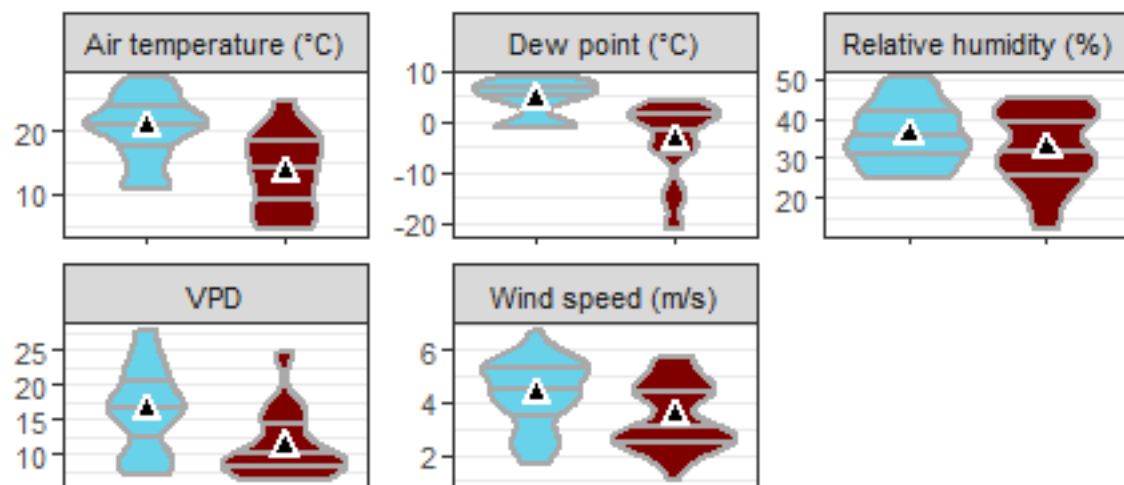


Table 1: Results of generalized linear mixed effect regression models testing three measure of fire behavior against four potential predictor variables. Statistics reflect pooled results of 50 imputed datasets using the *mice* package in R; see Methods. Vapor pressure deficit included for Rate of spread only due to statistically-significant difference between GLMM regression results that included VPD compared to RH alone (Wald = 5.32,  $P = 0.02$ ), while temperature models had no such difference.

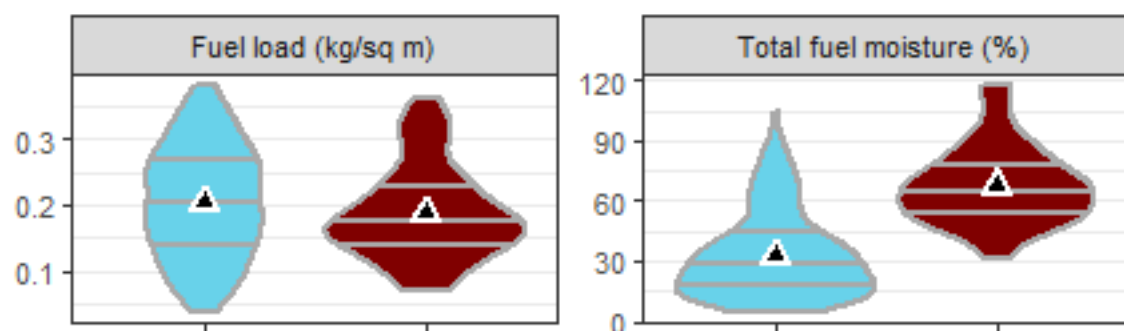
Response	Model term	t	df	P
Rate of spread	Wind speed	2.92	108.0	< 0.01
	Vapor pressure deficit	-2.31	108.1	0.02
	Relative humidity	-1.66	80.8	0.10
	Fuel load	1.16	49.9	0.25
	Fuel moisture	-0.68	62.9	0.50
Canopy temperature	Fuel load	2.82	54.2	0.01
	Fuel moisture	-2.16	40.9	0.04
	Relative humidity	-1.19	120.4	0.24
	Wind speed	0.02	132.4	0.99
Surface temperature	Relative humidity	-1.19	74.8	0.24
	Fuel load	-0.48	20.1	0.64
	Fuel moisture	-0.47	40.1	0.64
	Wind speed	0.06	49.5	0.95

