Supplement

Available canopy fuel

Tree level available canopy fuel (ACF), the dry mass of canopy fuels likely to be consumed in a fully active crown fire (needles, lichen, moss, and live and dead branch wood ≤ 6 mm in diameter) (Scott and Reinhardt, 2001), was derived from FIA plot Treelist tables. FIA Treelist tables (which are named TREE in the FIA database) provide a detailed inventory of trees on FIA plots (O'Connell et al., 2017). FIA plots with Treelists are based on Phase 2 sampling, in which measurements are taken on the standard FIA base grid which has a density of approximately 1 sample location per 2428 ha (6000 acres) (Bechtold and Patterson, 2005). The Treelist table variables: species code (SPCD), diameter (D), crown class code (CCLCD), tree status (STATUSCD), and tree density (TPA) were used to estimate ACF associated with each Treelist table entry using empirical equations from the literature following the approach outlined in the FuelCalc User's Guide (Lutes, 2016); FuelCalc is a fuel management software system which can be used to calculate forest canopy characteristics at an inventory plot. The Treelist tables provide a detailed inventory of trees on FIA plots (O'Connell et al., 2017). For each FIA plot the Treelist tables were used to estimate ACF for each tree inventoried using the species specific equations listed in Table S1. The Treelist tables include a tree expansion factors (TPA) which are used to scale each tree on a plot to a per-area basis (O'Connell et al., 2017). The variables for the equations listed in Table S1 are defined in Table S2. The variable *reduc* in the equations of Table S1 was assigned from Table S3, the species crosswalk and crown condition, using SPCD and CCLCD variables from the TREE table. The TREE table variable STATUSCD was used to flag dead trees and set the value for *dead* (1 for live tree and 0 for dead trees). Following Scott and Reinhardt (2001), we assumed that only softwood species contributed to ACF and only softwood tree species were included in the ACF calculations. Softwood tree species from the TREE tables that were not among the 26 species included in Table S1 were assigned equations using the crosswalk from Table S3.

Table S1. Species specific equations used to calculate tree level available canopy fuel (ACF). See Table S2 for description of equation variables.

Species Code and Reference	Equations
PP (Brown, 1978)	$wt = exp^{(0.268+2.704*\log(D))}$ $f = 0.558 * exp^{(-0.0475*D)}$ $b = 0.625 * exp^{(-0.0511*D)} - f$ $acf = wt * reduc * (dead * f + 0.5 * b)$
GF (Brown, 1978)	$wt = exp^{(1.3094+1.6076*\log(D))}$ $f = \frac{1}{1.592 + 0.0529 * D}$ $b = \frac{1}{1.15 + 0.0416 * D} - f$ $D > 36\text{: } f = 0.286, b = 0.378 - f$ $acf = wt * reduc * (dead * f + 0.5 * b)$
DF (Brown, 1978)	$wt = exp^{(1.368+1.5819*\log(D))}$ $f = 0.484 * exp^{(-0.0210*D)}$ $b = 0.729 * exp^{(-0.0233*D)} - f$ $acf = wt * reduc * (dead * f + 0.5 * b)$
LP (Brown, 1978)	$wt = exp^{(0.1224+1.8820*\log(D))}$ $f = 0.493 - 0.0117 * D$ $b = (0.777 - 0.0146 * D) - f$ $acf = wt * reduc * (dead * f + 0.5 * b)$
WL (Brown, 1978)	$wt = exp^{(0.4373+1.6786*\log(D))}$ $f = 0.347 * exp^{(-0.0434*D)}$ $b = 0.745 * exp^{(-0.0362*D)} - f$ $acf = wt * reduc * (dead * f + 0.5 * b)$

