

## **APPENDIX I**

# **Wildfire Risk to Vegetation**



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## Acronyms and Abbreviations

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FTI	Fire Threat Index
MCA	Montana Code Annotated

## **I.1 Wildfires**

This section briefly describes wildfire information relevant to the proposed rail line, including Montana railroad wildfire control statutes, wildfire behavior, and wildfire risk.<sup>1</sup>

### **I.1.1 Montana Railroad Wildfire Statutes and Requirements**

Two Montana State laws require railroads to control fire hazards in rail rights-of-way. Montana Code Annotated (MCA) 69-14-721 requires railroads to keep areas along the track free of any dangerous or combustible materials. Any railroad failing to comply with the statute is liable for any damages related to fire emanating from the trains, track maintenance, or other railroad operations. MCA 69-14-722 requires railroads to plow fireguards parallel to the track wherever the track passes through rangeland and grazing lands during certain times of the year, and to burn all grass and vegetation inside of the plowed fireguard. If any railroad fails to comply with the statute, the board of county commissioners of the county where the violation occurs will cause the neglected plowing, burning, or both to be done. The railroad is liable for all damages caused by its failure to comply with this statute.

In addition, the Montana Public Service Commission, which regulates intrastate railroads in Montana, requested in 2005 that all railroad companies operating in Montana submit their specific plans for mitigating fire danger along railroad tracks. The commission cited drought conditions and MCA 69-14-721 and 69-14-722 in their request for these plans.

### **I.1.2 Wildfire Behavior**

Three factors influence wildfire behavior: fuel, weather, and topography. These components affect and increase the likelihood of a fire starting, the speed and direction from which a fire travels, the intensity at which it burns, and the ability to control and extinguish it. Wildfire behavior will vary as wind, slope, and fuel moisture content change (FireSafe Montana 2009).

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<sup>1</sup> This appendix provides supporting information for Section 8.2, *Vegetation*, of the Draft Environmental Impact Statement for the Tongue River Railroad. This information should not be interpreted as stand-alone information and must be read in combination with the associated vegetation section.

### I.1.2.1 Fuel

Fuel is required for any fire to burn. Wildland fire fuel consists of live and dead vegetation such as trees, shrubs, grasses, and their debris. Structures can also be a source of fuel. The amount of fuel, its moisture content, and its composition influence fire behavior (FireSafe Montana 2009).

Four general fuel types are listed for Rosebud, Custer, and Big Horn Counties in their Rural and Wildland Fire Protection Plans. Powder River County’s fire protection plan was not available. A small portion of the proposed rail line would pass through Powder River County, and the fuel types would be similar to those of the other three counties. Table I-1 summarizes the ignition risk of the fuels for each county.

- **Rangeland** fuel is predominately grass and sagebrush. The ignition risk in rangeland fluctuates rapidly depending on the local weather; vegetation is generally normalized within an hour of any rapid change in humidity, precipitation, and drying. High winds can cause fires to spread rapidly in rangeland.
- **Dry crops, pasture, and hayland** fuels can result in a severe fire hazard on a limited seasonal basis. Fires in this fuel type spread rapidly and can be difficult to control.
- **Coniferous forest** fuel poses a fire hazard dependent on seasonal conditions. Under severe dry conditions, forested areas can present a major hazard. This fuel responds somewhat slower to changes in moisture and temperature than other fuels, which can reduce fire risk compared to lighter fuels (such as grasses and dry crops). Fires in this fuel are slower-moving than in other fuels.
- **River bottom** fuels are usually not readily ignitable. Fires do not spread rapidly and seldom exhibit erratic fire behavior.

**Table I-1. Fuel Type Ignition Risk**

Fuel Type	Rosebud County	Custer County	Big Horn County
Rangeland	Moderate	Moderate-High <sup>a</sup>	Moderate-High
Dry crops, pasture, hayland	High	Moderate-High	Moderate-High
Coniferous forest	Moderate	Moderate-High	High
River bottom	Low	Moderate	Low-Moderate

Notes:  
<sup>a</sup> Mixed rangeland barren is an additional fuel type listed for Custer County. Its ignition risk is the same as rangeland  
Sources: Montana District of Natural Resources and Conservation 1978a, 1978b, 1991

### I.1.2.2 Weather

Because temperature, precipitation, and humidity can affect fuel characteristics, weather plays a significant factor in the ignition risk and potential spread of wildfires. While weather is highly unpredictable and variable from day to day, a general understanding of weather and climate in a specific area can provide some context for potential risk.