Figure 1: Distribution of weather, fuel, and fire behavior data for fires in southwestern North Dakota (Hettinger, dark maroon) and central North Dakota (Central Grasslands, light blue). Horizontal gray lines denote 25%, 50% (median) and 75% quantiles; triangles are arithmetic means. Means and standard deviation are also reported in Supplemental Information Table 1. VPD = Vapor pressure deficit.

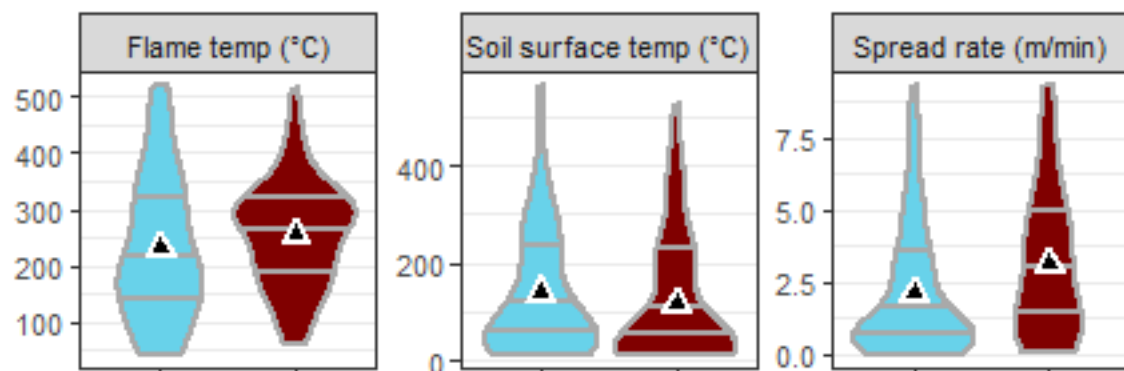
## Weather



## Fuel



## Fire behavior



Location ■ Central Grasslands ■ Hettinger

Figure 2: Principal Components Analysis of fire behavior data (response variables in blue; rate of spread (ROS), temperature above surface (flame °C), and temperature at soil surface (soil °C) for prescribed burns on rangeland at Hettinger (H), in southwestern North Dakota, and Central Grasslands (CG), in central North Dakota. No difference between locations ( $P = 0.11$ ). Total variance explained in these two axes = 86%.