SF (Brown, 1978)	$wt = 7.345 + 1.255 * D * D$ $f = 0.597 * exp^{(-0.0425*D)}$ $b = 0.864 * exp^{(-0.0373*D)} - f$ $acf = wt * reduc * (dead * f + 0.5 * b)$
WB (Brown, 1978)	$wt = 0.8371 * D * D$ $f = 0.512 * exp^{(-0.0374*D)}$ $b = 0.864 * exp^{(-0.0585*D)} - f$ $acf = wt * reduc * (dead * f + 0.5 * b)$
AL (Brown, 1978)	$wt = exp^{(0.4373+1.6786*\log(D))}$ $f = 0.512 * exp^{(-0.0374*D)}$ $b = 0.745 * exp^{(-0.0362*D)} - f$ $acf = wt * reduc * (dead * f + 0.5 * b)$
WP (Brown, 1978)	$wt = exp^{(0.7276+1.5497*\log(D))}$ $f = 0.550 * exp^{(-0.0345*D)}$ $0.914 - 0.0978 * sqrt(D) - f$ $acf = wt * reduc * (dead * f + 0.5 * b)$
WC (Brown, 1978)	$wt = exp^{(0.8815+1.6389*\log(D))}$ $f = 0.617 * exp^{(-0.0233*D)}$ $b = 0.756 * exp^{(-0.0241*D)} - f$ $acf = wt * reduc * (dead * f + 0.5 * b)$
WH (Brown, 1978)	$wt = exp^{(0.7218+1.7502*\log(D))}$ $f = 0.547 * exp^{(-0.0370*D)}$ $b = 0.835 * exp^{(-0.0380*D)} - f$ $acf = wt * reduc * (dead * f + 0.5 * b)$

MH (Ghlolz et al., 1979; Brown, 1978)	$$(1)\ wt.foli = 2.2 * exp^{(-3.8169+1.9756*\log(Dcm))}$$ $$(2)\ f = 0.547 * exp^{(-0.0370*D)}$$ $$(3)\ b = 0.835 * exp^{(-0.0380*D)}$$ $$D > 40$$ $$f = 0.125$$ $$b = 0.182$$ $$wt.branch = wt.foli * \frac{(b-f)}{f}$$ $$acf = wt * reduc * (dead * f + 0.5 * b)$$ Eq. (1) Ghlolz et al. (1979), Eq. (2) & (3) Brown (1978) Mass of fine branches estimated using relative values for WH from Brown (1978)
PY (Grier, 1992)	$$brasml = 10^{(-1.613+2.088*log_{10}(Dcm))}$$ $$tptfol = 10^{(-0.946+1.565*log_{10}(Dcm))}$$ $$acf = 2.2 * (totfol * dead + 0.33 * brasml) * reduc$$
EP (Ker, 1980b)	$$wt.crown.kg = exp^{(-2.0241+1.6296*\log(Dcm))}$$ $$wt.foliage.kg = exp^{(-2.6925+1.4653*\log(Dcm))}$$ $$f = \frac{wt.foliage.kg}{wt.crown.kg}$$ $$b = \frac{1}{(1.15 + 0.0416 * D)} - f$$ $$wt.branch.kg = b * wt.crown.kg$$ $$acf = 2.2 * reduc * (wt.foliage.kg * dead + wt.branch.kg * 0.5)$$
EH (Ker, 1980b)	$$wt.crown.kg = exp^{(-2.2934+1.8442*\log(Dcm))}$$ $$wt.foliage.kg = exp^{(-3.0924+1.6829*\log(Dcm))}$$ $$f = \frac{wt.foliage.kg}{wt.crown.kg}$$ $$b = 0.835 * exp^{(-0.0380*D)} - f$$ $$wt.branch.kg = b * wt.crown.kg$$ $$acf = 2.2 * reduc * (wt.foliage.kg * dead + wt.branch.kg * 0.5)$$

BF
(Ker,1980a;
Brown, 1978)

$$wt.crown.kg = exp^{(-2.0259+1.7433*\log(Dcm))}$$
$$wt.foliage.kg = exp^{(-2.7854+1.7433*\log(Dcm))}$$
$$f = \frac{wt.foliage.kg}{wt.crown.kg}$$
$$b = \frac{1}{(1.15 + 0.0416 * D)} - f$$
$$wt.branch.kg = b * wt.crown.kg$$
$$acf = 2.2 * reduc * (wt.foliage.kg * dead + wt.branch.kg * 0.5)$$

Fraction of canopy mass as fine branch estimated using GF from Brown (1978)

BS
(Ker,1980a;
Brown, 1978)

$$wt.crown.kg = exp^{(-2.000+1.8570*\log(Dcm))}$$
$$wt.foliage.kg = exp^{(-2.5387+1.8570*\log(Dcm))}$$
$$f = \frac{wt.foliage.kg}{wt.crown.kg}$$
$$b = \frac{1}{(1.15 + 0.0416 * D)} - f$$
$$wt.branch.kg = b * wt.crown.kg$$
$$acf = 2.2 * reduc * (wt.foliage.kg * dead + wt.branch.kg * 0.5)$$

Fraction of canopy mass as fine branch estimated using GF from Brown (1978)

