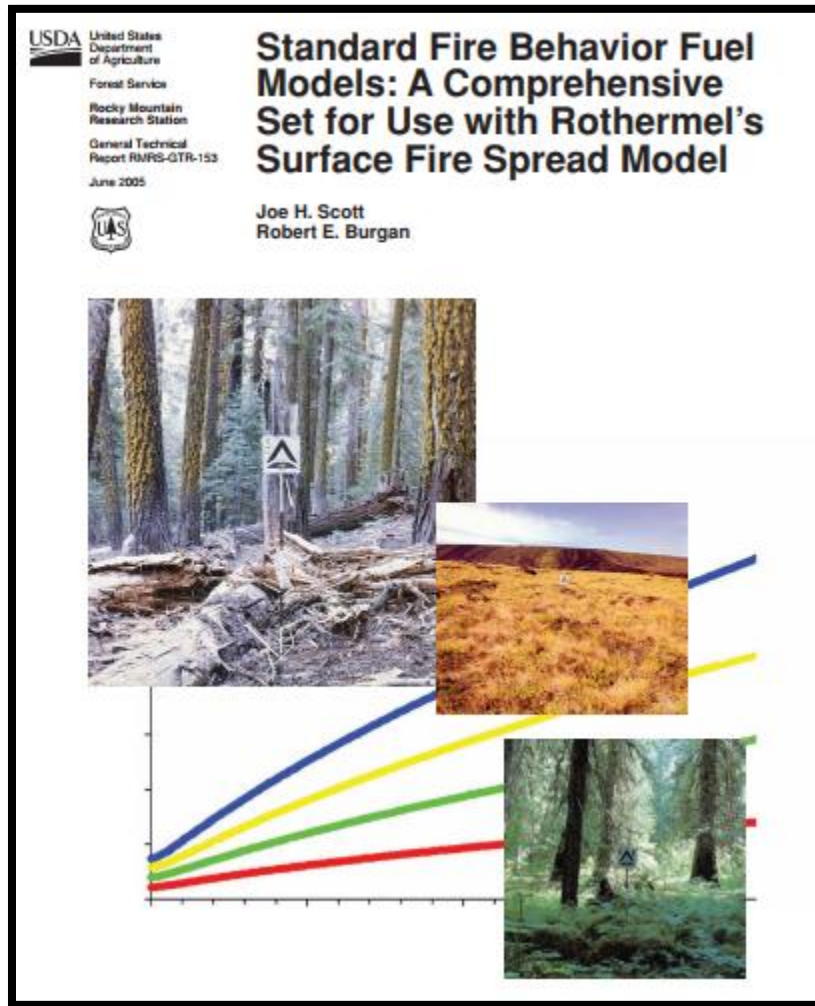


## Fire Behavior Fuel Model Reference Guide

*Adapted by Heather Heward from the University of Idaho from Scott and Burgan 2005 GTR 153 with additional selection figures developed by Faith Ann Heinsch from the Forest Service.*



*Scott, Joe H.; Burgan, Robert E. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. Gen. Tech. Rep. RMRS-GTR-153. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p.*

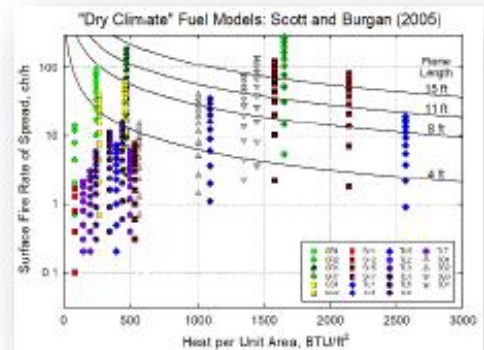
# Steps for Selecting a Fire Behavior Fuel Model

*Pre-work - Become a student of fire behavior. Build the slides that you will need to understand how fuels will burn under different loading, moisture, and weather conditions.*

1. Select likely fuel models based on primary fire carrier and general fire behavior using the **Fuel Model Flow Chart**.



2. Check the **Fuel Model Comparison Graphs** to see if there are other fuel models from different fuel categories that better represent your fire behavior.



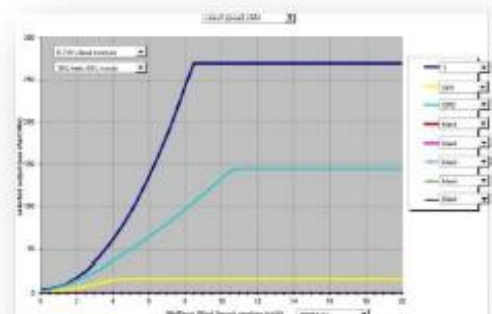
3. Look up each potential fuel model in **GTR 153 – Standard Fire Behavior Fuel Models, Scott and Burgan 2005** to view its description and general fire behavior.

**GR2 (100)**  
Low Load, Dry Climate Grass (Dynamic)

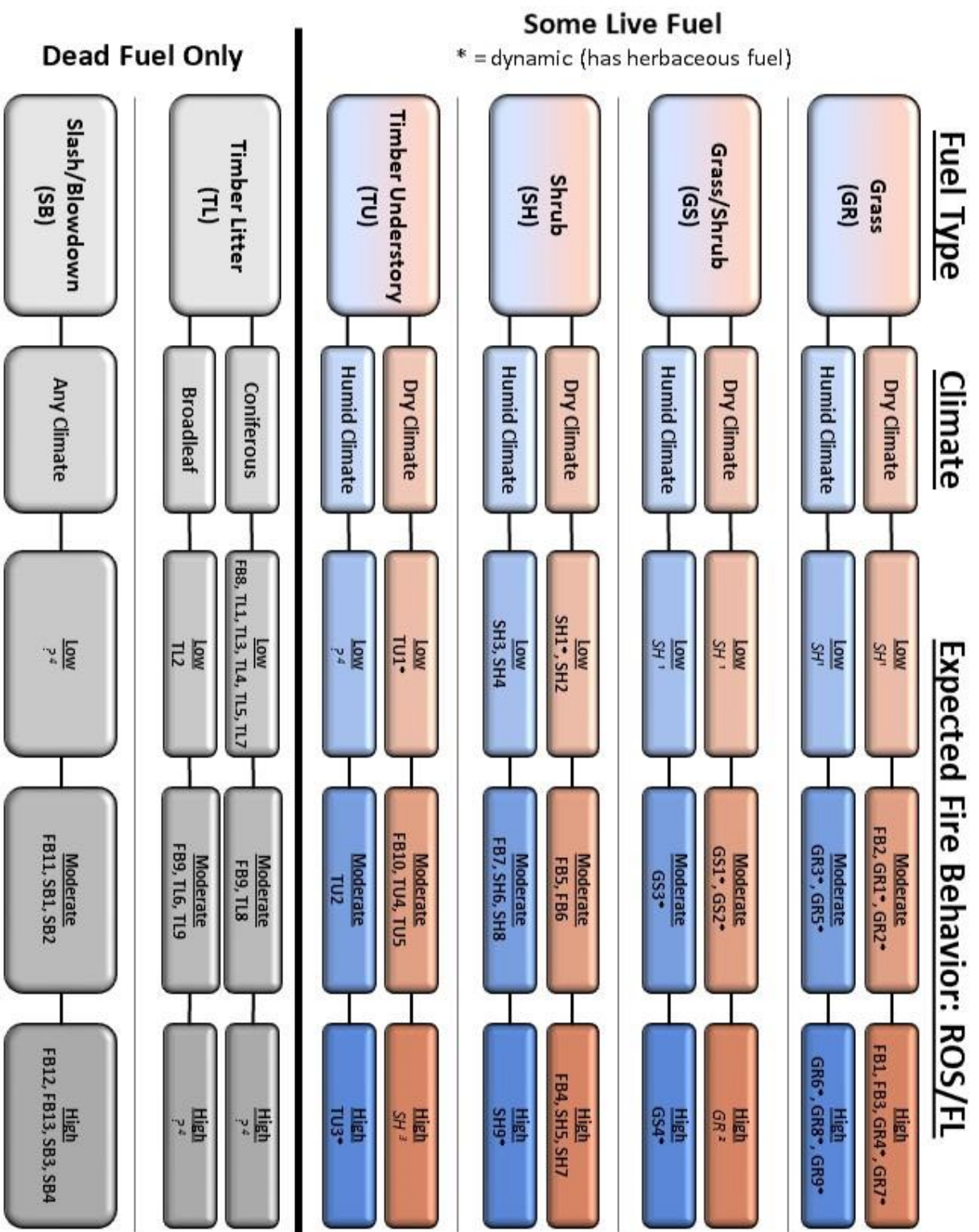
**Description:** The primary carrier of fire in GR2 is grass, though small amounts of fine dead fuel may be present. Load is greater than GR1, and fuelbed may be more continuous. Shrubs, if present, do not affect fire behavior.

Fire fuel load (51ac) 0.10  
Characteristic S40 (H-1) 1820  
Bedding ratio (dimensionless) 0.00158  
Radiation moisture content (percent) 15

4. Graph each potential fuel model on the **CompareModelFour** spreadsheet and compare the modeled fire behavior to observed or expected fire behavior. Adjust fuel moisture conditions, look at flame lengths AND rate of spread



# Fuel Model Flow Chart



(Anderson 1982, Scott and Burgan 2005)

## 53 Fuel Models

**NOTE:** It is possible to have a fuel model with a different name than the primary fire carrier. If a box in the flow chart has an italicized fuel category, existing fuel models in that fuel type do not represent those conditions well. You need to think outside the box.

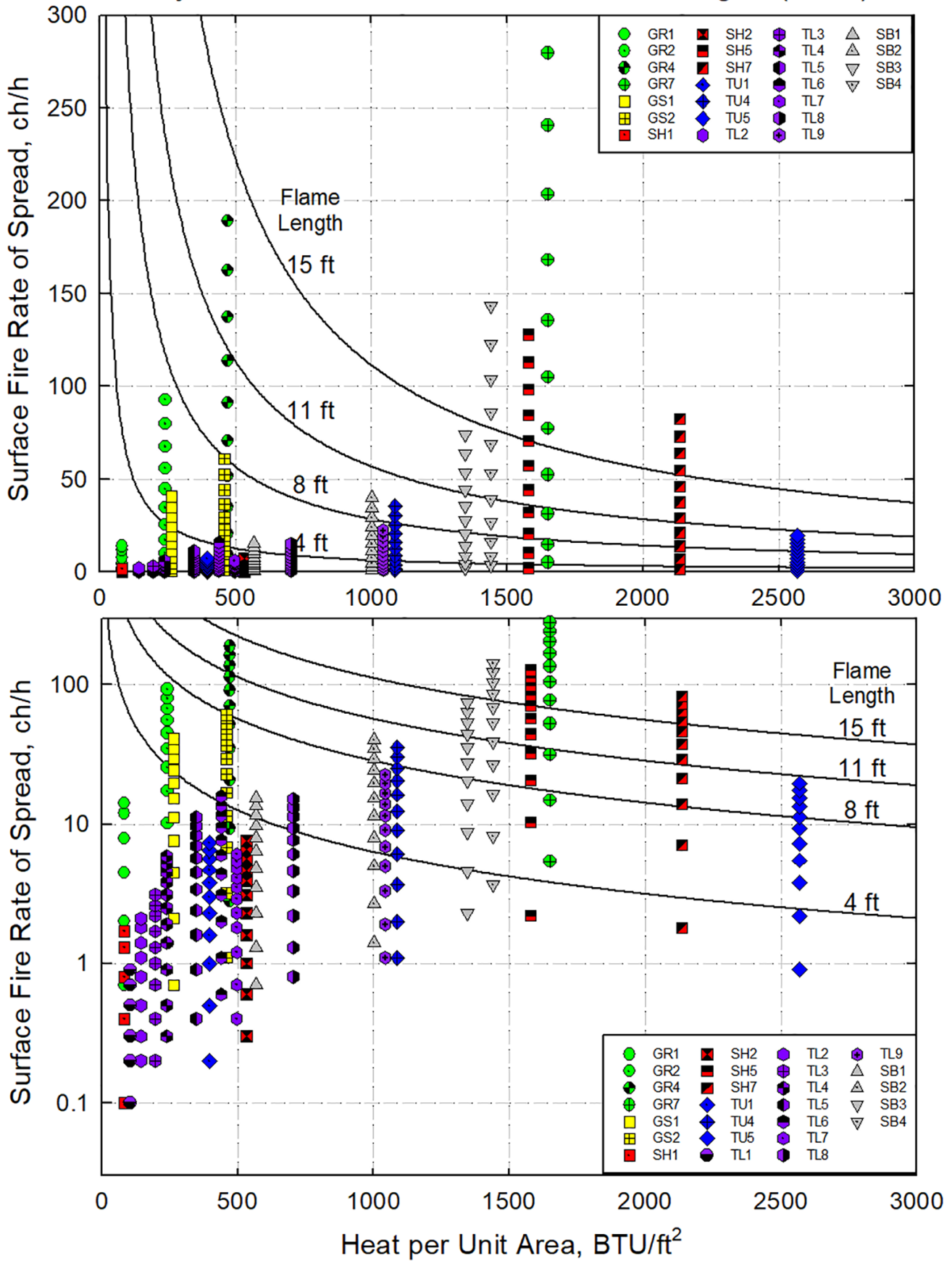
<sup>1</sup> For low fire behavior in Grass/Shrub consider a Shrub model (e.g., SH1, SH2 for dry climate; SH3, SH4 for humid)

<sup>2</sup> For high fire behavior in Grass/Shrub, consider a Grass model.

