground and debris left from cutting down trees and shrubs (slash) are an important part of the fuel complex near structures.

This larger and denser material generates more heat than smaller fuels do, and it can be problematic when it is burning near structures.

Ultimately, the farther away from a structure that large amounts of these materials can be moved, the better.

**MORE:** A guide to mulched materials is available on the Colorado Forest Restoration Institute website, [cfri.colostate.edu](http://cfri.colostate.edu).



A firefighter monitors a burnout on the 416 Fire in southwest Colorado in 2018. This effort to manage the wildfire by eliminating fuels left of the train tracks illustrates how fire can transition through different fuel types and arrangements. Photo: Kyle Miller, Wyoming Interagency Hotshot Crew

## VERTICAL/LADDER FUELS



Kari Greer

### LADDER FUELS

Ladder fuels are burnable materials such as smaller trees and brush that provide a means for fire to climb vertically and continue into aerial fuel sources. Ladder fuels allow a fire to leave the ground level and burn up into the branches and crowns of larger vegetation. Lower branches on large trees also can act as ladder fuels.

These fuels are potentially very hazardous but are generally easy to mitigate. Pay close attention to ladder fuels near homes, as they are extremely hazardous and especially important to address.



InciWeb

### BRUSH/SHRUBS

Examples of common brush fuels in Colorado are sagebrush, bitterbrush and mountain mahogany.

As with any type of fuel, brush that is close together and adjacent to homes is hazardous.

In dry climates like Colorado, brush fuels are generally dense and contain more material in a given space than grasses. Brush also usually grows larger and burns longer and more intensely than grass when it ignites.

This makes brush fires more complex, particularly when the brush grows under trees or in large, uniform stands.

## CROWN (AERIAL) FUELS



Kari Greer

### 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 intense, often move rapidly, can burn large areas, and produce embers that can travel great distances and start spot fires well ahead of the main fire.

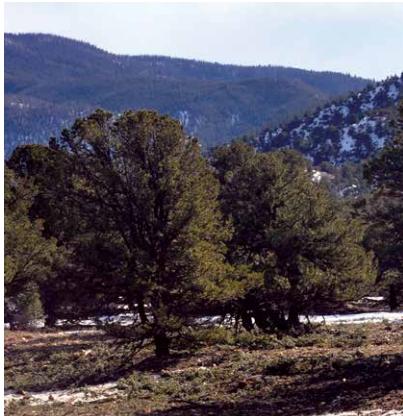
Crown fire hazard can be reduced by thinning trees to decrease crown fuels, reducing surface fuels under the remaining trees and eliminating vertical fuel continuity from the ground into the crowns.

See recommendations on pages 8-9 of this guide.

# Forest Types

**R**ecommendations in this guide refer primarily to ponderosa pine, Douglas fir and mixed-conifer ecosystems below 9,500 feet in elevation.

Those who live in or near other forest types can follow these additional recommendations.



## PIÑON-JUNIPER

Fires in piñon-juniper forests tend to burn intensely in the crowns of trees under windy conditions.

When thinning these trees on a property, create a mosaic pattern that is a mixture of individuals 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 the crowns of individual trees is 10 feet, increasing for larger trees, clumps and stands on steeper slopes.

Pruning trees for defensible space is not as critical in piñon-juniper forests as it is in pine or fir forests. Instead, it is more important to space the trees so it is difficult for a fire to move from one tree clump to the next. These trees should only be pruned to remove branches that are dead or are touching the ground. Live branches can be pruned up to 3 feet above the ground, or a third the height of the tree, whichever is less. Removing shrubs growing beneath piñon and juniper canopies is recommended.

Pruning live branches or removing and processing these trees is not recommended between April and October, when the piñon Ips beetle is active in Colorado. Thinning activity that stimulates sap flow in summer months can attract these beetles to healthy trees. It is acceptable to remove dead trees and dead branches during the summer.