WS
(Ker, 1980a)

$$wt.crown.kg = exp^{(-2.7323+2.0433*\log(Dcm))}$$
$$wt.foliage.kg = exp^{(-3.2985+1.9103*\log(Dcm))}$$
$$f = \frac{wt.foliage.kg}{wt.crown.kg}$$
$$b = \frac{1}{(1.15 + 0.0416 * D)} - f$$
$$wt.branch.kg = b * wt.crown.kg$$
$$acf = 2.2 * reduc * (wt.foliage.kg * dead + wt.branch.kg * 0.5)$$

RP
(Ker, 1980a)

$$wt.crown.kg = exp^{(-3.9952+2.3287*\log(Dcm))}$$
$$wt.foliage.kg = exp^{(-4.4257+2.1220*\log(Dcm))}$$
$$f = \frac{wt.foliage.kg}{wt.crown.kg}$$

	$b = \frac{1}{(1.15 + 0.0416 * D)} - f$ $wt.branch.kg = b * wt.crown.kg$ $acf = 2.2 * reduc * (wt.foliage.kg * dead + wt.branch.kg * 0.5)$
RS (Freedman et al., 1982)	$wt.crown.kg = exp^{(-2.8371 + 2.1136 * \log(Dcm))}$ $wt.foliage.kg = exp^{(-4.1968 + 2.2167 * \log(Dcm))}$ $f = \frac{wt.foliage.kg}{wt.crown.kg}$ $b = \frac{1}{(1.15 + 0.0416 * D)} - f$ $wt.branch.kg = b * wt.crown.kg$ $acf = 2.2 * reduc * (wt.foliage.kg * dead + wt.branch.kg * 0.5)$
PI (Duvenek, 2005)	$wt.g = exp^{(2.37724 + 2.47786 * \log(Dcm))}$ $f = \frac{exp^{(1.72630 + 2.30627 * \log(Dcm))}}{wt.g}$ $b = \frac{exp^{(1.38394 + 2.26384 * \log(Dcm))}}{wt.g}$ $acf = \frac{2.2}{1000} * wt.g * reduc * (f * dead + b * 0.5)$
LO (Rogerson, 1964)	$wt.foliage.kg = 10^{(2.67156 * \log(D) - 1.79586)}$ $acf = 2.2 * reduc * (wt.foliage.kg * dead + 0.50 * 0.25 * wt.foliage.kg)$ Assume mass of fine branches = 25% of foliage mass

Table S2. Description of variables in Table S1 equations.

Variable	Description
Acf	Mass of foliage plus half of small branch wood (≤ 0.25 inch diameter)
F	Fraction of canopy mass that is foliage, b is the fraction of canopy mass that is small branch wood (≤ 0.25 inch diameter)
B	Fraction of canopy mass that is small branch wood (≤ 0.25 inch diameter)
Wt	Weight of tree crown (lb)
D	Tree diameter at breast height (inches)
wt.foliage.kg	Mass of foliage (kg)
wt.branch.kg	Mass of small branch wood (kg)
wt.crown.kg	Mass of tree crown (kg)
wt.g	Mass of tree crown (g)
Dcm	Tree diameter at breast height (cm)
Reduc	Factor to reduce a tree's crown weight based on its crown condition class (see Table S3)
Dead	Value was set to 0 for dead trees, otherwise set to 1, reduces foliage mass to 0 for dead trees

Table S3. Tree Species Crosswalk and Crown Condition. Crosswalk of FIA TREE table species codes (SPCD) to Crown Condition Codes and canopy weight reduction factors (reduc) for available canopy fuel calculations.