<sup>3</sup> For high fire behavior in a dry climate Timber Understory, look at Shrub models

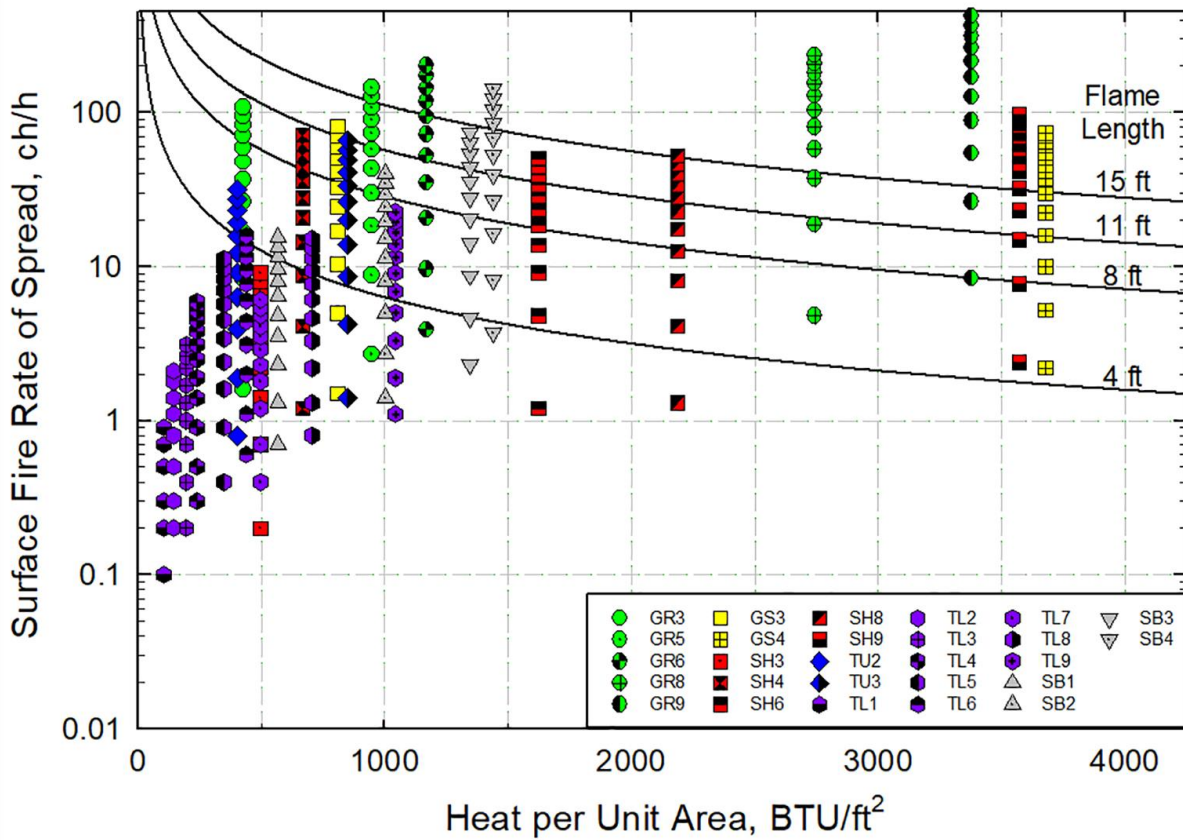
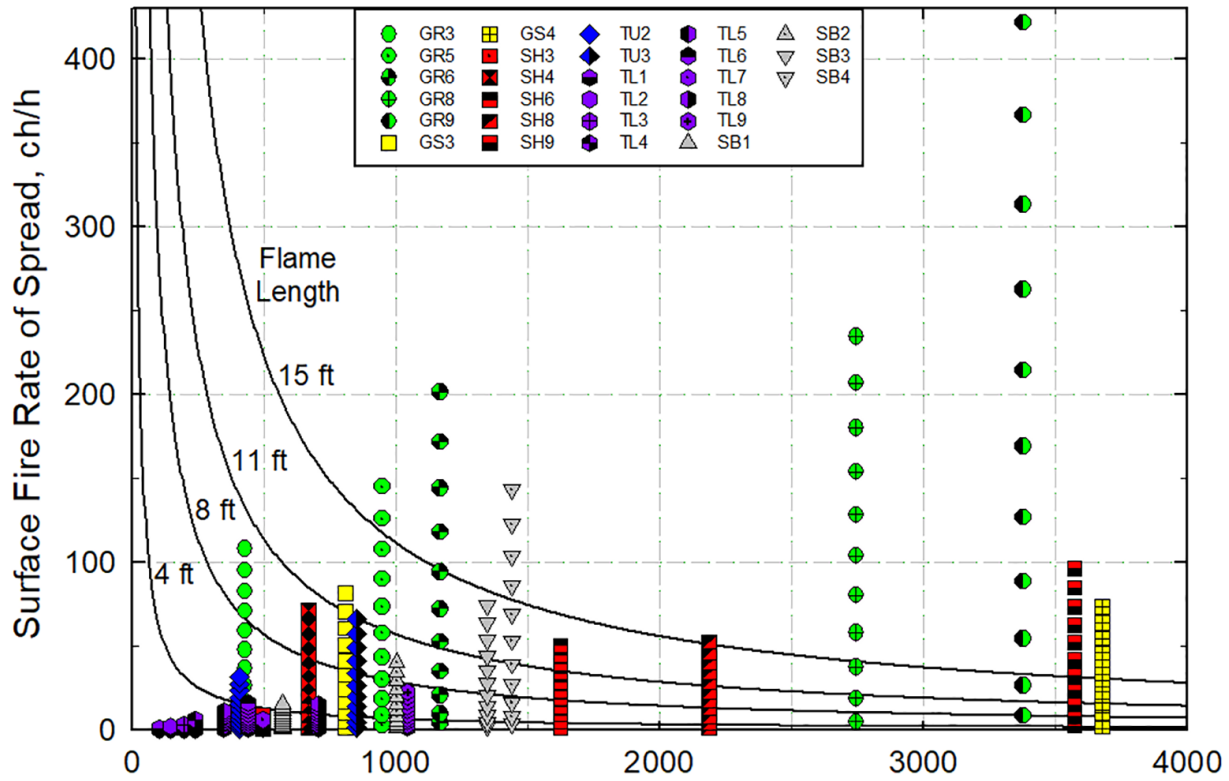
<sup>4</sup> For high fire behavior in Timber Litter and low fire behavior in both Timber Understory (Humid) and Slash/Blowdown, look at the area again. There is likely something else contributing to fire behavior.

# "Dry Climate" Fuel Models: Scott and Burgan (2005)



**INPUTS:** 1-hr Moisture=6%; 10-hr=7%; 100-hr=8%; Herb=60%; Woody=90%; Midflame WS=1-10 mph; Slope=0%  
**These fuel models reach the Wind Limit:** GR1 @ 5 mph, SH1 @ 4mph, TL1 @ 5 mph, TL2 @ 7 mph, and TL3 @ 8 mph

# "Humid Climate" Fuel Models: Scott and Burgan (2005)



**INPUTS:** 1-hr Moisture=6%; 10-hr=7%; 100-hr=8%; Herb=60%; Woody=90%; Midflame WS=1-10 mph; Slope=0%  
**These fuel models reach the Wind Limit:** TL1 @ 5 mph, TL2 @ 7 mph, and TL3 @ 8 mph

# Fire Behavior Fuel Model Reference Table – Adapted from fbfrg.org

(fuels in shaded rows = dynamic, **right justified** fuel models are humid climate models)

Carrier	FM #	FM code	Fuel Model Name	Total Load	Bed Depth (ft)	Flame Length	ROS	Moist Extinc
<b>Dry Climate Fuel Models</b>								
GR	1	FM1	Short Grass	0.7	1.0			12
GR	2	FM2	Timber Grass and Understory	4.0	1.1			15
GR	3	FB3	Tall grass	3.0	2.5	H	M	25
GR	101	GR1	Short, sparse dry climate grass	0.4	0.4	M	L	15
GR	103	GR3	Low load very course humid climate grass	2.0	2.0	VH	H	30
GR	102	GR2	Low load dry climate grass	1.1	1.0	H	M	15
GR	104	GR4	Moderate load dry climate grass	2.2	2.0	VH	H	15
GR	105	GR5	Low load humid climate grass	2.9	1.5	VH	VH	40
GR	106	GR6	Moderate load humid climate grass	3.5	1.5	EX	EX	40
GR	107	GR7	High load dry climate grass	6.4	3.0	VH	VH	15
GR	108	GR8	High load very course humid climate grass	8.8	4.0			30
GR	109	GR9	Very high load humid climate grass	11.0	5.0			40
GS	121	GS1	Low-load dry climate grass shrub	1.4	0.9	M	L	15
GS	122	GS2	Moderate-load dry climate grass shrub	2.6	1.5	H	M	15
GS	123	GS3	Moderate load humid climate grass shrub	3.3	1.8	H	M	40
GS	124	GS4	High load humid climate grass shrub	12.8	2.1	H	VH	40
SH	4	FB4	Chaparral	16.0	6			20
SH	5	FB5	Brush	3.5	2			20
SH	6	FB6	Dormant shrub	6	2.5			25
SH	7	FB7	Southern rough	4.9	2.5			40
SH	141	SH1	Low load dry climate shrub	2.0	1	VL	VL	15
SH	142	SH2	Mod load dry climate shrub	8.4	1	L	L	15
SH	143	SH3	Mod. Load humid climate shrub	9.7	2.5	L	L	40
SH	144	SH4	Low load humid climate timber-shrub	4.8	3	H	M	30
SH	145	SH5	High load dry climate shrub	8.6	6	VH	VH	15
SH	146	SH6	Low load humid climate shrub	5.8	2	H	H	30
SH	147	SH7	Very high load dry climate shrub	14.4	6	VH	VH	15
SH	148	SH8	High load humid climate shrub	10.7	3	H	H	40
SH	149	SH9	Very high load humid climate shrub	15.5	4.4	H	VH	40
TU	161	TU1	Light load dry climate timber-grass-shrub	3.7	0.6	L	L	20
TU	162	TU2	Moderate load humid climate timber-shrub	4.2	1	M	L	30
TU	163	TU3	Moderate load humid climate timber-grass-shrub	3.3		H	M	30
TU	164	TU4	Dwarf conifer with understory	6.5	0.5	L	L	12
TU	165	TU5	Very high load dry climate timber-shrub	14	1	M	M	25
TU	10	FB10	Timber litter and understory	12	1			25
TL	8	FB8	Compact timber litter	5.0	0.2			30
TL	9	FB9	Hardwood litter	3.5	0.2			25
TL	181	TL1	Low load compact conifer litter	6.8	0.2			30
TL	182	TL2	Low load broadleaf litter	5.9	0.2	VL	VL	25
TL	183	TL3	Mod. Load conifer litter	5.5	0.3	VL	L	20
TL	184	TL4	Small downed logs	6.2	0.4	L	L	25
TL	185	TL5	High load conifer litter	8.1	0.6	L	L	25
TL	186	TL6	Moderate load broadleaf litter	4.8	0.3	M	L	25
TL	187	TL7	Large downed logs	9.8	0.4	L	L	25
TL	188	TL8	Long-needle litter	8.3	0.3	M	L	35
TL	189	TL9	Very high load broadleaf litter	14.1	0.6	M	M	35

Carrier	FM #	FM code	Fuel Model Name	Total Load	Bed Depth (ft)	Flame Length	ROS	Moist Extinc
<b>Slash/Blowdown Fuel Models</b>								
SB	11	FB 11	Light slash	11.5	1.0			15
SB	12	FB 12	Medium slash	34.6	2.3			20
SB	13	FB 13	Heavy slash	58.1	3.0			25
SB	201	SB1	Low load activity fuel	15.5	1.0	M	L	25
SB	202	SB2	Moderate load activity or low load blowdown	12.8	1.0	M	M	25
SB	203	SB3	High load activity fuel or moderate load blowdown	11.3	1.2	H	H	25
SB	204	SB4	High load blowdown	14.0	2.7	VH	VH	25

The material above this point is not a part of GTR 153.  
The information below this point is directly from GTR 153.

**Table 2**—Level of curing versus live herbaceous moisture content.

Level of curing		Live herbaceous moisture content
Uncured	0 percent	120 percent or more
One-quarter	25	98
One-third	33	90
One-half	50	75
Two-thirds	66	60
Three-quarters	75	53
Fully cured	100	30 or less

**Table 3**—Dead fuel moisture content values (percent) for the dead fuel moisture scenarios.

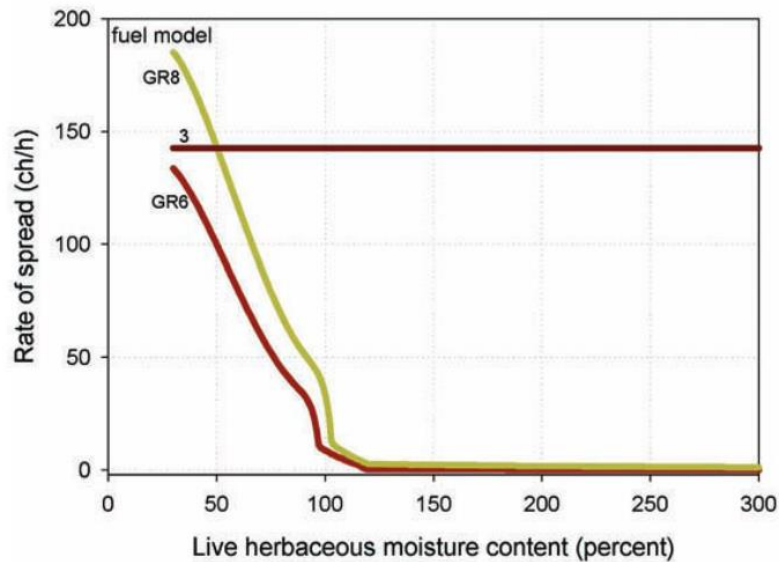
	D1 Very low	D2 Low	D3 Moderate	D4 High
1-hr	3	6	9	12
10-hr	4	7	10	13
100-hr	5	8	11	14

**Table 4**—Live fuel moisture content values (percent) for the live fuel moisture scenarios.

	<b>L1</b> <b>Fully cured</b> <b>Very low</b>	<b>L2</b> <b>Two-thirds cured</b> <b>Low</b>	<b>L3</b> <b>One-third cured</b> <b>Moderate</b>	<b>L4</b> <b>Fully green (uncured)</b> <b>High</b>
Live herbaceous	30	60	90	120
Live woody	60	90	120	150

**Table 5**—Adjective class definitions for predicted fire behavior.

<b>Adjective class</b>	<b>ROS (ch/h)</b>	<b>FL (ft)</b>
Very Low	0-2	0-1
Low	2-5	1-4
Moderate	5-20	4-8
High	20-50	8-12
Very High	50-150	12-25
Extreme	>150	>25

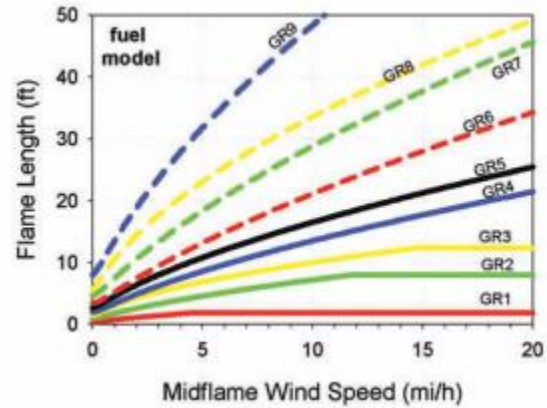
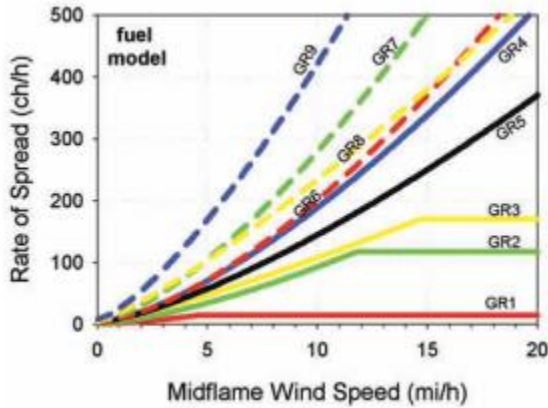


**Figure 2**—Comparison of dynamic fuel models GR6 and GR8 with static fuel model 3.



# Grass Fuel Type Models (GR)

The primary carrier of fire in the GR fuel models is grass. Grass fuels can vary from heavily grazed grass stubble or sparse natural grass to dense grass more than 6 feet tall. Fire behavior varies from moderate spread rate and low flame length in the sparse grass to extreme spread rate and flame length in the tall grass models. All GR fuel models are dynamic, meaning that their live herbaceous fuel load shifts from live to dead as a function of live herbaceous moisture content. The effect of live herbaceous moisture content on spread rate and intensity is strong.

