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Supplement of

Distribution of black carbon in ponderosa pine forest floor and soils following the High Park wildfire

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1 **Supplement**

2 **Bulk Density Determination**

3 During excavation, if the majority of a rock resided inside the frame that rock was
4 collected, if the majority of a rock was outside the frame the rock was left in place and the
5 soil was excavated around the rock. Thin nylon fabric was used to line the pit and millet
6 was added to the pit until level with the top of the excavation frame. The volume of the
7 millet was determined with a graduated cylinder. The volume for the 0-5 cm depth was the
8 volume of the millet that filled the entire 0-5 cm depth, with the volume of the frame
9 thickness subtracted. The volume of the 5-15 cm depth was the volume of the millet the
10 filled the entire 0-15 cm depth with the volume of the entire 0-5 cm depth subtracted.

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12 **BPCA method validation**

13 The BPCA method was validated by evaluating an unburned field soil from our site that
14 was mixed with a laboratory produced biochar at 5, 20 and 50% soil weight. The
15 laboratory biochar was derived from beetle-killed pine sourced from the CLP drainage
16 combusted at approximately 400 to 500 °C and ground to a fine texture. The BPCA method
17 validation with biochar-amended soils generated a linear relationship among the samples
18 ($BPCA-C = -1.506 + (0.89 * \% \text{ char})$, $r^2 = 0.94$, $p < 0.001$). The coefficients of variation at
19 different amendment levels were 0.05 at 5% amendment, 0.07 at 20% amendment, and
20 0.19 at 50% amendment. The majority of BPCA-C values in our field study were below the
21 5% amendment, thus we concluded the method was robust for quantifying BC and
22 progressed with field-based sample collections.

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32 **Table S1.** Results of mixed model evaluating the effects of layer, burn severity, and slope
 33 on C and N values and bulk density presented with degrees of freedom (df) and p-values.

effect	df	log %C	log %N	C:N	log C stock (g C m ⁻²)	bulk density
slope	2	0.306	0.872	0.009	0.774	0.927
burn	2	0.002	0.135	<0.001	0.080	0.796
layer	2	<0.001	<0.001	<0.001	<0.001	0.109
slope x burn	4	0.917	0.746	0.838	0.671	0.691
slope x layer	4	0.077	0.051	0.725	0.672	0.617
burn x layer	4	<0.001	0.005	<0.001	0.284	0.792
slope x burn x layer	8	0.093	0.169	0.685	0.534	0.875

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36 **Table S2.** Results of Tukey's post-hoc comparisons evaluating the source of significant
 37 differences in %C, %N, C:N and C stocks by burn severity, layer, slope and the interaction
 38 terms presented as adjusted p-values.

post hoc comparisons	log % C	log % N	C:N	log C stock (g C m ⁻²)
high vs. unburned	0.001	0.132	<0.001	0.320
moderate vs. unburned	0.371	0.835	<0.001	0.708
high vs. moderate	0.029	0.318	0.004	0.069
0-5 cm vs. forest floor	<0.001	<0.001	<0.001	<0.001
5-15 cm vs. forest floor	<0.001	<0.001	<0.001	<0.001
0-5 cm vs. 5-15 cm	<0.001	<0.001	0.703	0.696
0-5 vs. 5-15 degrees	0.998	0.941	0.028	0.755
0-5 vs. 15-30 degrees	0.932	0.984	0.012	0.915
5-15 cm vs. 15-30 degrees	0.947	0.864	0.916	0.944
forest floor: unburned vs. moderate	0.009	0.968	<0.001	0.217
forest floor: unburned vs. high	<0.001	0.004	<0.001	0.400
forest floor: moderate vs. high	<0.001	0.006	<0.001	0.009
0-5 cm: unburned vs. moderate	0.631	0.978	0.471	0.938
0-5 cm: unburned vs. high	0.947	0.513	1.000	0.805
0-5 cm: moderate vs. high	0.166	0.376	0.448	0.582
5-15 cm: unburned vs. moderate	0.662	0.448	0.999	0.840
5-15 cm: unburned vs. high	0.947	0.999	0.674	0.706
5-15 cm: moderate vs. high	0.836	0.399	0.628	0.968

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40 **Table S3.** Results of mixed model evaluating the effects of layer, burn severity and slope on
 41 BPCA-C concentration and stocks presented as degrees of freedom (df) and p-values.

effect	df	BPCA C (g kg ⁻¹ C)	log BPCA C stock (g BPCA-C m ⁻²)
slope	2	0.446	0.801
burn	2	0.007	0.012
layer	2	0.610	<0.001
slope x burn	4	0.191	0.853
slope x layer	4	0.740	0.829
burn x layer	4	<0.001	<0.001
slope x burn x layer	8	0.545	0.679

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 43 **Table S4.** Results of Tukey's post-hoc comparisons evaluating the source of significant
 44 differences in BPCA-C concentration and stocks by burn severity, layer, and the burn by
 45 layer interaction presented as adjusted p-values.

post hoc comparisons	BPCA C (g BPCA-C kg ⁻¹ C)	log BPCA C stock (g BPCA-C m ⁻²)
high vs. unburned	0.005	0.135
moderate vs. unburned	0.072	0.009
high vs. moderate	0.576	0.408
0-5 cm vs. forest floor	0.980	<0.001
5-15 cm vs. forest floor	0.734	<0.001
0-5 cm vs. 5-15 cm	0.615	0.814
unburned: 0-5 cm vs. forest floor	<0.001	<0.001
unburned: 5-15 cm vs. forest floor	0.004	<0.001
unburned: 0-5 cm vs 5-15 cm	0.711	0.882
moderate: 0-5 cm vs. forest floor	0.418	0.484
moderate: 5-15 cm vs. forest floor	0.085	0.847
moderate: 0-5 cm vs 5-15 cm	0.646	0.817
high: 0-5 cm vs. forest floor	0.023	0.172
high: 5-15 cm vs. forest floor	0.027	0.162
high: 0-5 cm vs. 5-15 cm	0.998	0.999
forest floor: unburned vs. moderate	<0.001	<0.001
forest floor: unburned vs. high	<0.001	<0.001
forest floor: moderate vs. high	0.445	0.330
0-5 cm: unburned vs. moderate	0.874	0.999
0-5 cm: unburned vs. high	0.761	0.696
0-5 cm: moderate vs. high	0.974	0.709
5-15 cm: unburned vs. moderate	0.845	0.989
5-15 cm: unburned vs. high	0.986	0.948
5-15 cm: moderate vs. high	0.742	0.983

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47 **Table S5.** Results of mixed model evaluating the effects of burn, layer and their interaction
 48 on the relative abundances of B6CA, B5CA, B4CA and the ratio of B5CA:B6CA presented as
 49 degrees of freedom (df) and adjusted p-values.

effect	df	B6CA	B5CA	B4CA	B5CA:B6CA
burn	2	0.902	0.939	0.401	0.805
layer	2	<0.001	<0.001	<0.001	0.002
burn x layer	4	0.079	0.288	0.543	0.053

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51 **Table S6.** Tukey's Post hoc comparisons among layers and burn by layer interaction for
 52 relative abundance of B6CA, B5CA, B4CA and the ratio of B5CA:B6CA presented as the
 53 adjusted p-values.

post hoc comparisons	B6CA	B5CA	B4CA	B5CA:B6CA
0-5 cm vs. forest floor	0.997	<0.001	<0.001	0.115
5-15 cm vs. forest floor	<0.001	<0.001	0.148	0.001
0-5 cm vs. 5-15 cm	<0.001	0.037	0.002	0.176

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