SPCD	Canopy Code	Canopy Code for *reduc*	Crown Condition Class (*reduc*)				
			DOM	CDOM	INT	SUP	OTH
299	PP	PP	0.55	0.55	0.3	0.15	0.5
11	GF	WF	0.85	0.85	0.35	0.3	0.5
12	BF	WF	0.85	0.85	0.35	0.3	0.5
14	GF	WF	0.85	0.85	0.35	0.3	0.5
15	GF	WF	0.85	0.85	0.35	0.3	0.5
16	BF	WF	0.85	0.85	0.35	0.3	0.5
17	GF	WF	0.85	0.85	0.35	0.3	0.5
10	GF	WF	0.85	0.85	0.35	0.3	0.5
19	SF	WF	0.85	0.85	0.35	0.3	0.5
18	SF	WF	0.85	0.85	0.35	0.3	0.5
20	GF	WF	0.85	0.85	0.35	0.3	0.5
22	GF	WF	0.85	0.85	0.35	0.3	0.5
21	GF	WF	0.85	0.85	0.35	0.3	0.5
81	WC	IC	1.1	1.1	0.75	0.4	0.5
40	AC	IC	1.1	1.1	0.75	0.4	0.5
41	WC	IC	1.1	1.1	0.75	0.4	0.5
42	WC	IC	1.1	1.1	0.75	0.4	0.5
43	AC	IC	1.1	1.1	0.75	0.4	0.5
51	WC	IC	1.1	1.1	0.75	0.4	0.5
52	WC	IC	1.1	1.1	0.75	0.4	0.5
54	WC	IC	1.1	1.1	0.75	0.4	0.5
50	WC	IC	1.1	1.1	0.75	0.4	0.5
55	WC	IC	1.1	1.1	0.75	0.4	0.5
61	JP	PJ	1	1	1	1	1
62	JP	PJ	1	1	1	1	1
59	JP	PJ	1	1	1	1	1
63	JP	PJ	1	1	1	1	1
60	JP	PJ	1	1	1	1	1
69	JP	PJ	1	1	1	1	1
57	JP	PJ	1	1	1	1	1
64	JP	PJ	1	1	1	1	1
65	JP	PJ	1	1	1	1	1

58	JP	PJ	1	1	1	1	1
66	JP	PJ	1	1	1	1	1
68	JP	PJ	1	1	1	1	1
67	AC	IC	1.1	1.1	0.75	0.4	0.5
71	WL	PP	0.55	0.55	0.3	0.15	0.5
72	WL	WF	0.85	0.85	0.35	0.3	0.5
73	WL	PP	0.55	0.55	0.3	0.15	0.5
70	WL	PP	0.55	0.55	0.3	0.15	0.5
91	ES	DF	1.15	1.15	1.15	0.75	0.5
101	WB	LP	0.6	0.6	0.6	0.3	0.5
102	LP	LP	0.6	0.6	0.6	0.3	0.5
135	PP	PS	0.3	0.3	0.15	0.1	0.5
103	PP	PP	0.55	0.55	0.3	0.15	0.5
104	LP	LP	0.6	0.6	0.6	0.3	0.5
105	LP	LP	0.6	0.6	0.6	0.3	0.5
105	LP	LP	0.6	0.6	0.6	0.3	0.5
92	ES	DF	1.15	1.15	1.15	0.75	0.5
140	PY	PJ	1	1	1	1	1
90	RS	DF	1.15	1.15	1.15	0.75	0.5
107	LO	PP	0.55	0.55	0.3	0.15	0.5
108	LP	LP	0.6	0.6	0.6	0.3	0.5
109	PP	PP	0.55	0.55	0.3	0.15	0.5
134	PY	PJ	1	1	1	1	1
110	LO	PP	0.55	0.55	0.3	0.15	0.5
106	PY	PJ	1	1	1	1	1
111	LP	LP	0.6	0.6	0.6	0.3	0.5
93	ES	WF	0.85	0.85	0.35	0.3	0.5
112	PP	PP	0.55	0.55	0.3	0.15	0.5
113	LP	PP	0.55	0.55	0.3	0.15	0.5
94	WS	DF	1.15	1.15	1.15	0.75	0.5
115	LO	PP	0.55	0.55	0.3	0.15	0.5
116	PP	PP	0.55	0.55	0.3	0.15	0.5
117	PP	PP	0.55	0.55	0.3	0.15	0.5
118	PP	PS	0.3	0.3	0.15	0.1	0.5
142	LP	LP	0.6	0.6	0.6	0.3	0.5
95	BS	DF	1.15	1.15	1.15	0.75	0.5
8184	RP	LP	0.6	0.6	0.6	0.3	0.5