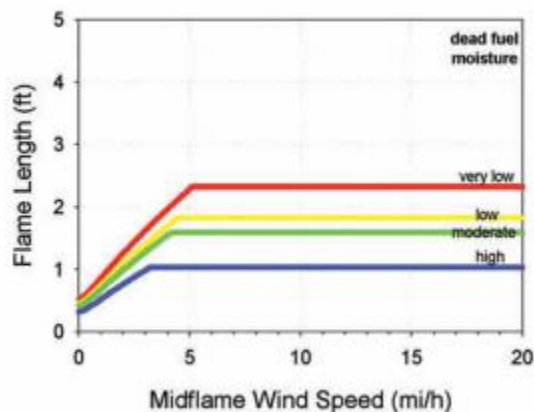
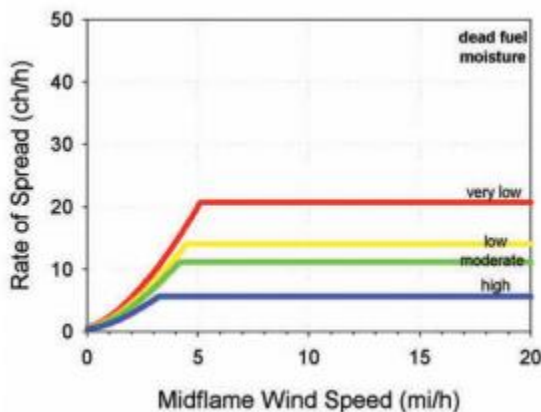


## GR1 (101)

*Short, Sparse Dry Climate Grass (Dynamic)*

Fine fuel load (t/ac)	0.40
Characteristic SAV (ft-1)	2054
Packing ratio (dimensionless)	0.00143
Extinction moisture content (percent)	15

Description: The primary carrier of fire in GR1 is sparse grass, though small amounts of fine dead fuel may be present. The grass in GR1 is generally short, either naturally or by grazing, and may be sparse or discontinuous. The moisture of extinction of GR1 is indicative of a dry climate fuelbed, but GR1 may also be applied in high-extinction moisture fuelbeds because in both cases predicted spread rate and flame length are low compared to other GR models.

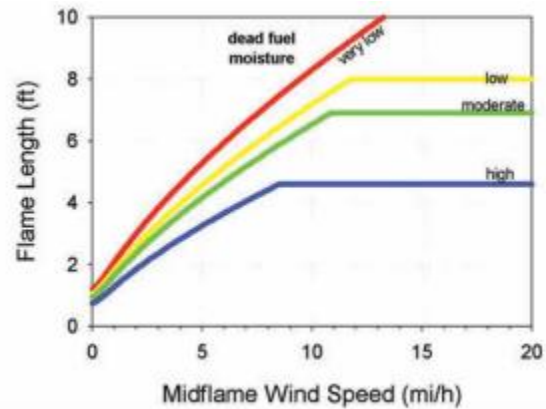
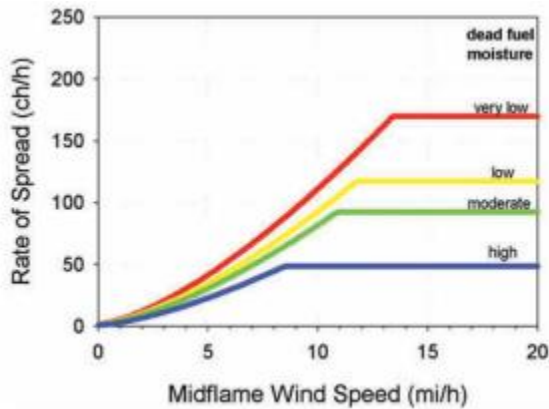


## GR2 (102)

### *Low Load, Dry Climate Grass (Dynamic)*

**Description:** The primary carrier of fire in GR2 is grass, though small amounts of fine dead fuel may be present. Load is greater than GR1, and fuelbed may be more continuous. Shrubs, if present, do not affect fire behavior.

Fine fuel load (t/ac)	1.10
Characteristic SAV (ft-1)	1820
Packing ratio (dimensionless)	0.00158
Extinction moisture content (percent)	15

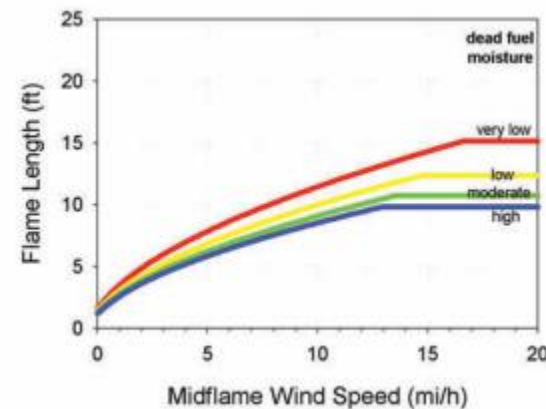
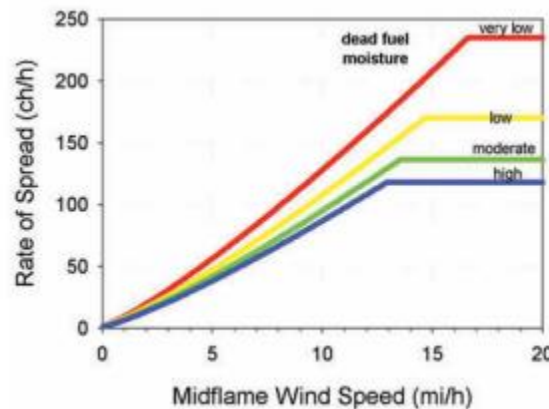


## GR3 (103)

### *Low Load, Very Coarse, Humid Climate Grass (Dynamic)*

**Description:** The primary carrier of fire in GR3 is continuous, coarse, humid-climate grass. Grass and herb fuel load is relatively light; fuelbed depth is about 2 feet. Shrubs are not present in significant quantity to affect fire behavior.

Fine fuel load (t/ac)	1.60
Characteristic SAV (ft-1)	1290
Packing ratio (dimensionless)	0.00143
Extinction moisture content (percent)	30



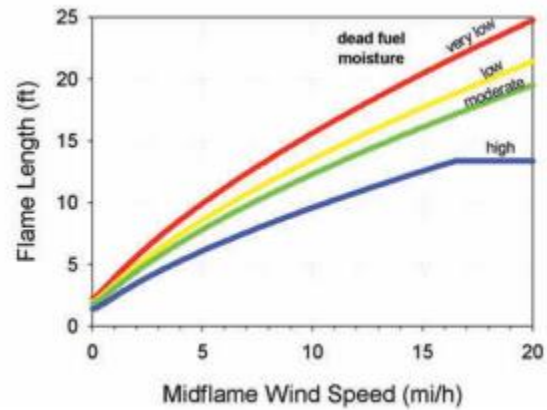
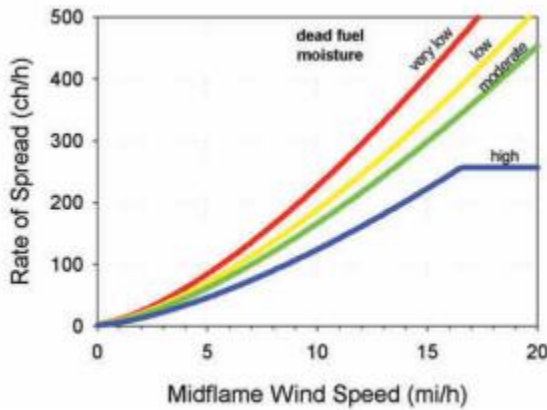
## GR4 (104)

*Moderate Load, Dry Climate Grass (Dynamic)*

Description: The primary carrier of fire in GR4 is continuous, dry-climate grass. Load and depth are greater than GR2; fuelbed depth is about 2 feet.



Fine fuel load (t/ac)	2.15
Characteristic SAV (ft-1)	1826
Packing ratio (dimensionless)	0.00154
Extinction moisture content (percent)	15



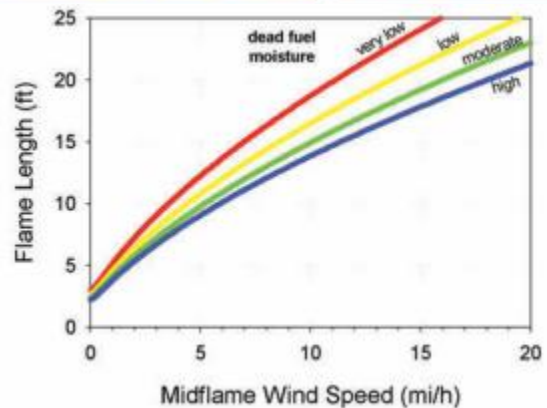
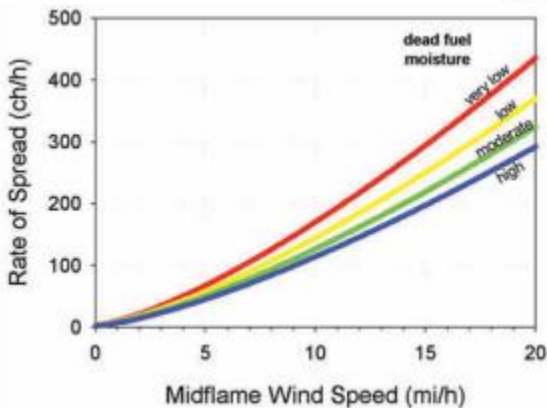
## GR5 (105)

*Low Load, Humid Climate Grass (Dynamic)*

Description: The primary carrier of fire in GR5 is humid-climate grass. Load is greater than GR3 but depth is lower, about 1 to 2 feet.



Fine fuel load (t/ac)	2.9
Characteristic SAV (ft-1)	1631
Packing ratio (dimensionless)	0.00277
Extinction moisture content (percent)	40

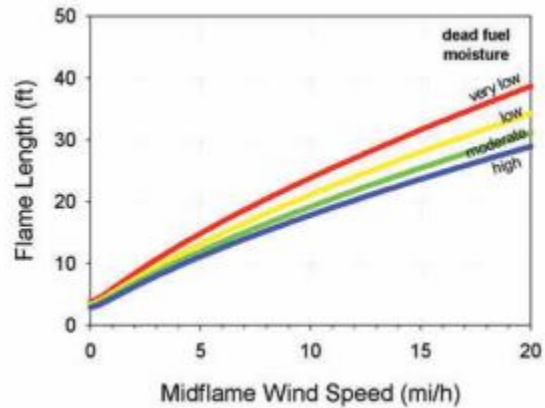
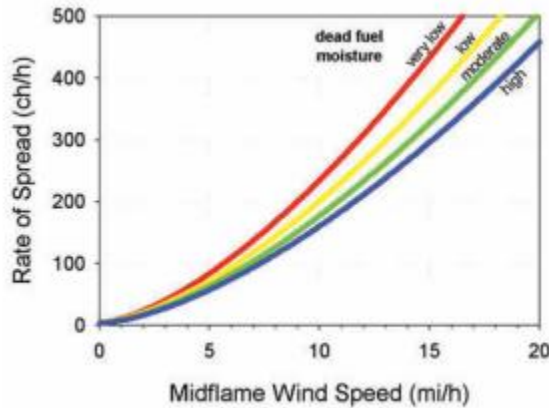


## GR6 (106)

### Moderate Load, Humid Climate Grass (Dynamic)

Description: The primary carrier of fire in GR6 is continuous humid-climate grass. Load is greater than GR5 but depth is about the same. Grass is less coarse than GR5.

Fine fuel load (t/ac)	3.5
Characteristic SAV (ft-1)	2006
Packing ratio (dimensionless)	0.00335
Extinction moisture content (percent)	40

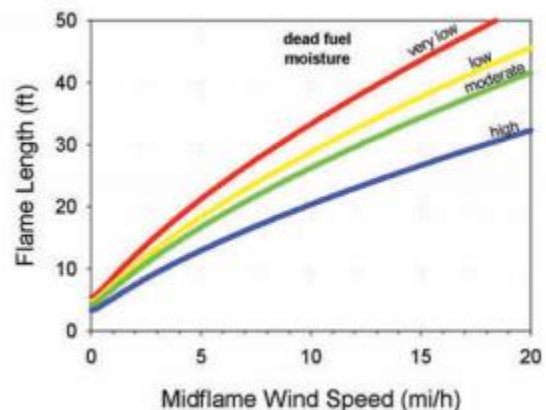
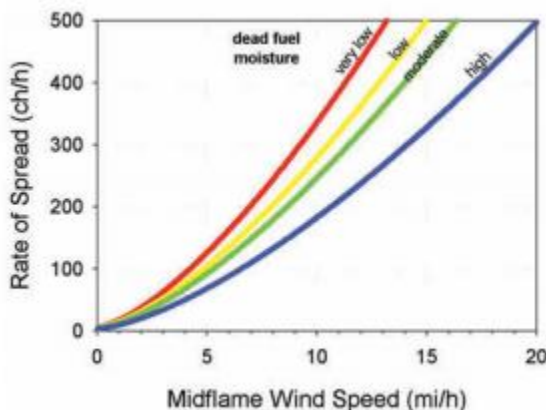


## GR7 (107)

### High Load, Dry Climate Grass (Dynamic)

Description: The primary carrier of fire in GR7 is continuous dry-climate grass. Load and depth are greater than GR4. Grass is about 3 feet tall.