Dry, hot, and windy weather increases the likelihood of a wildfire occurring. These conditions make fuel ignition easier, allow fuels to burn more rapidly, and increase fire intensity. During extensive dry periods, fuel moisture can reach critical levels in terms of fire risk. High winds can also exacerbate wildfires, transforming a small, easily controllable fire into a catastrophic event in a matter of minutes (FireSafe Montana 2009).

Custer, Rosebud, Powder River, and Big Horn Counties have cold, dry winters with warm summers. The fire season in Montana is generally in the summer, coinciding with higher temperatures and drier conditions. Peak average annual temperatures are reached in July and August. Average annual precipitation in southeastern Montana is lower compared to the western part of the state and higher elevations. Approximately 70 percent of all annual precipitation in the four counties occurs in spring (March, April and May) and summer (June, July, and August) with approximately equal amounts of precipitation falling across both seasons. Table I-2 summarizes precipitation and average summer temperatures for the Rosebud, Custer, and Big Horn Counties.

**Table I-2. Climate Summary for Locations in Rosebud, Custer, and Big Horn Counties <sup>a</sup>**

<b>Location</b>	<b>Average Annual Precipitation (inches)</b>	<b>Average Summer Temperature (Fahrenheit) <sup>b</sup></b>
Colstrip, MT	14.63	67.8
Birney, MT	13.58	70.3
Decker, MT	11.55	no data
Lame Deer, MT	no data	66.0
Miles City, MT	12.44	70.7

Notes:

<sup>a</sup> Data based on measurements between 1981 and 2010 at locations listed in table. No climate stations in Powder River County are located near the proposed rail line

<sup>b</sup> Summer is defined as June, July, and August

Source: National Oceanic and Atmospheric Administration 2014

### **I.1.2.3 Topography**

The steepness of slope significantly influences wildfire behavior and rate of fire spread because heat rises. Slopes with south and southwest aspects tend to be drier and more prone to ignition. Steep, narrow drainages and canyons act like chimneys when wildfires occur (FireSafe Montana 2009).

The topography of southeastern Montana is characterized by hilly, rugged uplands interspersed with wide, rolling valleys. While most of the slopes are less than 1 percent grade, they range from flat to more than 5 percent. A greater percentage of steeper slopes occur in the southern part of the study area.

### I.1.3 Wildfire Risk Assessment

The West Wide Wildfire Risk Assessment (Oregon Department of Forestry et al. 2012) is a wildfire risk assessment model for 17 western states, including Montana. The assessment quantifies the level of risk of wildfires to communities and resources. One assessment output is the Fire Threat Index (FTI). The FTI integrates the probability of an acre igniting and the expected final fire size, based on the rate of spread in four weather percentile categories, into a single measure of wildfire threat. Three primary components are incorporated into the FTI.

- **Fire occurrence** is based on historical fire occurrence information.
- **Fire behavior** is based on fuels, topography, and weather.
- **Fire suppression effectiveness** is based on the expected fire behavior and a measure of the suppression effectiveness of fire protection forces.

The FTI is divided into nine classification categories. A lower FTI category indicates a lower probability of an area igniting, and a higher FTI category indicates a higher probability of an area igniting. The results of the assessment for the Rosebud, Custer, Big Horn, and Powder River Counties indicate that all four counties have the same average FTI: Category 3. However, the acreage associated with each category varies. Big Horn County has the most acreage associated with a high FTI (Category 7, 8, or 9), followed by Custer, Rosebud, and Powder River Counties (Table I-3). Big Horn County has over three times the acreage of high FTIs than the county with the next highest acreage of high FTIs (Custer County).

**Table I-3. Acreages of High FTIs for Big Horn, Custer, Rosebud and Powder River Counties**

Location	FTI 7 (Acres)	FTI 8 (Acres)	FTI 9 (Acres)	Total (Acres)
Big Horn County	117,667	43,039	21,923	182,629
Custer County	48,599	523	0	49,122
Rosebud County	23,839	7,576	3,831	35,246
Powder River County	13,614	558	0	14,172

Source: Oregon Department of Forestry et al. 2012  
FTI = Fire Threat Index

## I.2 References

FireSafe Montana. 2009. *Living with Fire: Homeowners' Firesafe Guide for Montana*. Available: <http://firesafemt.townsquareinteractive.com/files/2012/05/Living-w-Fire-FSM-2009-1.pdf>. Accessed: April 1, 2014.

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