133	PY	PJ	1	1	1	1	1
119	WP	LP	0.6	0.6	0.6	0.3	0.5
143	PY	PJ	1	1	1	1	1
120	LP	LP	0.6	0.6	0.6	0.3	0.5
136	LP	LP	0.6	0.6	0.6	0.3	0.5
100	PP	PP	0.55	0.55	0.3	0.15	0.5
121	LO	PP	0.55	0.55	0.3	0.15	0.5
8188	PP	PP	0.55	0.55	0.3	0.15	0.5
122	PP	PP	0.55	0.55	0.3	0.15	0.5
96	ES	DF	1.15	1.15	1.15	0.75	0.5
123	LP	LP	0.6	0.6	0.6	0.3	0.5
138	PY	PJ	1	1	1	1	1
124	PP	PP	0.55	0.55	0.3	0.15	0.5
125	LP	LP	0.6	0.6	0.6	0.3	0.5
125	LP	LP	0.6	0.6	0.6	0.3	0.5
141	PY	PJ	1	1	1	1	1
126	PI	PP	0.55	0.55	0.3	0.15	0.5
97	RS	DF	1.15	1.15	1.15	0.75	0.5
127	PP	PP	0.55	0.55	0.3	0.15	0.5
128	PI	PP	0.55	0.55	0.3	0.15	0.5
98	ES	DF	1.15	1.15	1.15	0.75	0.5
129	EP	DF	1.15	1.15	1.15	0.75	0.5
114	LP	PP	0.55	0.55	0.3	0.15	0.5
130	LP	LP	0.6	0.6	0.6	0.3	0.5
131	LO	PP	0.55	0.55	0.3	0.15	0.5
139	LO	PP	0.55	0.55	0.3	0.15	0.5
132	LP	LP	0.6	0.6	0.6	0.3	0.5
137	PP	PP	0.55	0.55	0.3	0.15	0.5
200	DF	DF	1.15	1.15	1.15	0.75	0.5
201	DF	DF	1.15	1.15	1.15	0.75	0.5
202	DF	DF	1.15	1.15	1.15	0.75	0.5
212	WC	DF	1.15	1.15	1.15	0.75	0.5
211	WC	DF	1.15	1.15	1.15	0.75	0.5
222	WC	DF	1.15	1.15	1.15	0.75	0.5
231	WC	WF	0.85	0.85	0.35	0.3	0.5
221	WC	DF	1.15	1.15	1.15	0.75	0.5
232	WC	WF	0.85	0.85	0.35	0.3	0.5

230	WC	WF	0.85	0.85	0.35	0.3	0.5
241	WC	IC	1.1	1.1	0.75	0.4	0.5
261	EH	DF	1.15	1.15	1.15	0.75	0.5
262	EH	DF	1.15	1.15	1.15	0.75	0.5
263	WH	DF	1.15	1.15	1.15	0.75	0.5
264	WH	DF	1.15	1.15	1.15	0.75	0.5
260	EH	DF	1.15	1.15	1.15	0.75	0.5

AC = Atlantic White Cedar, BF = Balsam Fir, BS= Black Spruce, DF = Douglas Fir, EH = Eastern Hemlock, EP = Eastern White Pine, ES = Engelmann Spruce, GF = Grand Fir, JP = Oneseed Juniper, LO = Loblolly Pine, LP = Lodgepole Pine, PI = Pitch Pine, PP =Ponderosa Pine, PY = Pinyon Pine, RP = Red Pine, RS = Red Spruce, SF = Subalpine Fir,WB = Whitebark Pine, WC = Western Redcedar, WH =Western Hemlock, WL = Western Larch, WP =Western White Pine, WS = White Spruce.

Emission factors

The modified combustion efficiencies (MCE; the molar ratio of emitted CO_2 to the sum of emitted CO_2 and CO (MCE $=\Delta CO_2/(\Delta CO_2 + \Delta CO)$)) and emission factors (EF) for 98 fires measured in multiple field studies (Table S4) were used to derive best estimate EF for use in the Missoula Fire Lab Emission Inventory (MFLEI). The data in Table S4 was used to model EF for CO_2, CO, CH_4, and $PM_{2.5}$ as a linear function of MCE for forest and rangeland fires. The EF plotted versus MCE and linear least squares regression fit lines and statistics are shown in Figure S1 for forest fires and Figure S2 for rangeland fires. The linear functions in Figures S1 and S2 were combined with best estimate MCE values of 0.881, 0.933, and 0.942 for western/northern forest, southern forest, and rangeland fires, respectively, (Urbanski, 2014) to derive the EF used in the MFLEI.

Table S4. MCE and EF (g kg^{-1}) from field studies used in MFLEI.