Fine fuel load (t/ac)	6.4
Characteristic SAV (ft-1)	1834
Packing ratio (dimensionless)	0.00306
Extinction moisture content (percent)	15



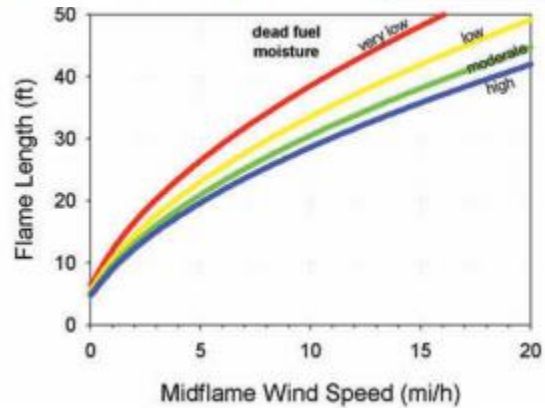
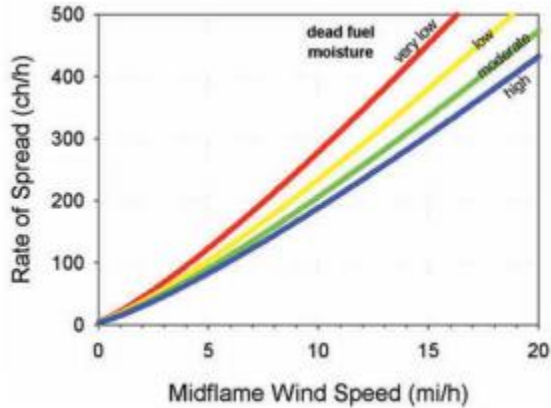
## GR8 (108)

### *High Load, Very Coarse, Humid Climate Grass (Dynamic)*

Description: The primary carrier of fire in GR8 is continuous, very coarse, humid climate grass. Load and depth are greater than GR6. Spread rate and flame length can be extreme if grass is fully cured.

Fine fuel load (t/ac)	7.8
Characteristic SAV (ft-1)	1302
Packing ratio (dimensionless)	0.00316
Extinction moisture content (percent)	30

x

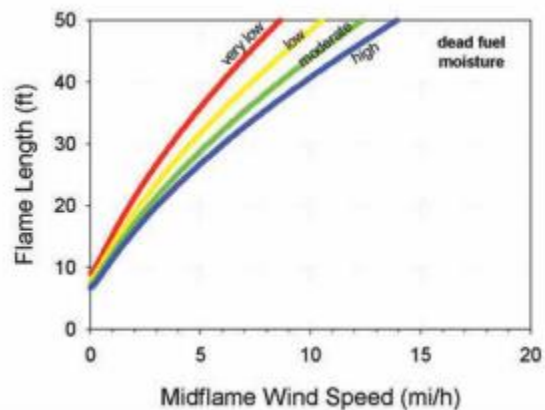
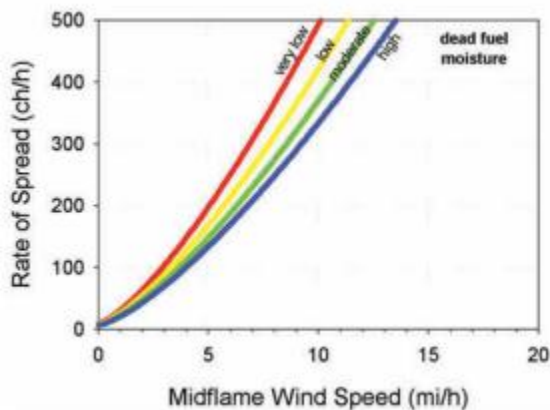


## GR9 (109)

### *Very High Load, Humid Climate Grass (Dynamic)*

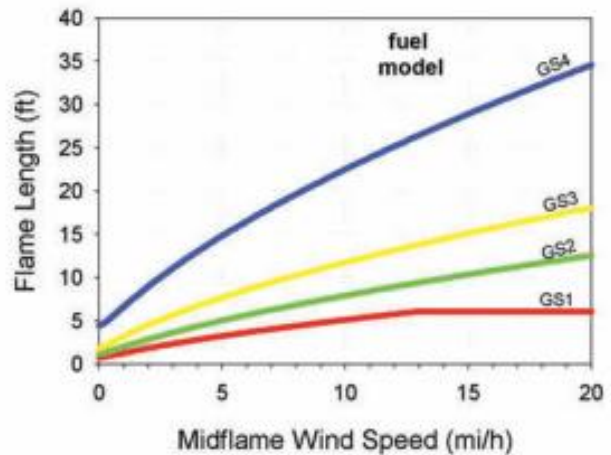
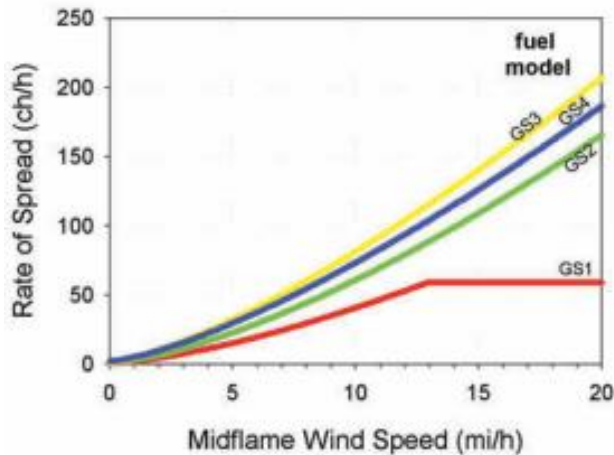
Description: The primary carrier of fire in GR9 is dense, tall, humid-climate grass. Load and depth are greater than GR8, about 6 feet tall. Spread rate and flame length can be extreme if grass is fully or mostly cured.

Fine fuel load (t/ac)	10.0
Characteristic SAV (ft-1)	1612
Packing ratio (dimensionless)	0.00316
Extinction moisture content (percent)	40



## Grass-Shrub Fuel Type Models (GS)

The primary carrier of fire in the GS fuel models is grass and shrubs combined; both components are important in determining fire behavior. All GS fuel models are dynamic, meaning that their live herbaceous fuel load shifts from live to dead as a function of live herbaceous moisture content. The effect of live herbaceous moisture content on spread rate and intensity is strong and depends on the relative amount of grass and shrub load in the fuel model.

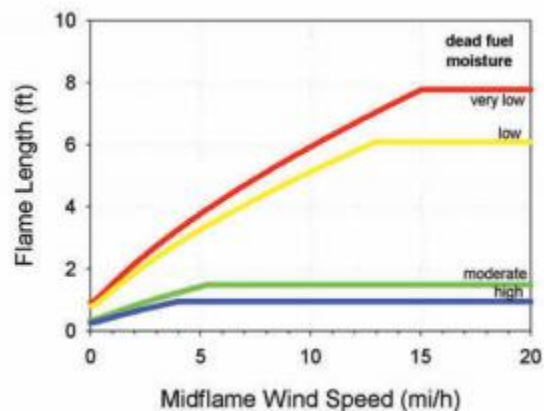
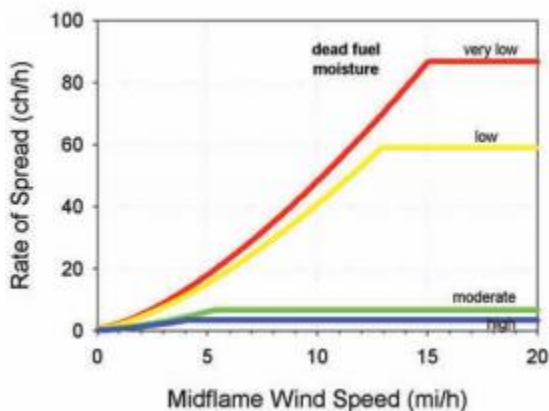


### GS1 (121)

*Low Load, Dry Climate Grass-Shrub (Dynamic)*

Description: The primary carrier of fire in GS1 is grass and shrubs combined. Shrubs are about 1 foot high, grass load is low. Spread rate is moderate; flame length low. Moisture of extinction is low.

Fine fuel load (t/ac)	1.35
Characteristic SAV (ft-1)	1832
Packing ratio (dimensionless)	0.00215
Extinction moisture content (percent)	15

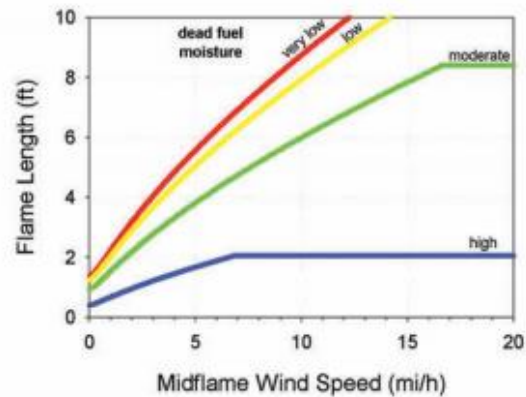
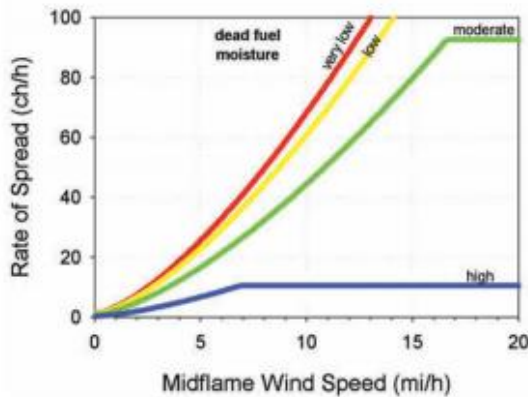


## GS2 (122)

### *Moderate Load, Dry Climate Grass-Shrub (Dynamic)*

Description: The primary carrier of fire in GS2 is grass and shrubs combined. Shrubs are 1 to 3 feet high, grass load is moderate. Spread rate is high; flame length moderate. Moisture of extinction is low.

Fine fuel load (t/ac)	2.1
Characteristic SAV (ft-1)	1827
Packing ratio (dimensionless)	0.00249
Extinction moisture content (percent)	15

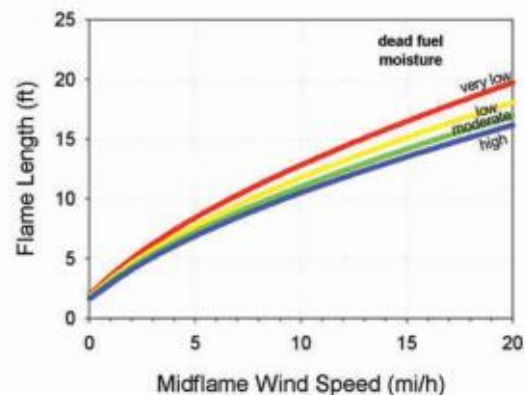
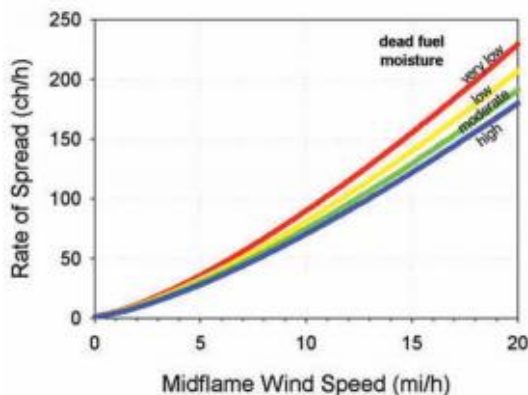


## GS3 (123)

### *Moderate Load, Humid Climate Grass-Shrub (Dynamic)*

Description: The primary carrier of fire in GS3 is grass and shrubs combined. Moderate grass/shrub load, average grass/shrub depth less than 2 feet. Spread rate is high; flame length moderate. Moisture of extinction is high.

Fine fuel load (t/ac)	3.0
Characteristic SAV (ft-1)	1614
Packing ratio (dimensionless)	0.00259
Extinction moisture content (percent)	40

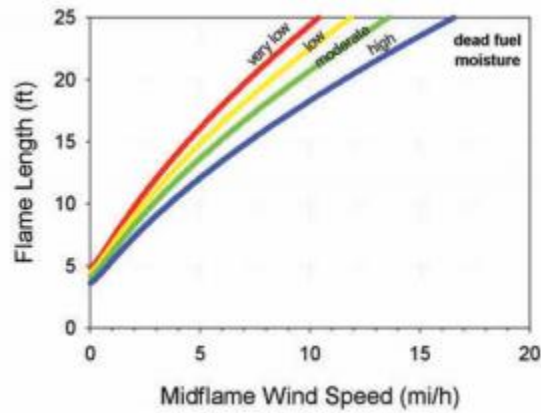
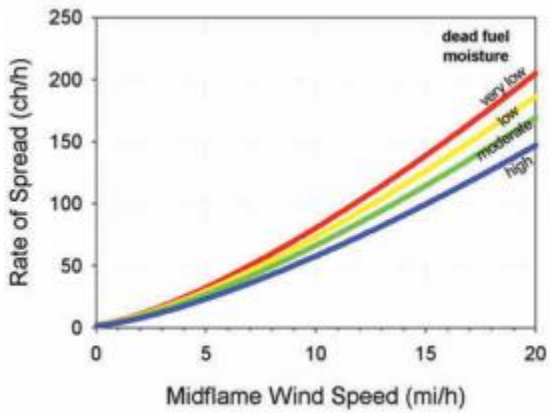


## GS4 (124)

### *High Load, Humid Climate Grass-Shrub (Dynamic)*

Description: The primary carrier of fire in GS4 is grass and shrubs combined. Heavy grass/shrub load, depth greater than 2 feet. Spread rate high; flame length very high. Moisture of extinction is high.

