

KENNEDY GULCH PRESCRIBED BURN FUEL MODELING AND SMOKE MANAGEMENT

BY J.B. WEBB
MAY 6, 2006

The Kennedy Gulch prescribed burn is located near Foxton at the intersection of the Kennedy Gulch road and the North Fork of the South Platte River. It covers 328 acres; 169 of those acres have been masticated to reduce fire hazard and improve forest health. Because of roads and operable ridgelines, the area was divided into eight units ranging in size from 5 acres to 103 acres.

Denver Water is not yet designated as a significant user of prescribed fire and hence is limited to 10 tons of total emissions annually. Masticated fuels are a

relatively new phenomenon and fuel models do not yet exist for them. Two fuel inventory plots were installed employing techniques described in "Handbook for Inventorying Downed Woody Fuels" by James Brown, 1974, USDA GTR INT-16.

These two plots demonstrated the wide variety of fuel loading found on masticated areas. Table 1 provides a breakdown of tons/acre by size class for the two plots. The untreated portions in the burn area are best described by Fuel Models 9 and 10. Sparse grama grass and bare soil also are found in these portions of the burn area.

TABLE 1: KENNEY GULCH RX BURN MASTICATED FUEL LOADING

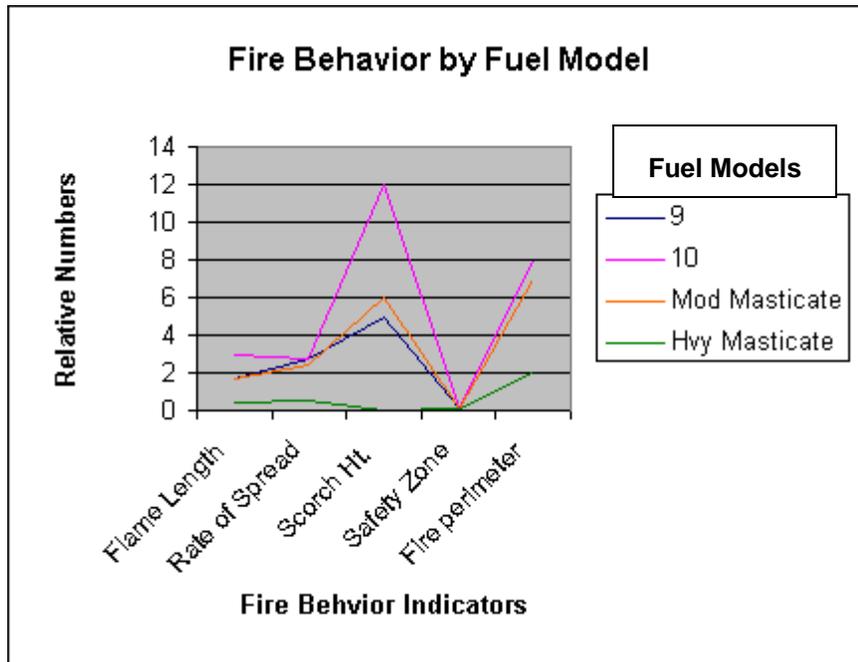
FUEL DESCRIPTOR	HEAVY FUEL LOADING T/A	MODERATE FUEL LOADING T/A
0-0.25"	2.406	3.331
0.25-1"	4.873	1.624
1-3"	20.383	5.096
3"+	28.468	2.064
Total Tons/acre	56.130	12.115
Fuel Bed depth	4.0"	3.7"
Duff depth	1.5	.875"

Custom fuel models were developed using BehavePlus3. Predicted fire behavior characteristics using these custom models were within the realm of expectation and closely matched fire behavior observed by

Roz Woo in similar masticated ponderosa pine/Douglas-fir areas on the San Juan National Forest. Table 2 provides insights into expected fire behaviors within the burn area.

TABLE 2: EXPECTED FIRE BEHAVIOR IN THE KENNEDY GULCH RX BURN AREA

Fuel Model	Flame Length	Rate of Spread	Scorch Ht.	Safety Zone	Fire perimeter
9	1.7	2.7	5	0.08	8
10	3	2.7	12	0.11	8
Mod Masticate	1.7	2.4	6	0.08	7
Hvy Masticate	0.4	0.5	0	0.06	2



SASEM runs were done on a variety of ignition scenarios for this burn area. Classic SASEM and New SASEM runs

yielded dramatically different results in terms of air quality impacts. See Table 3 for the results of SASEM runs for this burn.

TABLE 3: COMPARISON OF MULTIPLE SASEM RUNS FOR KENNEDY GULCH RX BURN

TYPE SASEM RUN	FUEL MODEL	BURNED ACRES	TOTAL EMISSIONS TONS/ACRE	TON/ACRE FACTOR	ANNUAL ACRES W/ 10 TON LIMIT
Classic	Masticated	169	11.242	0.067	149
New	Masticated	169	38.276	0.226	44
Classic	Average	328	12.728	0.039	256
New	Average	328	59.622	0.182	55

The most logical way to burn this area from a fire operations perspective is to burn the units with a majority of the masticated fuels first. They lay on ridgelines and on the northern side of the area. Once these areas are secure (black), then the more flammable, steeper slopes can be burned with less risk and fewer personnel.

If Denver Water does not become designated as a significant user of prescribed fire, it will be difficult to burn three of the units that exceed the 44- or 55-acre annual 10-ton limit (depending on

which SASEM model used). These units are 60, 70 and 103 acres, and contain a mix of both masticated and untreated fuels. Terrain within these units does not lend itself to further unit dissection.

Recommendation: plan to burn the first 50 acres on the north side of the area in fall 2006 and seek significant user designation for 2007 and beyond. This will provide the flexibility for Denver Water to use prescribed burning in its substantial quest to reduce landscape-scale fire hazards and improve forest health on its lands.