Fire ID[1]	Region	Fire Type[2]	Cover Type	Platform[3]	MCE	CO_2	CO	CH_4	$PM_{2.5}$	Ref[4]
FL1	South	PF	forest	tower	0.952	1712	55	1.41	10	U09
FL2	South	PF	forest	tower	0.94	1690	69	1.26	11.3	U09
FL4	South	PF	forest	tower	0.934	1681	75	1.45	11.1	U09
ICI1	south	PF	forest	tower	0.942	1687	67	1.78	13.2	U09
ICI2	south	PF	forest	tower	0.928	1657	82	2.31	15.6	U09
NC1	south	PF	forest	tower	0.904	1621	109	3	10.4	U09
SC1	south	PF	forest	tower	0.921	1647	90	2.15	14.1	U09
SC12A	south	PF	forest	tower	0.942	1688	66	1.75	14.4	U09
SC12B	south	PF	forest	tower	0.923	1651	88	2.26	14.5	U09
SC3	south	PF	forest	tower	0.936	1682	73	1.99	11.4	U09
SC4	south	PF	forest	tower	0.936	1679	73	1.64	12.2	U09
SC5	south	PF	forest	tower	0.941	1683	67	1.59	15.4	U09
SC6	south	PF	forest	tower	0.932	1651	77	2.04	21.9	U09
SC7	south	PF	forest	tower	0.915	1630	96	2.89	16.2	U09
SC8	south	PF	forest	tower	0.918	1653	94	3.39	11.5	U09
EB1	south	PF	forest	tower	0.921	1652	90	2.62	11.9	U09
EB2	south	PF	forest	tower	0.938	1695	71	1.65	6.9	U09
FL5	south	PF	forest	tower	0.933	1665	76	2.13	15.7	U09
SC9	south	PF	forest	tower	0.935	1682	75	2.66	8.9	U09
FS1	south	PF	forest	tower	0.936	1681	74	2.16	9.7	U09
ICI3	south	PF	forest	tower	0.912	1626	100	3.34	15.3	U09
Camp Lejeune IA	south	PF	forest	air	0.943	1691	65	1.6	9.5	B11

Little Florida 1	south	PF	forest	air	0.951	1714	56	1.33	7.3	B11
Little Florida 2	south	PF	forest	air	0.957	1725	50	1.2	7	B11
Bear Pen	south	PF	forest	air	0.942	1660	65	2.16	22.6	B11
Camp Lejeune ME	south	PF	forest	air	0.945	1696	63	1.69	9.1	B11
Holly Shelter	south	PF	forest	air	0.952	1733	55	2.69	NA	B11
Block 6	south	PF	forest	air	0.932	1674	78	1.74	NA	A13
Block 9b	south	PF	forest	air	0.919	1643	92	2.08	3.4	A13
Block 22b	south	PF	forest	air	0.935	1679	74	2.01	7.3	A13
Pine Plantation	south	PF	forest	air	0.904	1606	109	6.66	4.2	A13
Georgetown	south	PF	forest	air	0.938	1696	72	2.22	5.5	A13
Francis Marion	south	PF	forest	air	0.933	1686	78	1.88	4.6	A13
Bamberg	south	PF	forest	air	0.957	1739	49	2.02	1.4	A13
CL1	south	PF	forest	air	0.925	1682	88	3.73	NA	Y99
CL2	south	PF	forest	air	0.927	1671	84	5.18	NA	Y99
AZ1	west	PF	forest	tower	0.941	1698	68	3.2	6.2	U09
AZ2	west	PF	forest	tower	0.89	1605	127	4.86	21.4	U09
AZ3	west	PF	forest	tower	0.924	1658	87	2.26	11.9	U09
AZ4	west	PF	forest	tower	0.932	1668	78	2.29	13.4	U09
AZ5	west	PF	forest	tower	0.91	1607	101	4.37	20.9	U09
AZ6	west	PF	forest	tower	0.924	1648	87	3.12	14.5	U09
AZ7	west	PF	forest	tower	0.918	1640	93	3.53	13	U09
AZ8	west	PF	forest	tower	0.926	1650	84	3.32	15.4	U09
AZ9	west	PF	forest	tower	0.919	1639	92	3.53	14.4	U09
AZ10	west	PF	forest	tower	0.938	1678	70	2.49	14.8	U09
AZ11	west	PF	forest	tower	0.948	1717	59	1.62	6.2	U09
AZ12	west	PF	forest	tower	0.916	1622	94	3.22	20.8	U09
BC1	west	PF	forest	tower	0.894	1542	117	5.71	29	U09
BC2	west	PF	forest	tower	0.889	1568	125	6.47	16	U09
MT1	west	PF	forest	tower	0.914	1632	97	4.02	12.7	U09
MT2	west	PF	forest	tower	0.904	1584	107	3.26	15.3	U09
MT3	west	PF	forest	tower	0.918	1640	93	4.38	11.7	U09
MT4	west	PF	forest	tower	0.91	1610	101	4.44	19.5	U09
OR1	west	PF	forest	tower	0.906	1601	106	3.85	20.3	U09
OR2	west	PF	forest	tower	0.9	1603	114	5.23	14.5	U09