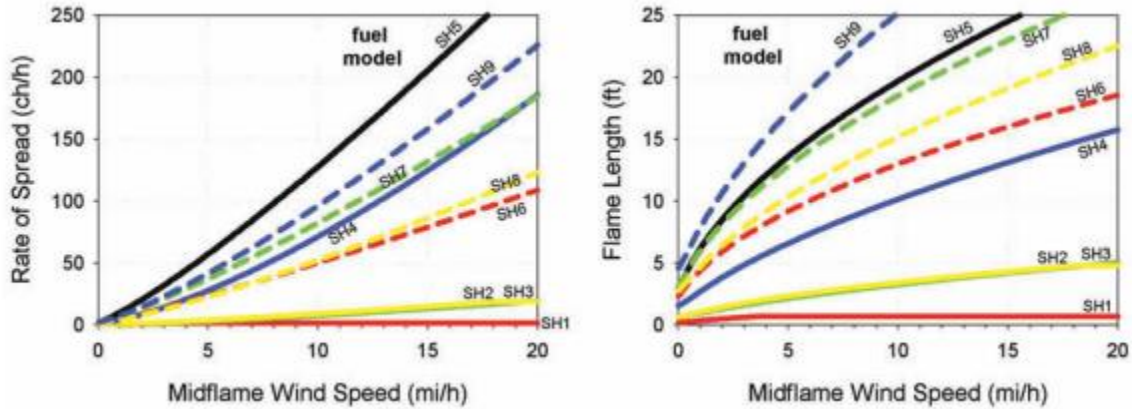
Fine fuel load (t/ac)	12.4
Characteristic SAV (ft-1)	1674
Packing ratio (dimensionless)	0.00874
Extinction moisture content (percent)	40





# Shrub Fuel Type Models (SH)

The primary carrier of fire in the SH fuel models is live and dead shrub twigs and foliage in combination with dead and down shrub litter. A small amount of herbaceous fuel may be present, especially in SH1 and SH9, which are dynamic models (their live herbaceous fuel load shifts from live to dead as a function of live herbaceous moisture content). The effect of live herbaceous moisture content on spread rate and flame length can be strong in those dynamic SH models.



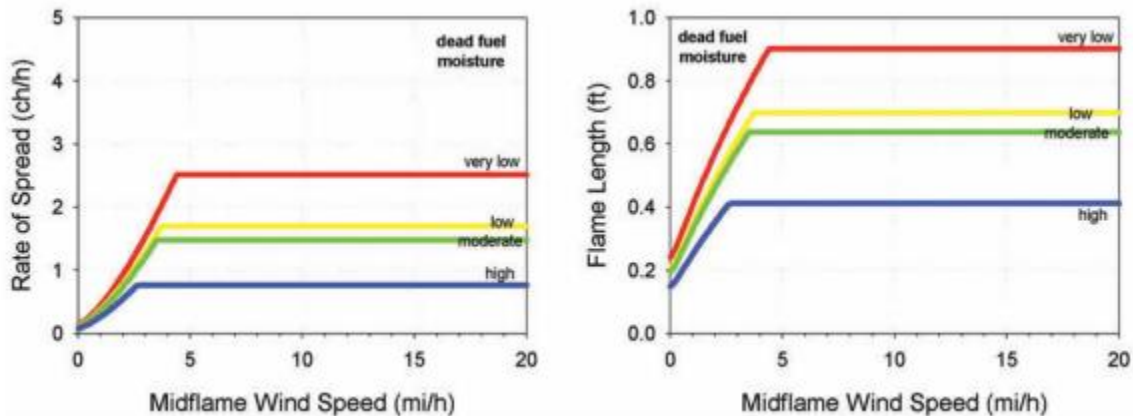
## SH1 (141)

### Low Load Dry Climate Shrub (Dynamic)

*Description:* The primary carrier of fire in SH1 is woody shrubs and shrub litter. Low shrub fuel load, fuelbed depth about 1 foot; some grass may be present. Spread rate is very low; flame length very low.



Fine fuel load (t/ac)	1.7
Characteristic SAV (ft-1)	1674
Packing ratio (dimensionless)	0.00280
Extinction moisture content (percent)	15



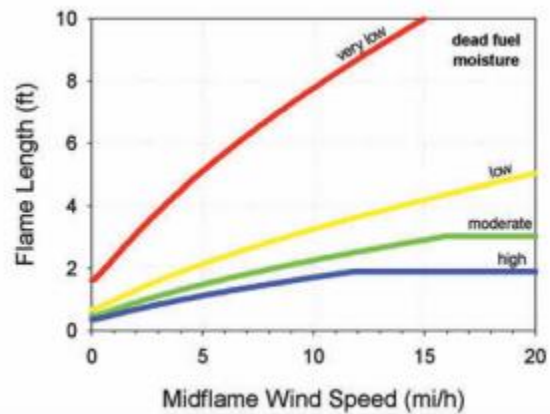
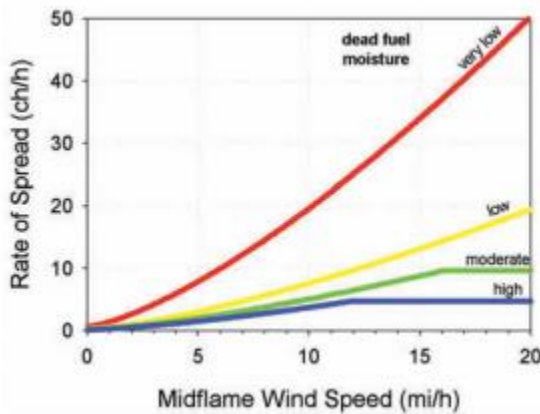
## SH2 (142)

### *Moderate Load Dry Climate Shrub*

Description: The primary carrier of fire in SH2 is woody shrubs and shrub litter. Moderate fuel load (higher than SH1), depth about 1 foot, no grass fuel present. Spread rate is low; flame length low.



Fine fuel load (t/ac)	5.2
Characteristic SAV (ft-1)	1672
Packing ratio (dimensionless)	0.01198
Extinction moisture content (percent)	15



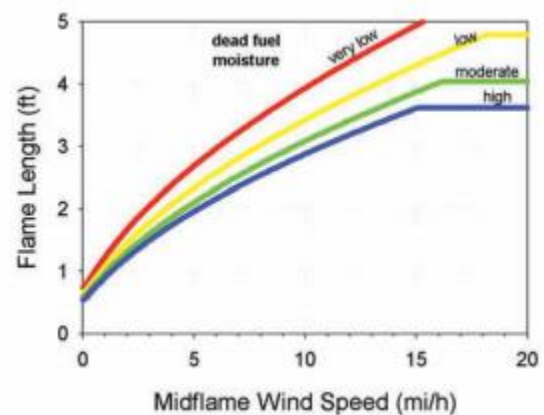
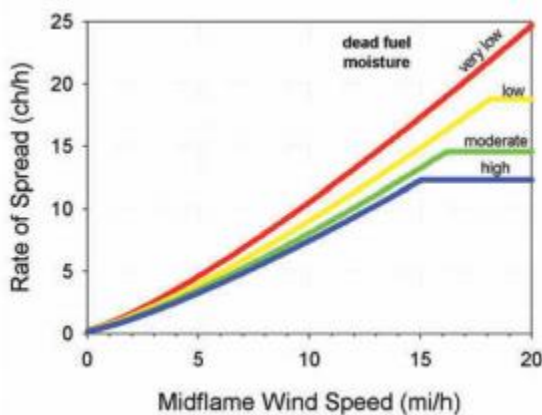
## SH3 (143)

### *Moderate Load, Humid Climate Shrub*

Description: The primary carrier of fire in SH3 is woody shrubs and shrub litter. Moderate shrub load, possibly with pine overstory or herbaceous fuel, fuel bed depth 2 to 3 feet. Spread rate is low; flame length low.



Fine fuel load (t/ac)	6.65
Characteristic SAV (ft-1)	1371
Packing ratio (dimensionless)	0.00577
Extinction moisture content (percent)	40

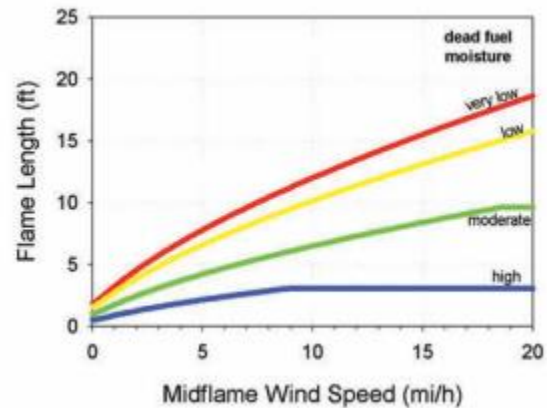
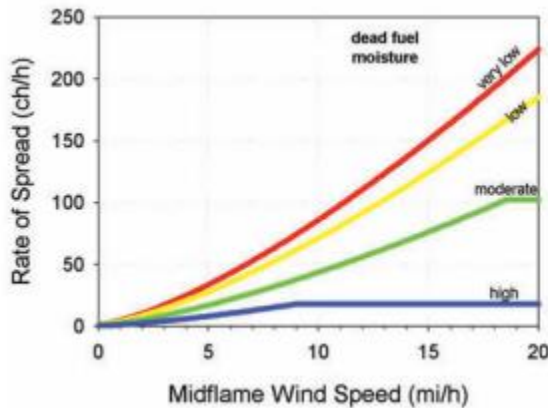


## SH4 (144)

### *Low Load, Humid Climate Timber-Shrub*

Description: The primary carrier of fire in SH4 is woody shrubs and shrub litter. Low to moderate shrub and litter load, possibly with pine overstory, fuel bed depth about 3 feet. Spread rate is high; flame length moderate.

Fine fuel load (t/ac)	3.4
Characteristic SAV (ft-1)	1682
Packing ratio (dimensionless)	0.00227
Extinction moisture content (percent)	30

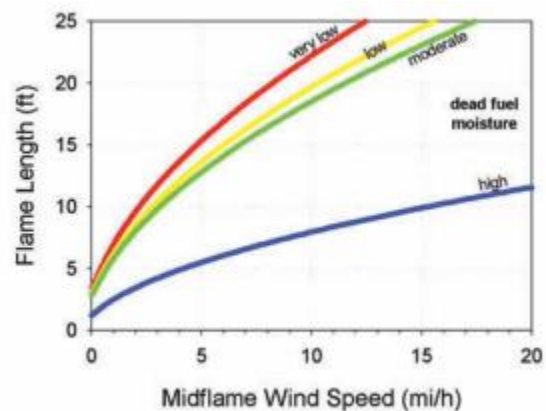
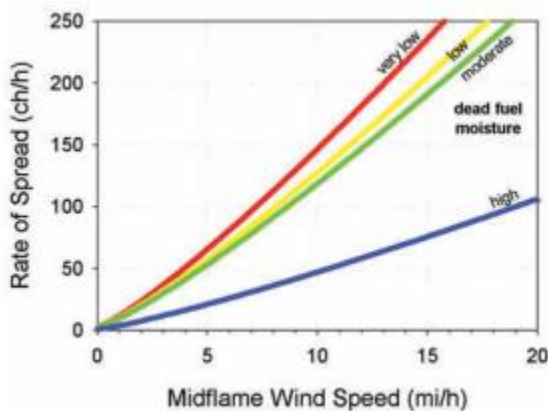


## SH5 (145)

### *High Load, Dry Climate Shrub*

Description: The primary carrier of fire in SH5 is woody shrubs and shrub litter. Heavy shrub load, depth 4-6 feet. Spread rate very high; flame length very high. Moisture of extinction is high.

Fine fuel load (t/ac)	6.5
Characteristic SAV (ft-1)	1252
Packing ratio (dimensionless)	0.00206
Extinction moisture content (percent)	15

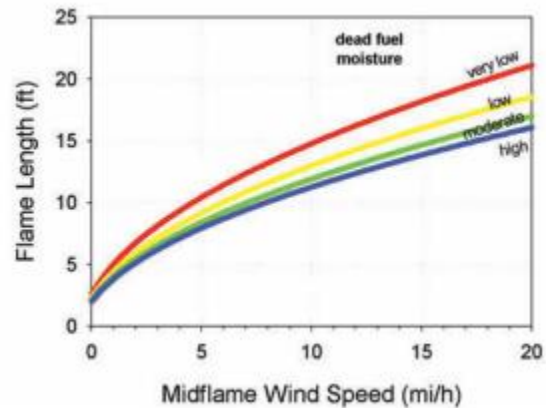
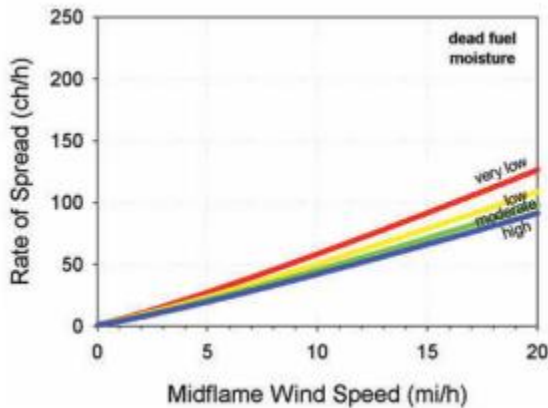


## SH6 (146)

### *Low Load, Humid Climate Shrub*

Description: The primary carrier of fire in SH6 is woody shrubs and shrub litter. Dense shrubs, little or no herbaceous fuel, fuelbed depth about 2 feet. Spread rate is high; flame length high.

Fine fuel load (t/ac)	4.3
Characteristic SAV (ft-1)	1144
Packing ratio (dimensionless)	0.00412
Extinction moisture content (percent)	30

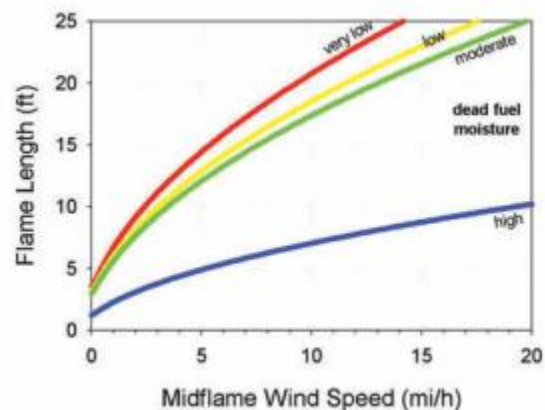
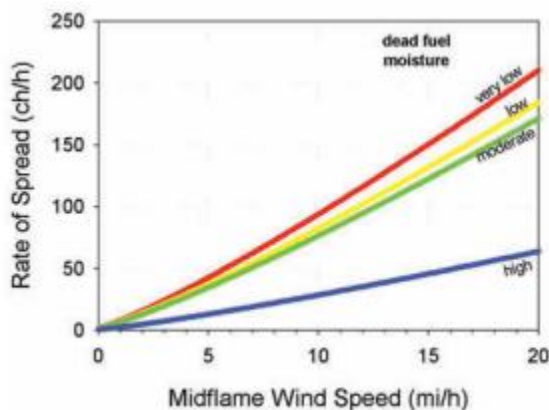


## SH7 (147)

### *Very High Load, Dry Climate Shrub*

Description: The primary carrier of fire in SH7 is woody shrubs and shrub litter. Very heavy shrub load, depth 4 to 6 feet. Spread rate lower than SH7, but flame length similar. Spread rate is high; flame length very high.