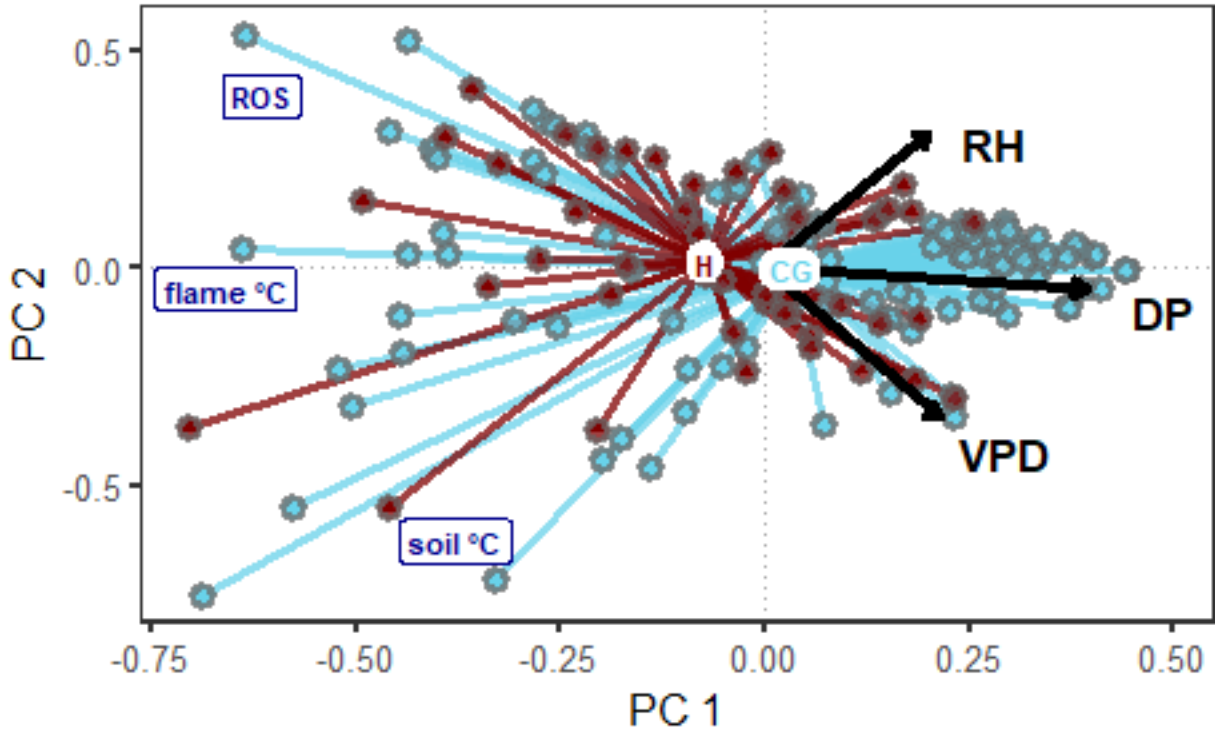
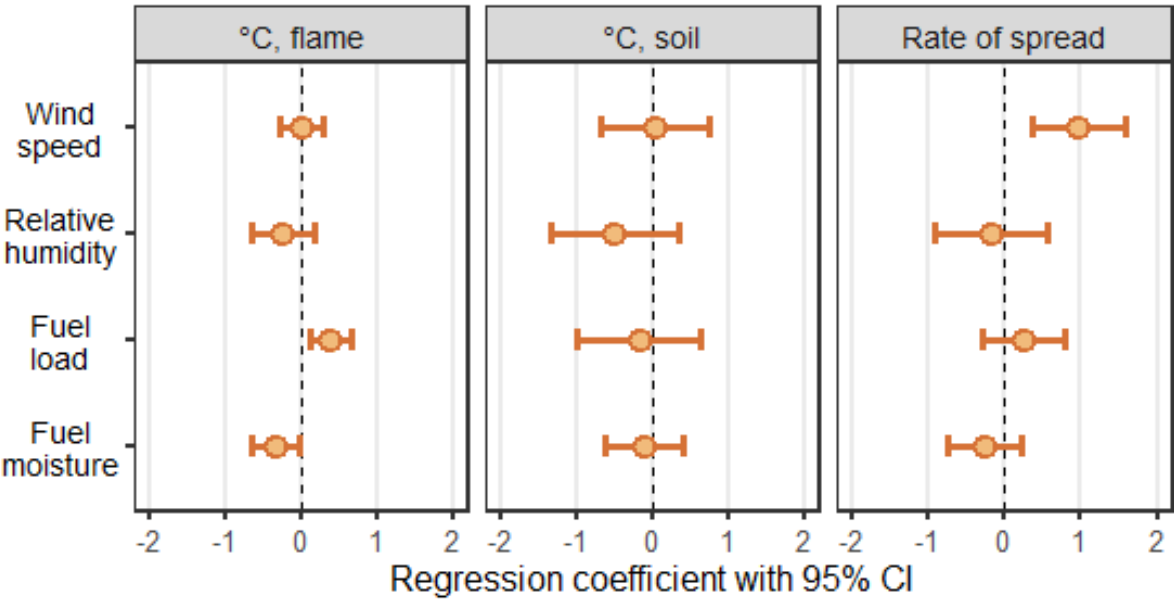


Figure 3: Regression coefficients and 95% confidence intervals for fuel and weather terms from models for maximum temperature at 15 cm above the soil surface (flame), maximum temperature at the soil surface (soil), and



rate of spread.