OR3	west	PF	forest	tower	0.916	1609	94	4.01	15.7	U09
Shaver	west	PF	forest	air	0.885	1523	126	7.94	24.2	B11
Turtle	west	PF	forest	air	0.913	1599	97	5.51	19	B11
Myrtle - Fall Creek	west	WF	forest	air	0.907	1626	106	3	6.1	R91
Silver	west	WF	forest	air	0.921	1637	89	2.6	20.2	R91
Mabel Lake	west	PF	forest	air	0.927	1660	83	3.5	12.8	R91
NF13	west	WF	forest	air	0.867	1570	154	7.89	NA	U13
BSL17	west	WF	forest	air	0.893	1622	123	6.43	NA	U13
BSL22	west	WF	forest	air	0.874	1583	145	7.85	NA	U13
HC22	west	WF	forest	air	0.897	1628	119	6.36	NA	U13
SC24	west	WF	forest	air	0.873	1583	146	7.57	NA	U13
SC25	west	WF	forest	air	0.885	1605	132	7.46	NA	U13
SC26	west	WF	forest	air	0.882	1598	136	7.71	NA	U13
SC27	west	WF	forest	air	0.889	1612	129	6.96	NA	U13
BSL28	west	WF	forest	air	0.884	1601	134	7.69	NA	U13
Quinault	west	PF	forest	air	0.85	1448	162	14	25.5	H96
Creamery	west	PF	forest	air	0.905	1535	103	12.7	27	H96
Raymond	west	PF	forest	air	0.877	1536	138	6.7	32.5	H96
Corral	west	WF	forest	air	0.81	1311	196	18	41.4	H96
MN4	west	PF	forest	tower	0.953	1717	54	1.5	10.1	U09
MN5	west	PF	forest	tower	0.936	1684	73	2.28	10	U09
MN6	west	PF	forest	tower	0.942	1693	66	2.07	11.5	U09
Grant A test	west	PF	shrub	air	0.95	1709	58	2.37	6	B11
Grant A	west	PF	shrub	air	0.938	1679	70	3.34	7.5	B11
Grant B	west	PF	shrub	air	0.903	1603	109	6.31	8.7	B11
Williams	west	PF	shrub	air	0.933	1666	76	3.77	8.6	B11
Atmore	west	PF	shrub	air	0.974	1705	61	3.1	4.9	B11
T2	west	PF	shrub	air	0.94	1681	69	3.23	6.8	B11
Bear	west	PF	shrub	tower	0.927	1601	80	4	8.6	H96
Newall	west	PF	shrub	tower	0.918	1602	91	3.55	8.5	H96
Lodi 1	west	PF	shrub	air	0.935	1664	74	2.4	13.5	R91
Lodi 2	west	PF	shrub	air	0.933	1650	75	3.6	23	R91
Eagle	west	PF	shrub	air	0.97	1748	34	0.9	11.3	R91
EP1	south	PF	grass	tower	0.914	1636	98	4.12	9.1	U09
EP2A	south	PF	grass	tower	0.936	1689	74	2.27	5.9	U09
EP2B	south	PF	grass	tower	0.961	1743	46	1.54	3.7	U09

MI1	south	PF	grass	tower	0.97	1752	35	0.9	9.9	U09
FS1	south	PF	grass	tower	0.936	1681	74	2.16	9.7	U09
ICI3	south	PF	grass	tower	0.912	1626	100	3.34	15.3	U09
MIN1	west	PF	grass	tower	0.948	1716	60	1.5	5.3	U09
MN2	west	PF	grass	tower	0.933	1652	76	2.68	18.8	U09
MN3	west	PF	grass	tower	0.95	1705	57	1.53	11.8	U09
MN4	west	PF	grass	tower	0.962	1750	44	1.07	3.6	U09

[1]Fire identifiers taken from cited publications

[2]Fire type: PF = prescribed fire, WF = wildfire

[3]Platform: Sampling platform, aircraft (air) or tower.