Fine fuel load (t/ac)	6.9
Characteristic SAV (ft-1)	1233
Packing ratio (dimensionless)	0.00344
Extinction moisture content (percent)	15



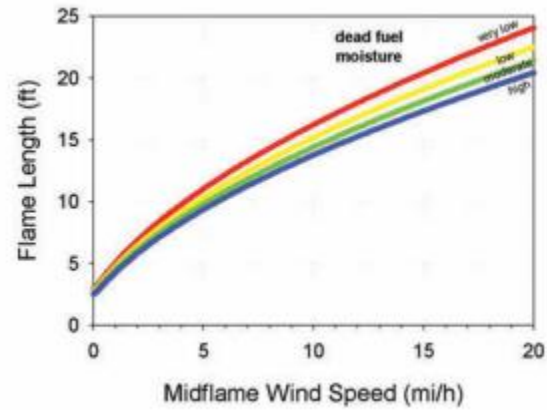
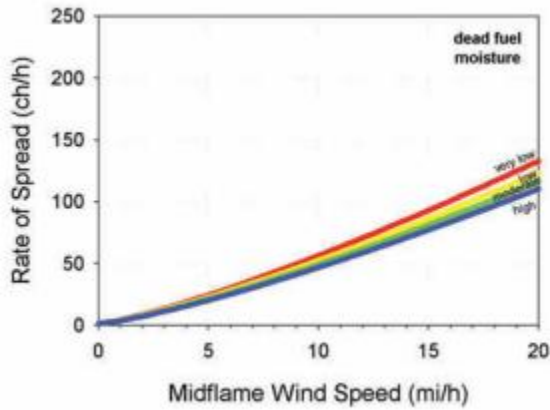
## SH8 (148)

### *High Load, Humid Climate Shrub*

Description: The primary carrier of fire in SH8 is woody shrubs and shrub litter. Dense shrubs, little or no herbaceous fuel, fuelbed depth about 3 feet. Spread rate is high; flame length high.



Fine fuel load (t/ac)	6.4
Characteristic SAV (ft-1)	1386
Packing ratio (dimensionless)	0.00509
Extinction moisture content (percent)	40



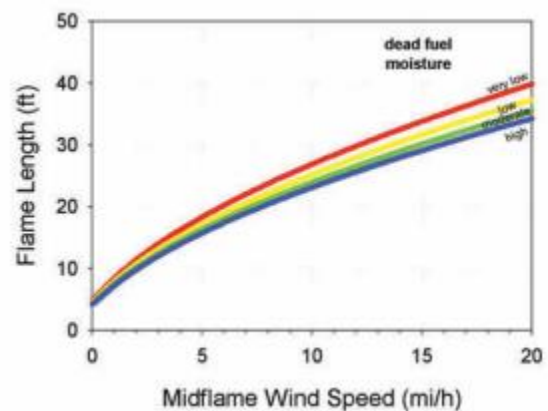
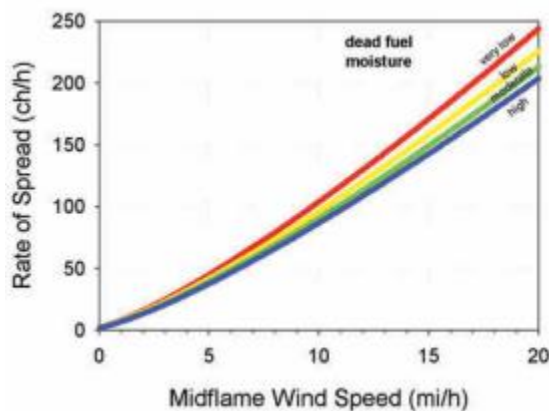
## SH9 (149)

### *Very High Load, Humid Climate Shrub (Dynamic)*

Description: The primary carrier of fire in SH9 is woody shrubs and shrub litter. Dense, finely branched shrubs with significant fine dead fuel, about 4 to 6 feet tall; some herbaceous fuel may be present. Spread rate is high, flame length very high.

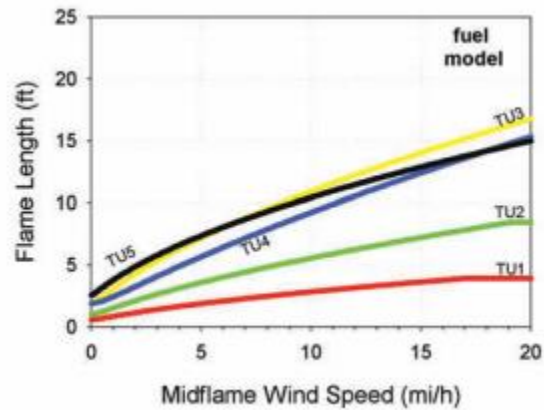
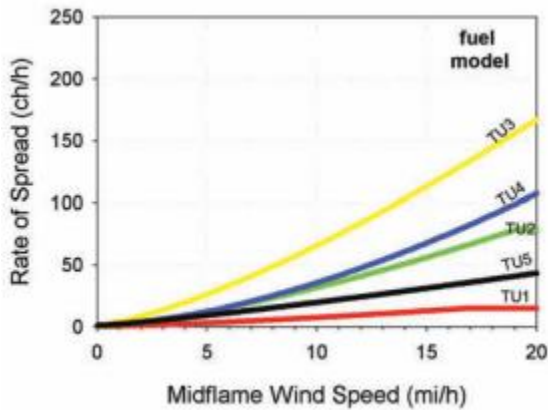


Fine fuel load (t/ac)	13.05
Characteristic SAV (ft-1)	1378
Packing ratio (dimensionless)	0.00505
Extinction moisture content (percent)	40



# Timber-Understory Fuel Type Models (TU)

The primary carrier of fire in the TU fuel models is forest litter in combination with herbaceous or shrub fuels. TU1 and TU3 contain live herbaceous load and are dynamic, meaning that their live herbaceous fuel load is allocated between live and dead as a function of live herbaceous moisture content. The effect of live herbaceous moisture content on spread rate and intensity is strong and depends on the relative amount of grass and shrub load in the fuel model.

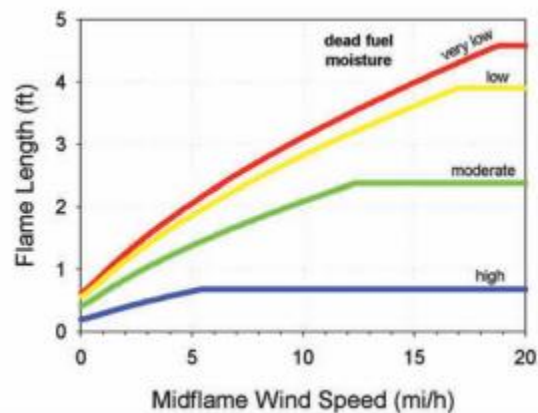
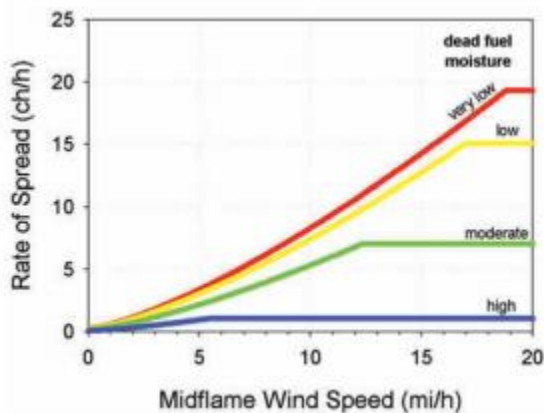


## TU1 (161)

*Low Load Dry Climate Timber-Grass-Shrub (Dynamic)*

Description: The primary carrier of fire in TU1 is low load of grass and/or shrub with litter. Spread rate is low; flame length low.

Fine fuel load (t/ac)	1.3
Characteristic SAV (ft-1)	1606
Packing ratio (dimensionless)	0.00885
Extinction moisture content (percent)	20



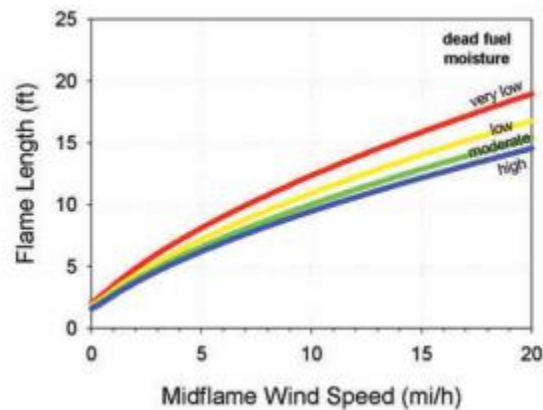
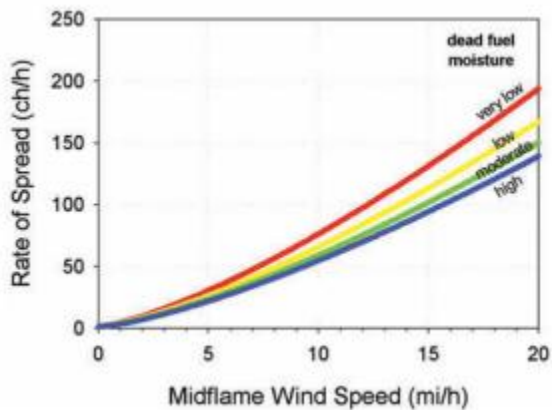
## TU2 (162)

*Moderate Load, Humid Climate Timber-Shrub*

The primary carrier of fire in TU2 is moderate litter load with shrub component. High extinction moisture. Spread rate is moderate; flame length low. Fine



Fine fuel load (t/ac)	1.15
Characteristic SAV (ft-1)	1767
Packing ratio (dimensionless)	0.00603
Extinction moisture content (percent)	30



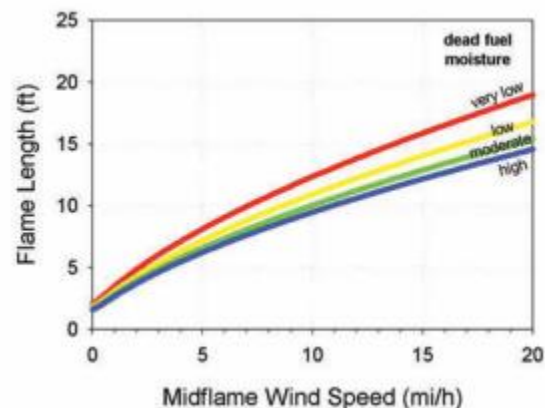
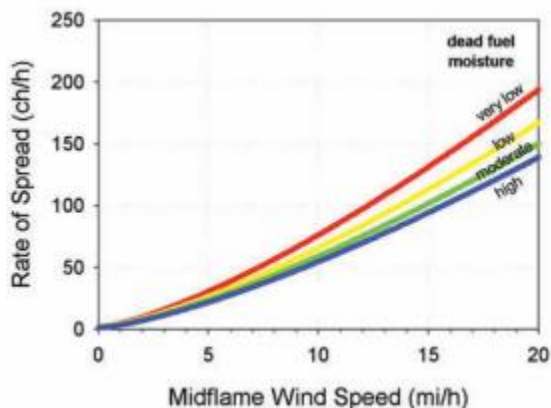
## TU3

*Moderate Load, Humid Climate Timber-Grass-Shrub (Dynamic)*

Description: The primary carrier of fire in TU3 is moderate forest litter with grass and shrub components. Extinction moisture is high. Spread rate is high; flame length moderate.



Fine fuel load (t/ac)	2.85
Characteristic SAV (ft-1)	1611
Packing ratio (dimensionless)	0.00359
Extinction moisture content (percent)	30



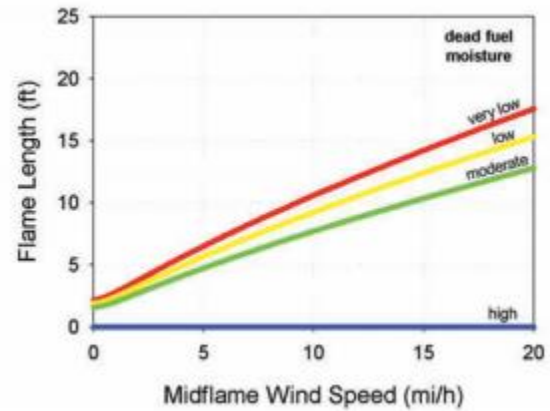
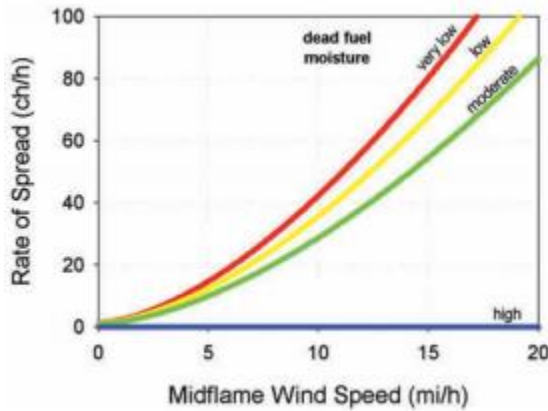
(163)

## TU4 (164)

### *Dwarf Conifer With Understory*

Description: The primary carrier of fire in TU4 is short conifer trees with grass or moss understory. Spread rate is moderate; flame length moderate.

Fine fuel load (t/ac)	6.5
Characteristic SAV (ft-1)	2216
Packing ratio (dimensionless)	0.01865
Extinction moisture content (percent)	12

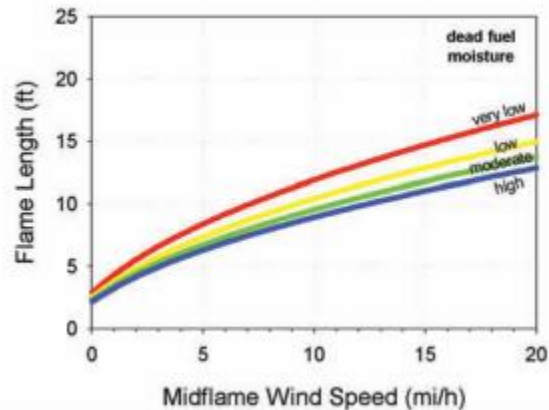
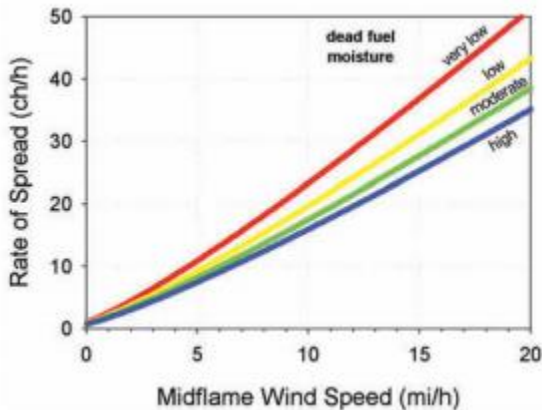


## TU5 (165)

### *Very High Load, Dry Climate Timber-Shrub*

Description: The primary carrier of fire in TU5 is heavy forest litter with a shrub or small tree understory. Spread rate is moderate; flame length moderate.

