

## Fuel Treatment Effectiveness

Fuels treatments have the potential to modify fire behavior by changing the structure, loading or continuity of an existing fuel complex. How much a treatment influences the fire behavior is primarily a function of the intensity of the treatment. More intense treatments, where large volumes of vegetation are treated and where the vertical structure of the fuel complex is disturbed to a significant extent, will have greater effects on the potential fire behavior than less intense treatments. However, even relatively minor changes to a fuel complex can have impacts on fire behavior by interrupting the continuity, changing the compactness of the fuelbed, or reducing fuel loading.

To judge the effectiveness of a potential fuel treatment assumptions need to be made concerning how the action will change the fuel structure and therefore the fuel model within the treatment area. Evaluating the change in fuel model associated with a fuel treatment is not an exact science and requires that professional judgement be used to evaluate the changes. In this CWPP, GIS was used to determine the existing fuel models within the Planning Area and professional judgement of Fire Behavior Analysts were used to identify the post-treatment fuel models. **Table XX** summarizes the changes in fuel models.

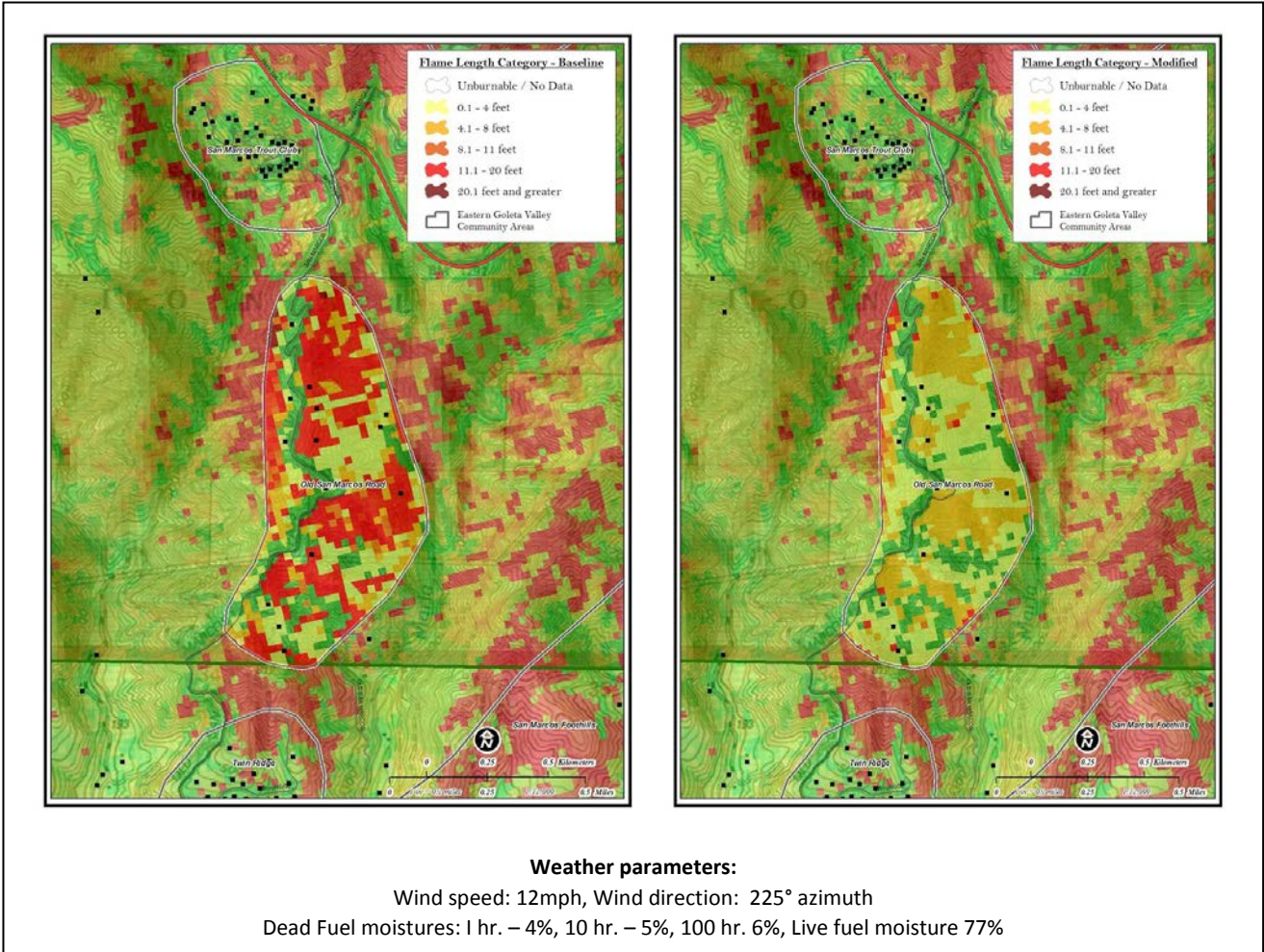
The pre-treatment and post-treatment expected flame lengths for each fuel model is displayed in **Table XX** and was obtained by using a consistent set of environmental parameters in the fire behavior model BEHAVE 5.0. The change in flame length between existing and post-treatment conditions can be used as one method for evaluating the effectiveness of the fuel treatment.