[4]A13 = Akagi et al., 2013; B11 = Burling et al., 2011; H96 = Hobbs et al., 1996; R91 = Radke, 1991; U09 = Urbanski et al., 2009; Y99 = Yokelson et al., 1999

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Figure Captions

Figure S1. Plots of CO_2, CO, CH_4, and $PM_{2.5}$ EF versus MCE for forest fires listed in Table S4. Solid lines are linear least squares regression fits.

Figure S2. Plots of CO_2, CO, CH_4, and $PM_{2.5}$ EF versus MCE for rangeland fires listed in Table S4. Solid lines are linear least squares regression fits.

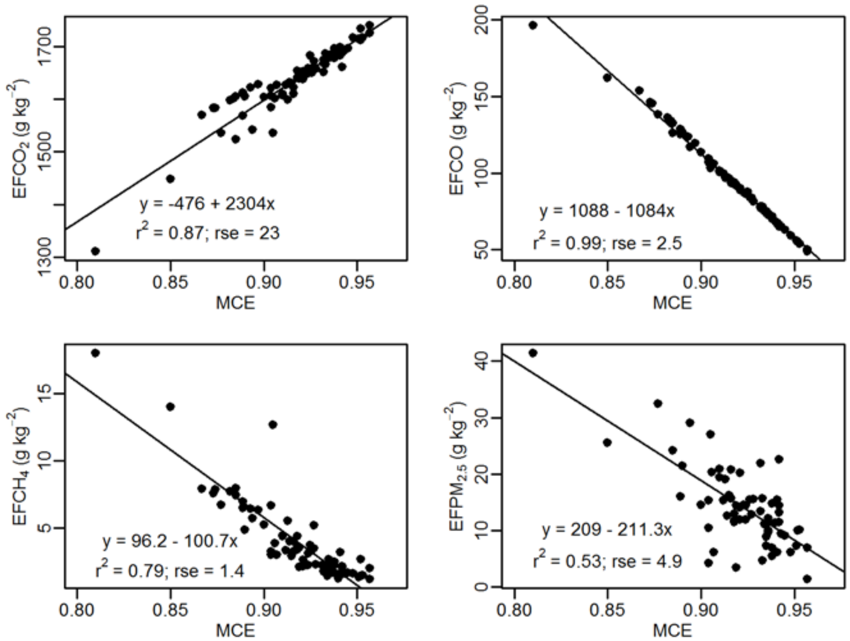

Figure S1. Plots of CO_2, CO, CH_4, and $PM_{2.5}$ EF versus MCE for forest fires listed in Table S4. Solid lines are linear least squares regression fits.

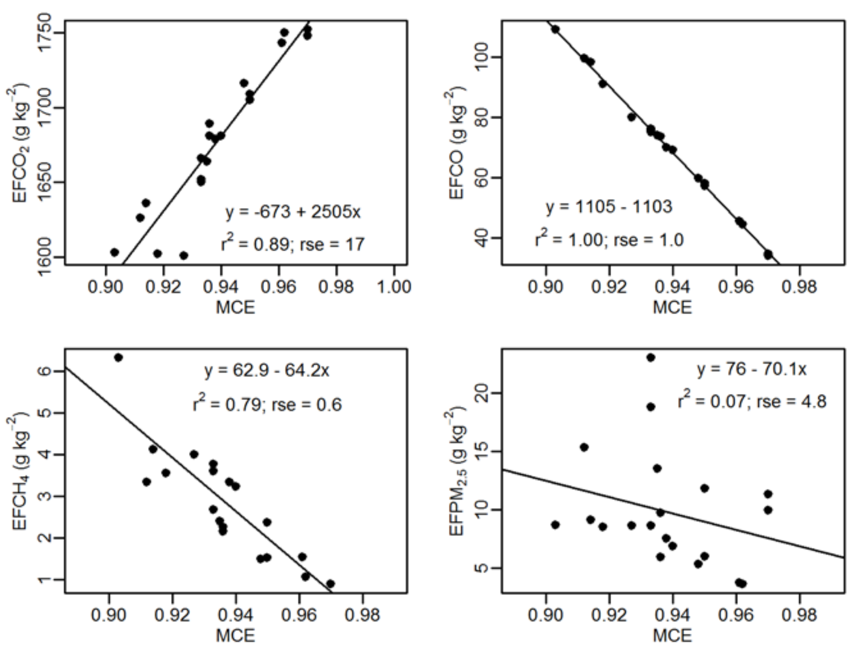

Figure S2. Plots of CO_2, CO, CH_4, and $PM_{2.5}$ EF versus MCE for rangeland fires listed in Table S4. Solid lines are linear least squares regression fits.