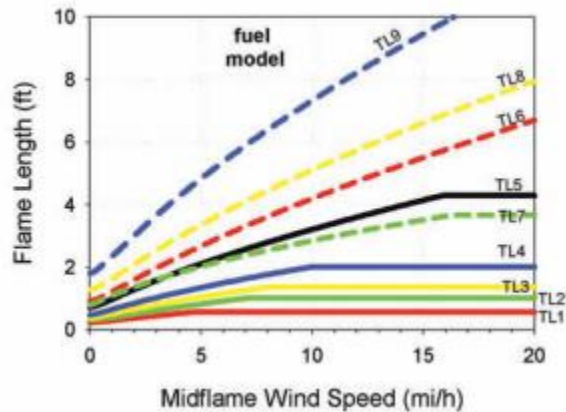
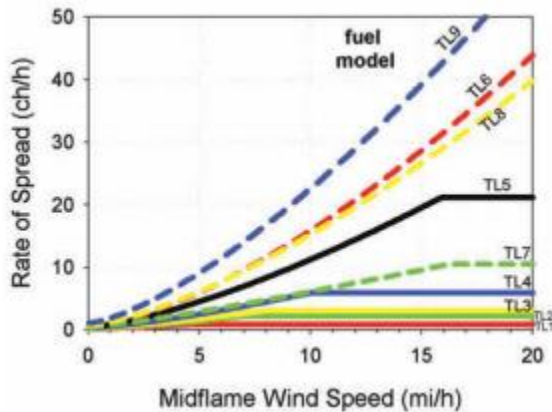
Fine fuel load (t/ac)	7.0
Characteristic SAV (ft-1)	1224
Packing ratio (dimensionless)	0.02009
Extinction moisture content (percent)	25





# Timber Litter Fuel Type Models (TL)

The primary carrier of fire in the TL fuel models is dead and down woody fuel. Live fuel, if present, has little effect on fire behavior.

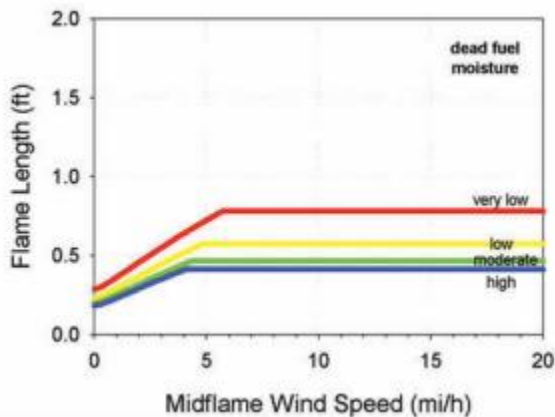
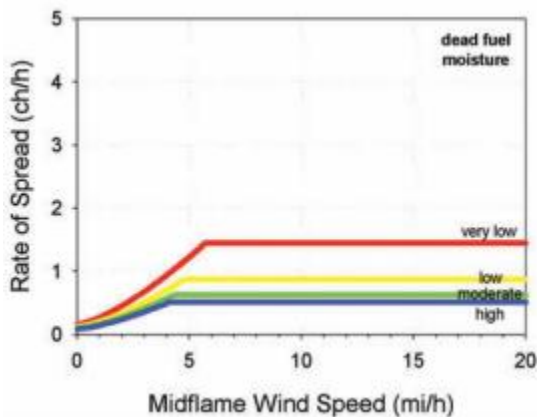


## TL1 (181)

### Low Load Compact Conifer Litter

Description: The primary carrier of fire in TL1 is compact forest litter. Light to moderate load, fuels 1 to 2 inches deep. May be used to represent a recently burned forest. Spread rate is very low; flame length very low.

Fine fuel load (t/ac)	1.0
Characteristic SAV (ft-1)	1716
Packing ratio (dimensionless)	0.04878
Extinction moisture content (percent)	30

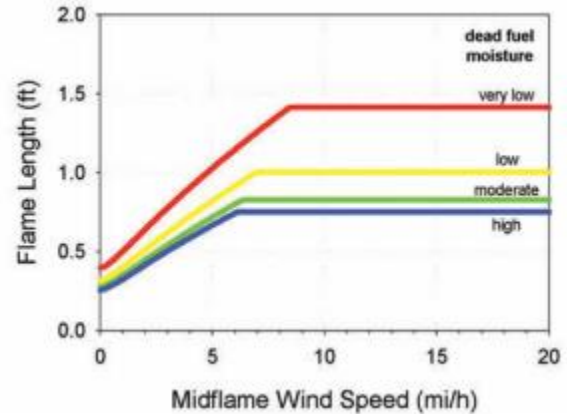
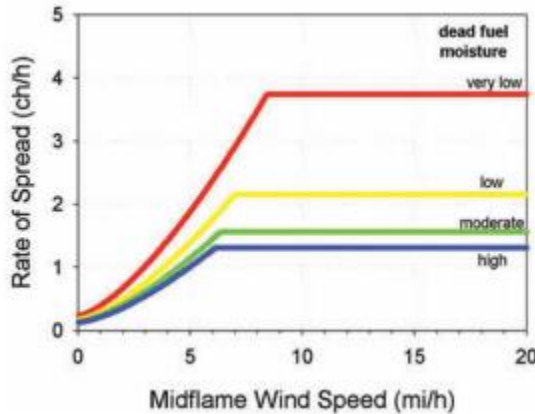


## TL2 (182)

### Low Load Broadleaf Litter

Description: The primary carrier of fire in TL2 is broadleaf (hardwood) litter. Low load, compact broadleaf litter. Spread rate is very low; flame length very low.

Fine fuel load (t/ac)	1.4
Characteristic SAV (ft-1)	1806
Packing ratio (dimensionless)	0.04232
Extinction moisture content (percent)	25

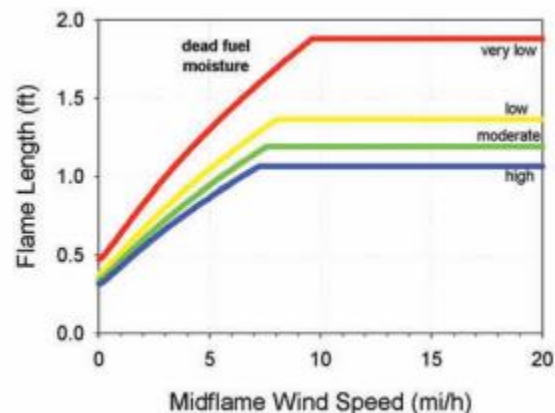
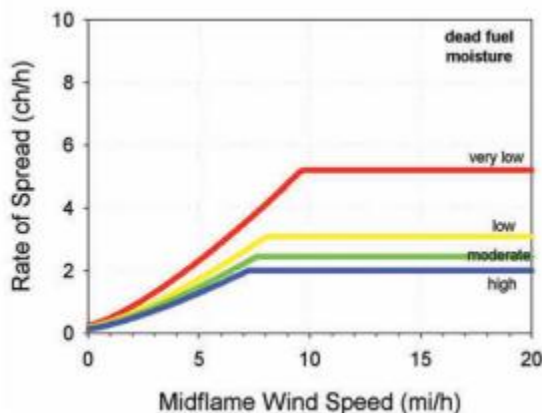


## TL3 (183)

### Moderate Load Conifer Litter

Description: The primary carrier of fire in TL3 is moderate load conifer litter, light load of coarse fuels. Spread rate is very low; flame length low.

Fine fuel load (t/ac)	0.50
Characteristic SAV (ft-1)	1532
Packing ratio (dimensionless)	0.02630
Extinction moisture content (percent)	20



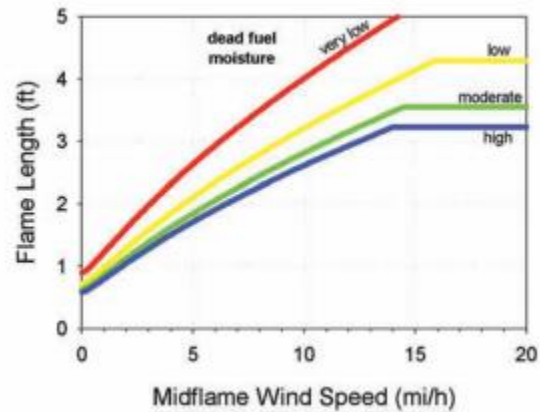
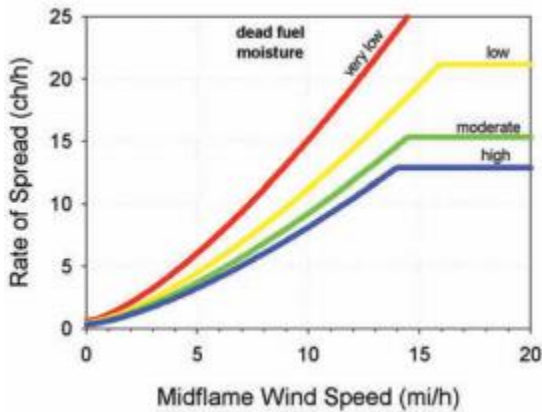
## TL4 (184)

### *Small downed logs*

**Description:** The primary carrier of fire in TL4 is moderate load of fine litter and coarse fuels. Includes small diameter downed logs. Spread rate is low; flame length low.



Fine fuel load (t/ac)	0.50
Characteristic SAV (ft-1)	1568
Packing ratio (dimensionless)	0.0222
Extinction moisture content (percent)	25



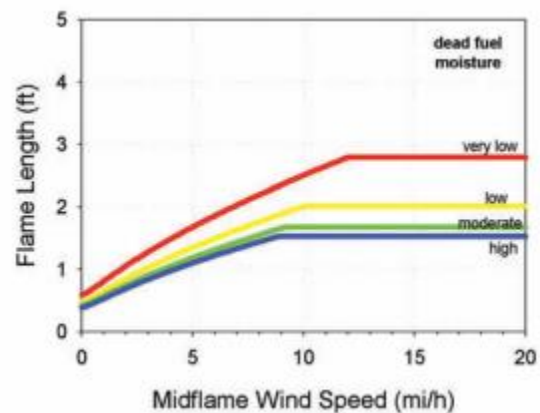
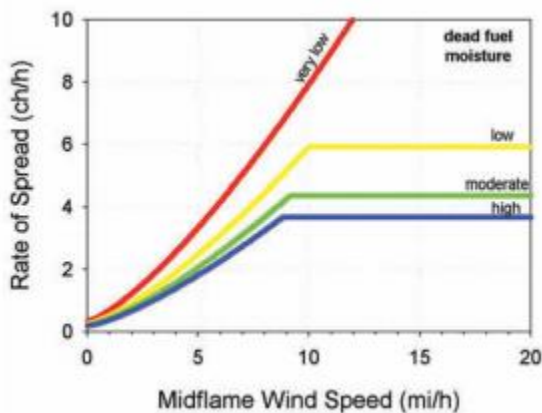
## TL5 (185)

### *High Load Conifer Litter*

**Description:** The primary carrier of fire in TL5 is high load conifer litter; light slash or mortality fuel. Spread rate is low; flame length low.



Fine fuel load (t/ac)	1.15
Characteristic SAV (ft-1)	1713
Packing ratio (dimensionless)	0.01925
Extinction moisture content (percent)	25

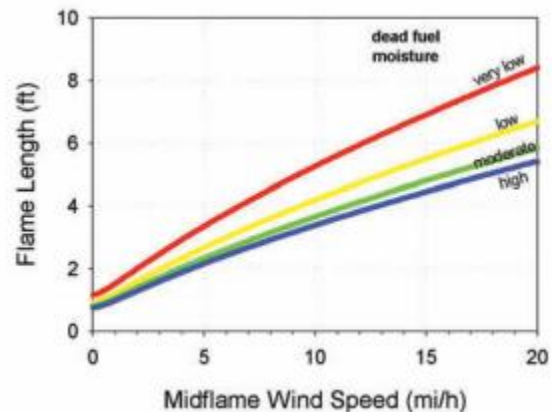
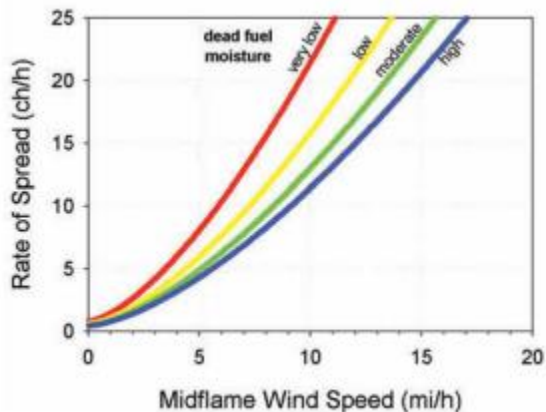


## TL6 (186)

### Moderate Load Broadleaf Litter

Description: The primary carrier of fire in TL6 is moderate load broadleaf litter, less compact than TL2. Spread rate is moderate; flame length low.

Fine fuel load (t/ac)	2.4
Characteristic SAV (ft-1)	1936
Packing ratio (dimensionless)	0.02296
Extinction moisture content (percent)	25

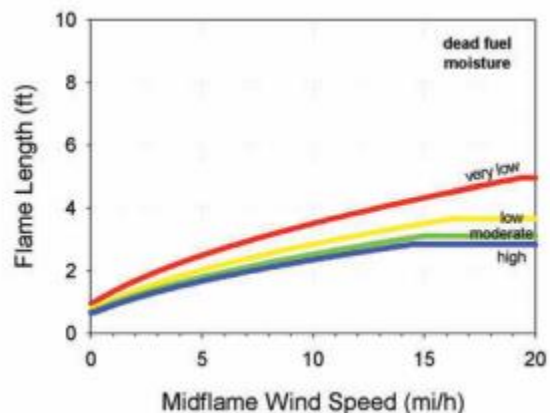
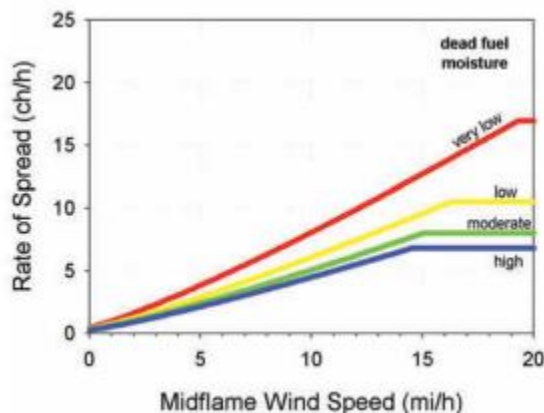


## TL7 (187)

### Large Downed Logs

Description: The primary carrier of fire in TL7 is heavy load forest litter, includes larger diameter downed logs. Spread rate low; flame length low.

