

## Fire Specialist Report

Date: February 27, 2009  
From: Rance Marquez  
Subject: Reducing flame lengths (FLs) and rates of spread (ROS) by changing fuel models.

The fire modeling program BEHAVE was used to predict the change in flame length. It was developed by the United States Department of Agriculture, Forest Service, Rocky Mountain Research Station (General Technical Report RMRS-GTR-DRAFT November 2004).

The Fuel Models from Scott and Burgan (2005) were used to calculate the flame lengths in BEHAVE software.

Based on field tours and 17 years of wildfire experience the fuel models represent vegetation similar to the existing vegetation conditions in the project area. A modified GR1 fuel model was used to represent a Forage Kochia strip seeding since the narrative description for this fuel model states that the "primary carrier of fire is sparse grass and the grass is generally short either naturally or by grazing, and may be sparse or discontinuous". Based on a site visit the narrative is an accurate description of the Forage Kochia seeding near Mountain Home, Idaho where the grass is discontinuous and short. The major difference is that the live fuel and 1-hour fuel moistures in the modified GR1 fuel model remain higher than in the unmodified fuel model.

Vegetation in the project area is dynamic. Changes (increases and decreases) in fuel loading and continuity occur on an annual basis. These changes are mainly due to growing season conditions. A wet, warm spring will grow more fine fuels (grass) than a dry, cold year and will lead to increased production and continuity of fine fuels.

Note that for the grass-shrub fuel model 2 (GS2) rates of spread (ROS) and flame lengths max out at wind speeds greater than 30 miles/hour.

Changing the existing vegetation/fuel model to a Forage kochia area/fuel model would decrease the continuity and increase the live fuel moisture relative to the adjacent vegetation. This would make Forage kochia effective at slowing or even stopping a wildfire (table 1).

Forage Kochia Fuel Model (modified GR1)							
Fuel Model	1 hour Fuel Moisture 10-40MPH windspeeds						Comments
	4%		12%		20%		
	FL	ROS	FL	ROS	FL	ROS	
Forage Kochia	1ft	6ch/hr	1ft	<1ch/hr	1ft	0ch/hr	Forage Kochia model. This model used the GR1 fuel model as a base line but with a higher 1-hr fuel moisture to emulate a forage kochia strip. <b>The flame lengths (FL) and Rates of Spread (ROS) were the same for all wind speeds.</b>
Project Area Fuel Model							
Flame Length and Rates of Spread at 10 Miles/hour wind speed							
Fuel Model	1 hour Fuel Moisture						Comments
	1%		3%		5%		
	FL	ROS	FL	ROS	FL	ROS	
GS2	12ft	117ch/hr	10ft	101ch/hr	10ft	92ch/hr	Similar to Sagebrush/grass site in a average production year.
Flame Length and Rates of Spread at 20 Miles/hour wind speed							
Fuel Model	1 hour Fuel Moisture						Comments
	1%		3%		5%		
	FL	ROS	FL	ROS	FL	ROS	
GS2	19ft	319ch/hr	16ft	274ch/hr	15ft	249ch/hr	Similar to Sagebrush/grass site in a average production year.
Flame Length and Rates of Spread at 30 Miles/hour wind speed							
Fuel Model	1 hour Fuel Moisture						Comments
	1%		3%		5%		
	FL	ROS	FL	ROS	FL	ROS	
GS2	23ft	506ch/hr	19ft	360ch/hr	17ft	296ch/hr	Similar to Sagebrush/grass site in a average production year.
Flame Length and Rates of Spread at 40 Miles/hour wind speed							
Fuel Model	1 hour Fuel Moisture						Comments
	1%		3%		5%		
	FL	ROS	FL	ROS	FL	ROS	
GS2	23ft	506ch/hr	19ft	360ch/hr	17ft	296ch/hr	Similar to Sagebrush/grass site in a average production year.

Table 1