

Accessory publication

Modelling long-term fire regimes of southern California shrublands

Seth H. Peterson^{A,F}, *Max A. Moritz*^B, *Marco E. Morais*^C, *Philip E. Dennison*^D and *Jean M. Carlson*^E

^ADepartment of Geography, University of California – Santa Barbara, Santa Barbara, CA 93106, USA.

^BCenter for Fire Research and Outreach, Department of Environmental Science, Policy and Management, University of California – Berkeley, Berkeley, CA 94720, USA.

^CThe Aerospace Corporation, 2350 E El Segundo Boulevard, El Segundo, CA 90245, USA.

^DCenter for Natural and Technological Hazards, Department of Geography, University of Utah, Salt Lake City, UT 84112, USA.

^EDepartment of Physics, University of California – Santa Barbara, Santa Barbara, CA 93106, USA.

^FCorresponding author. Email: seth@geog.ucsb.edu

Table A1. Standard Northern Forest Fire Laboratory (NFFL, Albini 1976) fuel model and custom fuel model (Weise and Regelbrugge 1997; Morais 2001) characteristics

Fuel model	Description	Dry biomass of dead fuels (<0.635 cm) (Mg ha ⁻¹)	Dry biomass of dead fuels (0.635–2.54 cm) (Mg ha ⁻¹)	Dry biomass of dead fuels (2.54–7.62 cm) (Mg ha ⁻¹)	Dry biomass of live herbaceous fuels (Mg ha ⁻¹)	Dry biomass of live woody fuels (Mg ha ⁻¹)	Surface area-to-volume ratio of <0.635 cm dead fuels (1 cm ⁻¹)	Surface area-to-volume ratio of live herbaceous fuels (1 cm ⁻¹)	Fuel bed depth (cm)	Dead fuel moisture of extinction (%)	Dead fuel heat content (J kg ⁻¹)	Live fuel heat content (J kg ⁻¹)
NFFL 1	short grass	1.66	0	0	0	0	105.98	0	30.48	12	18608	18608
NFFL 3	tall grass	6.75	0	0	0	0	45.42	0	76.20	25	18608	18608
NFFL 5	brush	2.24	1.12	0	0	4.48	60.56	0	60.96	20	18608	18608
NFFL 9	hardwood litter	6.55	0.92	0.34	0	0	75.7	0	6.10	25	18608	18608
Custom 15	old chamise	4.48	6.73	2.24	1.12	4.48	19.37	66.61	91.44	13	23260	23260
Custom 16	ceanothus	5.04	10.76	4.04	6.73	6.28	15.14	45.42	182.88	15	18608	18608
Custom 17	young chamise	2.91	2.24	2.24	4.48	4.48	19.37	66.61	121.92	20	18608	18608
Custom 18	sagebrush and buckwheat	12.33	1.79	0.22	1.68	5.6	19.37	45.42	91.44	25	21399	21399
Custom 20	WUI	1.66	4.19	3.36	0	0.83	105.98	45.42	53.34	40	18608	18608
Custom 21	SMM CSS	5.5	0.7	0	1.6	3	19.37	45.42	91.44	25	21399	21399

Model descriptions

Model name: 'Short Grass'

Fuel model number: 1

Source: Albini (1976)

Description:

This model corresponds to stands where the Potential Natural Vegetation (PNV) and cover was identified from Franklin (1997) as consisting of:

- dominated by exotic annual grasses
- Valley Oak (*Quercus lobata*) savanna
- open Walnut (*Juglans californica*) woodlands
- coastal cactus scrub consisting of Prickly Pear (*Opuntia oricola*) and exotic annual grasses

Model name: 'Tall Grass'

Fuel model number: 3

Source: Albini (1976)

Description:

This model corresponds to stands where the Potential Natural Vegetation (PNV) was identified from Franklin (1997) as consisting of:

- Coast Live Oak (*Quercus agrifolia*) woodland

Model name: 'Brush'

Fuel model number: 5

Source: Albini (1976)

Description:

This model corresponds to stands where the Potential Natural Vegetation (PNV) and cover was identified from Franklin (1997) as consisting of:

- dominated by northern mixed chaparral AND less than or equal to 2 years maturity
- >80% cover of Chamise (*Adenostoma fasciculatum*) AND less than or equal to 2 years maturity
- dominated by Redshank (*Adenostoma sparsifolium*) chaparral AND less than or equal to 2 years maturity
- dominated by coastal sage scrub AND less than or equal to 3 years maturity
- dominated by a mixed coastal sage scrub and northern mixed chaparral community AND less than or equal to 2 years maturity

Model name: 'Hardwood Litter'

Fuel model number: 9

Source: Albini (1976)

Description:

This model corresponds to riparian areas identified from a 1997 National Park Service field-based inventory as well as the following subclasses in Franklin (1997):

- riparian corridors
- non-native conifers and hardwoods

Model name: 'Old Chamise'

Fuel model number: 15

Source: Weise and Regelbrugge (1997)

Description:

This model corresponds to stands where the Potential Natural Vegetation (PNV) was identified from Franklin (1997) as consisting of:

- >80% cover of Chamise (*Adenostoma fasciculatum*) AND greater than 15 years maturity
- dominated by Redshank (*Adenostoma sparsifolium*) chaparral AND greater than 15 years maturity

Model name: 'Ceanothus'

Fuel model number: 16

Source: Weise and Regelbrugge (1997)

Description:

This model corresponds to stands where the Potential Natural Vegetation (PNV) was identified from Franklin (1997) as consisting of:

- dominated by northern mixed chaparral AND greater than 12 years maturity
- dominated by a mixed coastal sage scrub and northern mixed chaparral community AND greater than 12 years maturity

Model name: 'Young Chamise'
Fuel model number: 17
Source: Weise and Regelbrugge (1997)
Description:

This model corresponds to stands where the Potential Natural Vegetation (PNV) was identified from Franklin (1997) as consisting of:

- >80% cover of Chamise (*Adenostoma fasciculatum*) AND greater than or equal to 3 years maturity AND less than or equal to 15 years maturity
- dominated by Redshank (*Adenostoma sparsifolium*) chaparral AND greater than or equal to 3 years maturity AND less than or equal to 15 years maturity

Model name: 'Sagebrush and Buckwheat'
Fuel model number: 18
Source: Weise and Regelbrugge (1997)
Description:

This model corresponds to stands where the Potential Natural Vegetation (PNV) was identified from Franklin (1997) as consisting of:

- dominated by coastal sage scrub AND greater than 15 years maturity
- dominated by northern mixed chaparral AND greater than or equal to 3 years maturity AND less than or equal to 12 years maturity

Model name: 'Wildland Urban Interface'
Fuel model number: 20
Source: Morais (2001)
Description:

This model corresponds to stands where the cover was identified from Franklin (1997) as consisting of:

- rural residential or urban land use

This fuel model is meant to mimic the exotic landscape vegetation commonly surrounding homes in the Santa Monica Mountains. The grass component of the wildland–urban interface fuels is represented by values of D1H and DSAV taken from NFFL 1. The exotic landscaped vegetation component of the wildland–urban interface fuels is represented by values of D10H, D100H, LH, LW, LHS AV, and LWS AV taken from NFFL 7. The fuel bed depth is the numerical average of NFFL 1 and NFFL 7.

Model name: 'Santa Monica Mountains Coastal Sage Scrub'

Fuel model number: 21

Source: Morais (2001)

Description:

This model corresponds to stands where the Potential Natural Vegetation (PNV) was identified from Franklin (1997) as consisting of:

- dominated by coastal sage scrub AND greater than 3 years maturity AND less than or equal to 15 years maturity
- dominated by a mixed coastal sage scrub and northern mixed chaparral community AND less than or equal to 12 years maturity

Fuel biomass data collected from destructive sampling of coastal sage scrub sites in the Santa Monica Mountains displayed much lower loading values as compared to model 18 developed by the US Forest Service. The values used for fuel biomass in this fuel model represent values closer to what was recorded from the destructive samples taken in the Santa Monica Mountains.