Fine fuel load (t/ac)	0.30
Characteristic SAV (ft-1)	1229
Packing ratio (dimensionless)	0.03515
Extinction moisture content (percent)	25

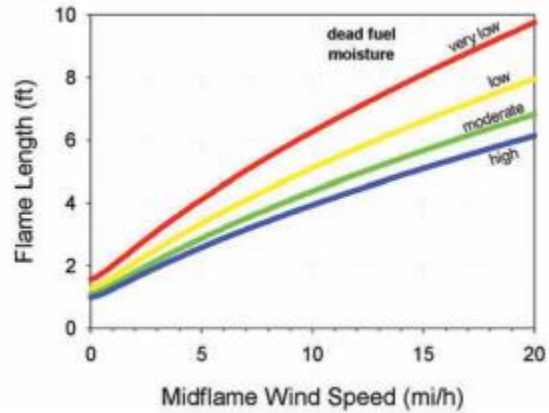
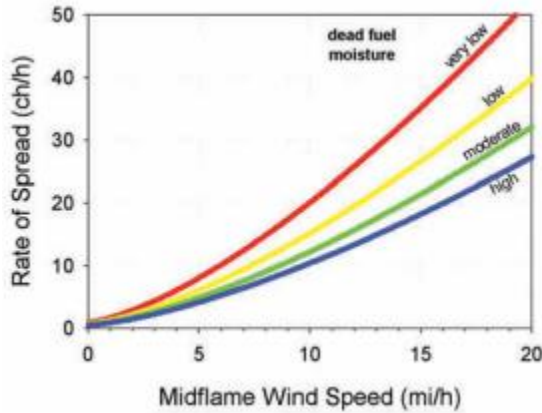


### TL8 (188) Long-Needle Litter

Description: The primary carrier of fire in TL8 is moderate load long-needle pine litter, may include small amount of herbaceous load. Spread rate is moderate; flame length low.



Fine fuel load (t/ac)	5.8
Characteristic SAV (ft-1)	1770
Packing ratio (dimensionless)	0.03969
Extinction moisture content (percent)	35

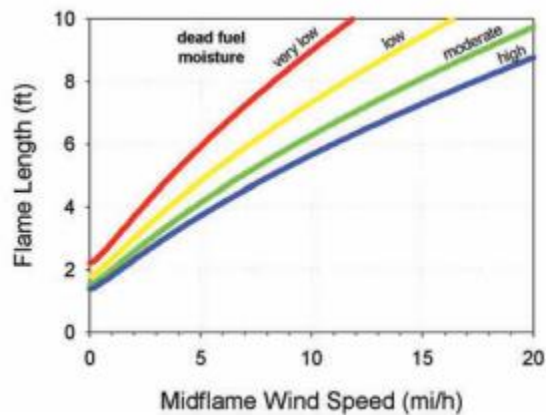
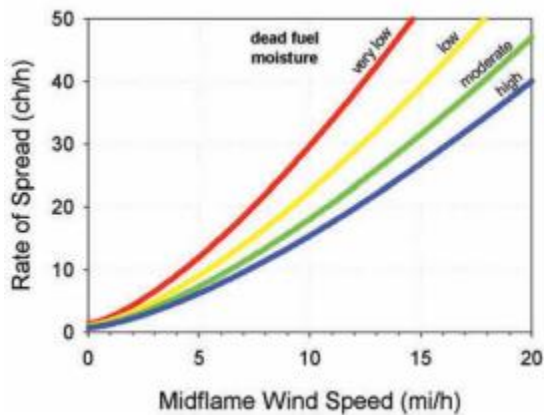


### TL9 (189) Very High Load Broadleaf Litter

Description: The primary carrier of fire in TL9 is very high load, fluffy broadleaf litter. TL9 can also be used to represent heavy needle-drape. Spread rate is moderate; flame length moderate.

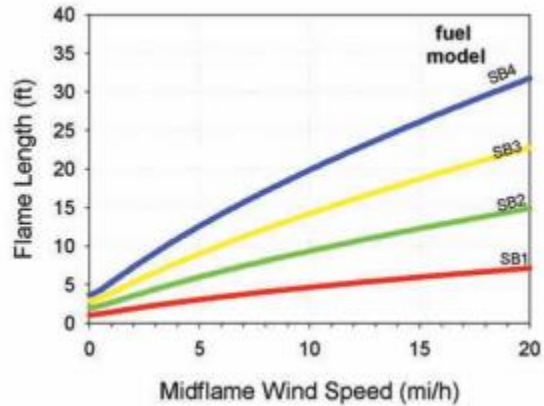
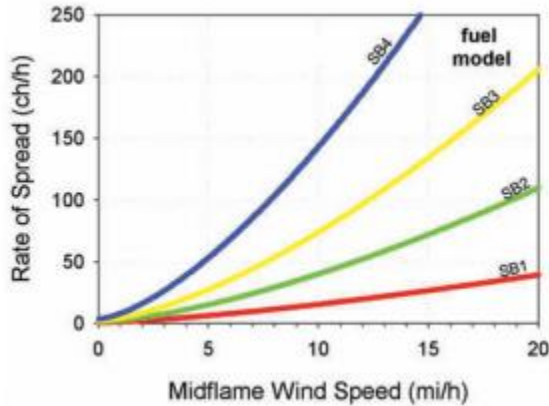


Fine fuel load (t/ac)	6.65
Characteristic SAV (ft-1)	1733
Packing ratio (dimensionless)	0.03372
Extinction moisture content (percent)	35



# Slash-Blowdown Fuel Type Models (SB)

The primary carrier of fire in the SB fuel models is activity fuel or blowdown. Forested areas with heavy mortality may be modeled with SB fuel models.

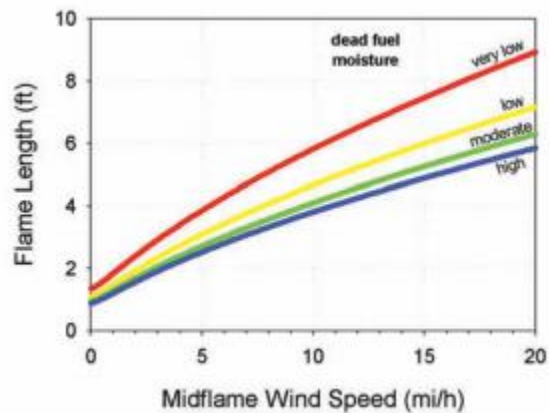
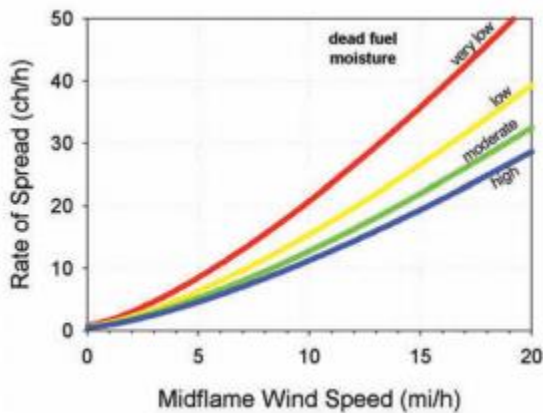


## SB1 (201)

### Low Load Activity Fuel

**Description:** The primary carrier of fire in SB1 is light dead and down activity fuel. Fine fuel load is 10 to 20 t/ac, weighted toward fuels 1 to 3 inches diameter class, depth is less than 1 foot. Spread rate is moderate; flame length low.

Fine fuel load (t/ac)	1.50
Characteristic SAV (ft-1)	1653
Packing ratio (dimensionless)	0.02224
Extinction moisture content (percent)	25



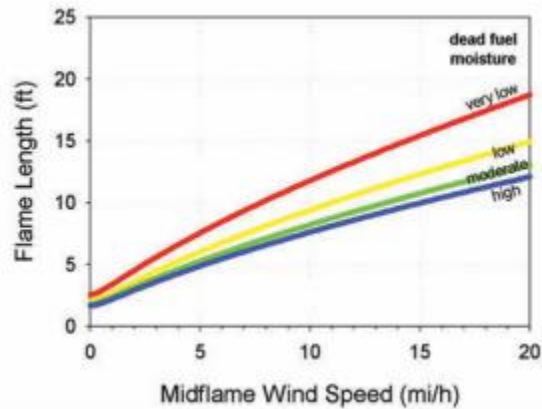
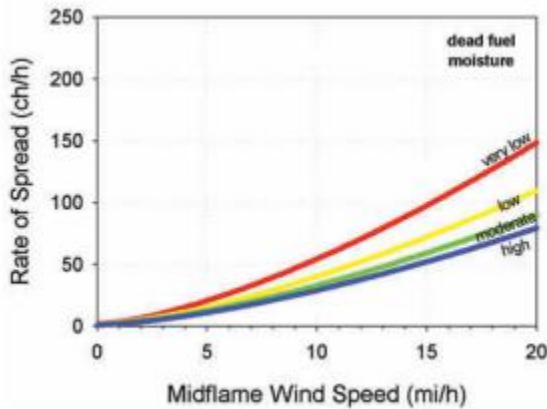
## SB2 (202)

### Moderate Load Activity Fuel or Low Load Blowdown

**Description:** The primary carrier of fire in SB2 is moderate dead and down activity fuel or light blowdown. Fine fuel load is 7 to 12 t/ac, evenly distributed across 0 to 0.25, 0.25 to 1, and 1 to 3 inch diameter classes, depth is about 1 foot. Blowdown is scattered, with many trees still standing. Spread rate is moderate; flame length moderate.



Fine fuel load (t/ac)	4.5
Characteristic SAV (ft-1)	1884
Packing ratio (dimensionless)	0.01829
Extinction moisture content (percent)	25



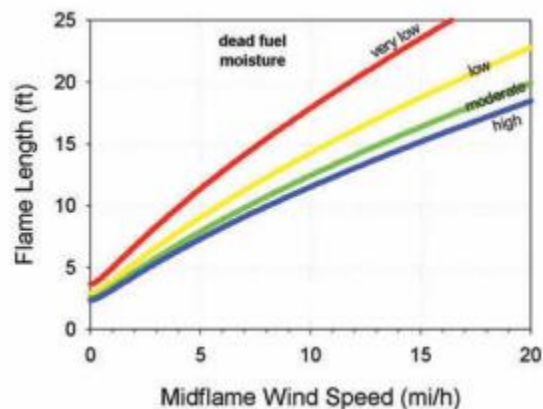
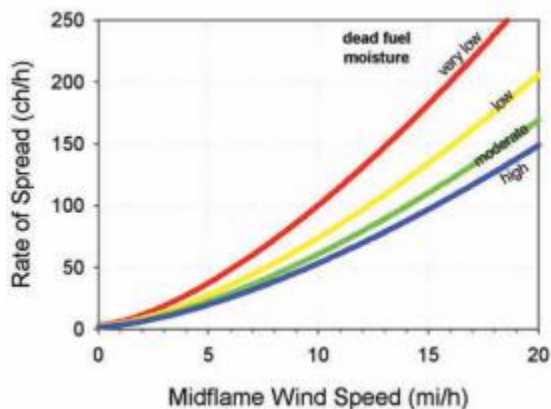
## SB3 (203)

### High Load Activity Fuel or Moderate Load Blowdown

**Description:** The primary carrier of fire in SB3 is heavy dead and down activity fuel or moderate blowdown. Fine fuel load is 7 to 12 t/ac, weighted toward 0 to 0.25 inch diameter class, depth is more than 1 foot. Blowdown is moderate, trees compacted to near the ground. Spread rate is high; flame length high.



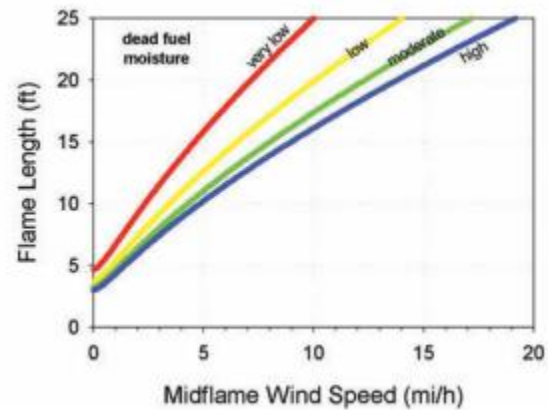
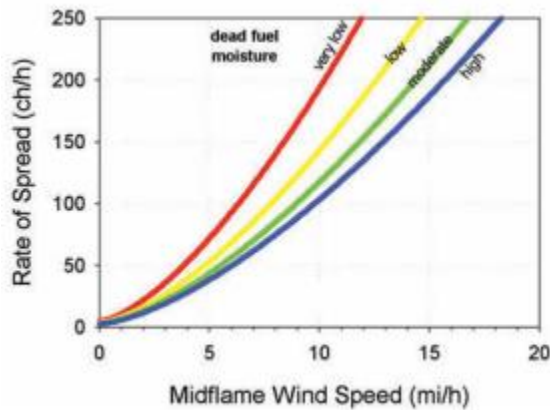
Fine fuel load (t/ac)	5.50
Characteristic SAV (ft-1)	1935
Packing ratio (dimensionless)	0.01345
Extinction moisture content (percent)	25



## SB4 (204) High Load Blowdown

**Description:** The primary carrier of fire in SB4 is heavy blowdown fuel. Blowdown is total, fuelbed not compacted, most foliage and fine fuel still attached to blowdown. Spread rate very high; flame length v ery high.

Fine fuel load (t/ac)	5.25
Characteristic SAV (ft-1)	1907
Packing ratio (dimensionless)	0.00744
Extinction moisture content (percent)	25



## 13 Fire Behavior Fuel Models

### Grass Dominated

- 1 Short grass (1 foot)
- 2 Timber (grass understory)
- 3 Tall grass (2.5 foot)

### Chaparral and Shrub Fields

- 4 Chaparral (6 feet)
- 5 Brush (2 feet)
- 6 Dormant brush, hardwood slash
- 7 Southern rough

### Timber Litter

- 8 Timber litter with normal dead
- 9 Hardwood litter/Open pine with grass
- 10 Timber litter with heavy dead

### Logging Slash

- 11 Light logging slash
- 12 Medium logging slash
- 13 Heavy logging slash