Existing Fuel Model	Existing Model Number	Post-treatment Fuel Model	Post- treatment Model Number	Existing Condition Flame Length*	Post Treatment Flame Length*
Short, Sparse Dry Climate Grass	101	Short, Sparse Dry Climate Grass	101	2.2	2.2
Low Load, Dry Climate Grass	102	Short, Sparse Dry Climate Grass	101	6.6	2.2
Low Load, Dry Climate Grass-Shrub	121	Low Load, Dry Climate Grass	141	4.8	1.0
Moderate Load, Dry Climate Grass-Shrub	122	Low Load, Dry Climate Grass-Shrub	121	7.0	4.8
Moderate Load Dry Climate Shrub	142	Low Load Dry Climate Shrub	141	6.1	1.0
Very High Load, Dry Climate Shrub	147	Moderate Load Dry Climate Shrub	142	16.5	6.1
Very High Load, Dry Climate Timber-Shrub	165	Low Load Dry Climate Timber-Grass-Shrub	161	9.4	2.4
Low Load Broadleaf Litter	182	Low Load Broadleaf Litter	182	1.1	1.1
Moderate Load Conifer Litter	183	Low Load Compact Conifer Litter	181	1.3	0.7
Small downed logs	184	Moderate Load Conifer Litter	183	1.8	1.3
High Load Conifer Litter	185	High Load Conifer Litter	183	2.8	1.3
Moderate Load	186	Low Load	182	3.5	1.1

Broadleaf Litter		Broadleaf Litter			
Large Downed Logs	187	Small downed logs	184	4.4	1.8
Long-Needle Litter	188	Moderate Load Conifer Litter	183	9.7	1.3
Very High Load Broadleaf Litter	189	Low Load Broadleaf Litter	186	15.5	3.5
* The consistent environmental parameters used in BEHAVE 5.0 to obtain the flame length output from the model are: Slope = 20%, Mid-flame Wind = 7 mph, Dead Fuel moistures = 4%, 5%, 6%, Live herbaceous fuel moisture = 30%, Live woody fuel moisture = 77%					

The change in expected fire behavior from implementing fuel treatments can also be displayed spatially using a landscape data file from the LANDFIRE program and FlamMap, a fire behavior modeling program to evaluate fire characteristics. Using LANDFIRE data in FlamMap modeling accounts for site specific conditions within an analysis area, but also requires that the existing LANDFIRE fuel data be modified to represent post-treatment fuel conditions. Given that this CWPP does not specifically define where fuel treatments will be placed, or to what intensity they will be implemented, only an example of this spatially explicit methodology is presented to show how this process can be used to evaluate the effectiveness of fuel treatments on the landscape.

The example presented evaluates potential flame lengths as if every pixel of the LANDFIRE fuel layer within the Old San Marcos Road Community Area had been modified by a fuel treatment. The changes to the fuel models found in [Table XX](#) are applied to all pixels within the Community Area. [Figure XX](#) spatially displays how fire behavior is changed by fuel treatments, while [Table XX](#) displays the tabular results of the changes in fire behavior.



**Figure XX.** Changes to modeled flame lengths based on potential fuel treatments

**Table XX.** Tabular summary of changes to modeled flame lengths from potential fuel treatments.

	Existing Fuel Condition	Modified Fuel Condition
No data/Unburnable	19.63%	19.63%
0.1 - 4 feet	24.25%	44.65%
4.1 - 8 feet	11.80%	31.41%
8.1 - 11 feet	4.01%	0.97%
11.1 - 20 feet	39.47%	3.08%
20.1 feet and greater	0.85%	0.26%