## LODGEPOLE PINE

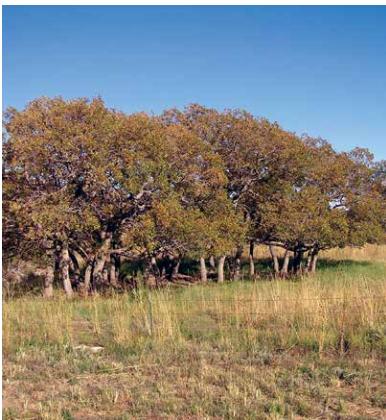
Older lodgepole pine stands generally do not respond well to selective thinning, but instead respond better to removing all trees over a defined area to allow healthy forest regeneration.

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 instead of removing all the standing trees.

Thinning older stands of lodgepole pine to the extent recommended for defensible space may require several attempts spaced over a decade or more. No more than 30 percent of the trees in a mature stand should be removed in each thinning operation. 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's perimeter and any adjacent trees or clumps of trees.

To ensure a positive response to thinning throughout the life of a lodgepole pine stand, trees must be thinned early. Begin when trees are small saplings and maintain low densities within the stand as the trees mature.



## 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 sprouts from this deep, extensive root system.

Treat Gambel oak near your home every three to five years, or more often depending on growing conditions. Sprouts should be mowed at least once a year. Herbicides can be used to supplement mowing and control regrowth when treating whole clumps.

This species can be “trained” to grow more like a tree than a shrub in some locations. Remove small diameter oak within clumps and any sprouts growing parallel to the ground.



## SPRUCE-FIR

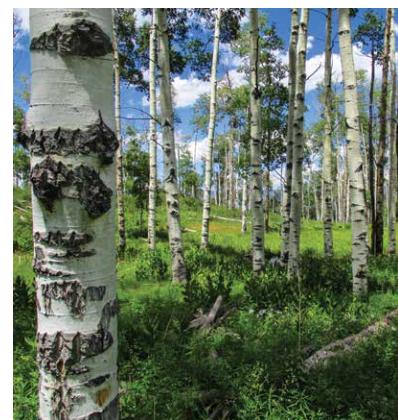
Spruce and fir trees tend to grow in association with each other.

Mature spruce and fir are prone to windthrow when heavily thinned. Light thinnings or leaving groups of trees will help mitigate this problem.

Their hardiness against the wind may not be a problem if a tree has grown to maturity in the open and isn't surrounded by other trees.

Spruce and fir tend to have crowns that extend to the ground. Eliminating lower branches that act as ladder fuels is recommended.

The spruce and Ips bark beetles are native to Colorado and infest Engelmann spruce and Colorado blue spruce. They are particularly attracted to recently fallen green trees and limbs, so it is important to remove any cut branches in a timely manner so surrounding healthy trees are not infested.



## 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, which can make the tree highly susceptible to fungal infections.

However, in older stands, numerous dead trees on the ground do require removal. Conifer trees often start growing in older aspen stands and can grow up through these old, downed aspens. A buildup of these trees eventually will increase the fire hazard of the stand, so young conifers should be removed from these areas.

Brush also can increase fire hazard in aspen stands and should be thinned to reduce flammability.

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## Cover Photography

### FRONT

**Top left:** Cleaning debris from gutters is a critical step to prevent home ignition. Photo: Wildfire Partners. **Top right:** Firefighters from Colorado's Platte Canyon Fire Protection District defend a home during a wildfire. As the population expands into the WUI, homeowners must take responsibility to prepare their homes for wildfire. Photo: Kari Greer. **Bottom:** Of 1,000 homes threatened in the 2016 Cold Springs Fire near Nederland, only 8 burned, due in part to homeowners who readied their properties and followed home ignition zone recommendations. Photo: Wildfire Partners

**BACK** Mitigation work helped spare this Boulder County home near Nederland during the Cold Springs Fire of 2016. Photo: Wildfire Partners



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