

Models used in BehavePlus

Models that are included in each of the BehavePlus modules with citations and notes (from Andrews 2009).

BehavePlus Module	Model	Reference and notes
SURFACE	Surface head fire rate of spread, reaction intensity, heat per unit area, characteristic dead fuel moisture, live fuel moisture of extinction, etc.	(Rothermel 1972) (Albini 1976a) minor adjustments
	Fireline intensity, flame length	(Byram 1959) with adjustments to work with Rothermel's surface fire spread model by (Albini 1976b)
	Surface fire flame residence time (used to calculate fireline intensity)	(Anderson 1969)
	Direction of maximum spread	(Rothermel 1983) using manual vectoring (Finney 1998; Rothermel 1983) calculations based on Rothermel's wind and slope factors
	Fire characteristics chart, relationship among rate of spread, heat per unit area, fireline intensity, and flame length	(Andrews and Rothermel 1982)
	Spread in direction from ignition point from a point source fire	(Andrews 1986)
	Effective wind speed	(Albini 1976b)
	Wind adjustment factor	(Albini and Baughman 1979; Baughman and Albini 1980; Rothermel 1983)
	Wind speed at 10 m adjusted to 20 ft	(Turner and Lawson 1978)
	13 standard fire behavior fuel models	(Rothermel 1972) 11 fuel models (Albini 1976b) slight revision of the 11 plus two more fuel models (Anderson 1982) fuel model selection guide
	40 standard fire behavior fuel models	(Scott and Burgan 2005)
	Custom fire behavior fuel models	(Burgan 1987; Burgan and Rothermel 1984)
	Dynamic fuel load transfer	(Burgan 1979) (Andrews 1986; Burgan and Rothermel 1984) as used in BEHAVE (Scott and Burgan 2005) as used in the 2005 standard fire behavior fuel models
	Two fuel models, weighted rate of spread	(Rothermel 1983)
	Two fuel models, harmonic mean	(Fujioka 1985)
	Two fuel models, 2-dimensional expected spread	(Finney 2003)
Palmetto gallberry special case fuel model	(Hough and Albini 1978)	
Western aspen special case fuel model	(Brown and Simmerman 1986) (Brown and Debyle 1987) for mortality	

BehavePlus Module	Model	Reference and notes
CROWN	Critical surface intensity needed for transition from surface to crown fire	(Van Wagner 1977)
	Transition to crown fire, relationship of surface fire intensity and critical surface fire intensity	(Finney 1998) (Scott and Reinhardt 2001)
	Crown fire rate of spread, area, and perimeter	(Rothermel 1991)
	Critical crown fire rate of spread, needed for an active crown fire	(Van Wagner 1993)
	Active crown fire, relationship of crown fire rate of spread and critical crown fire rate of spread	(Finney 1998) (Scott and Reinhardt 2001)
	Fire type: surface, torching, conditional crown, crowning	(Finney 1998) (Scott and Reinhardt 2001)
	Crown fire flame length	(Thomas 1963)
	Crown fire intensity	(Rothermel 1991)
	Power of the fire, power of the wind	(Byram 1959)
SAFETY	Safety zone size, separation distance, radius	(Butler and Cohen 1996; 1998a; 1998b)
SIZE	Elliptical fire size and shape, area, perimeter, length-to-width ratio	(Anderson 1983) double ellipse (Andrews 1986) simplified to simple ellipse
CONTAIN	Fire containment	(Albini and others 1978) in the old BEHAVE (Fried and Fried 1996) in BehavePlus
SPOT	Spotting distance from torching trees	(Albini and Baughman 1979; Chase 1981)
	Spotting distance from a burning pile	(Albini 1981)
	Spotting distance from a wind-driven surface fire	(Albini 1983a; Albini 1983b; Chase 1984)
SCORCH	Crown scorch height	(Van Wagner 1973)
MORTALITY	Tree mortality	(Reinhardt and Crookston 2003; Ryan and Reinhardt 1988) (Hood and others 2008) updates for version 5.0
	Bark thickness	(Hood and others 2008; Reinhardt and Crookston 2003; Ryan and Reinhardt 1988)
IGNITE	Probability of ignition from firebrand	(Schroeder 1969)
	Probability of ignition from lightning	(Latham and Schlieter 1989)
Fine Dead Fuel Moisture Tool	Fine dead fuel moisture tables	(Rothermel 1983)

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