PROJECT UPDATE

December 2014

Survival zones for wildland firefighters: data collection in a natural opening in timber (No. 3)

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DATA COLLECTION

Location: Near the Canadian Boreal FireSmart Research Site, NT
(61 36.334 N / -117 08.635 W)

Date: July 29, 2014

Fuel: Various deciduous and coniferous trees

Opening: 22 m x 13 m

Fuels

This site consisted of an even mixture of deciduous and coniferous trees and had a 50 cm tall shrub layer (Figure 1). The opening consisted of shrubs and grass. We made no alterations to the vegetation in the opening or to the surrounding forest.

Figure 1. Vegetation in and surrounding natural opening No. 3.

We set up two data collection boxes in the opening. Each box had a video camera and sensors to record temperature, heat flux, and carbon monoxide. We placed the boxes back to back to capture video of the fire as it approached and passed through the opening.

Weather

It had been a dry, hot, and windy summer for the Northwest Territories. Birch swamps in the area near the data collection sites were uncharacteristically dry. Weather conditions as recorded by the Crown Fire weather station are summarized in Table 1 and the fire weather index values are summarized in Table 2. The Crown Fire weather station was approximately 1 km south of our site.

Table 1. Weather conditions at noon on July 29, 2014.

Temperature	Relative Humidity	Wind Speed
21°C	24%	14 km/h

Table 2. Fire weather index values at noon on July 29, 2014.

FFMC	DMC	DC	ISI	BUI	FWI
92	29	539	12	52	26

Wind speeds recorded at the site (with a Kestrel handheld weather meter) were less than 10 km/h. No other site-specific weather data was recorded.

FINDINGS

Fire Behaviour

Unfortunately, no fire behaviour data or images were collected.

Heat Flux and Temperature

The heat flux profile from the sensor in the shorter data collection box showed that values over 5 kW/m^2 were sustained for about 5 seconds and peaked at 20 kW/m^2 (Figure 2).

The temperature profile from the sensor in the shorter box (Figure 3) showed that temperatures of greater than 50°C lasted over 9 minutes. In the taller box, temperatures of greater than 50°C last for 11 minutes and peaked at 171°C. Temperature was greater than 100°C for 23 seconds.

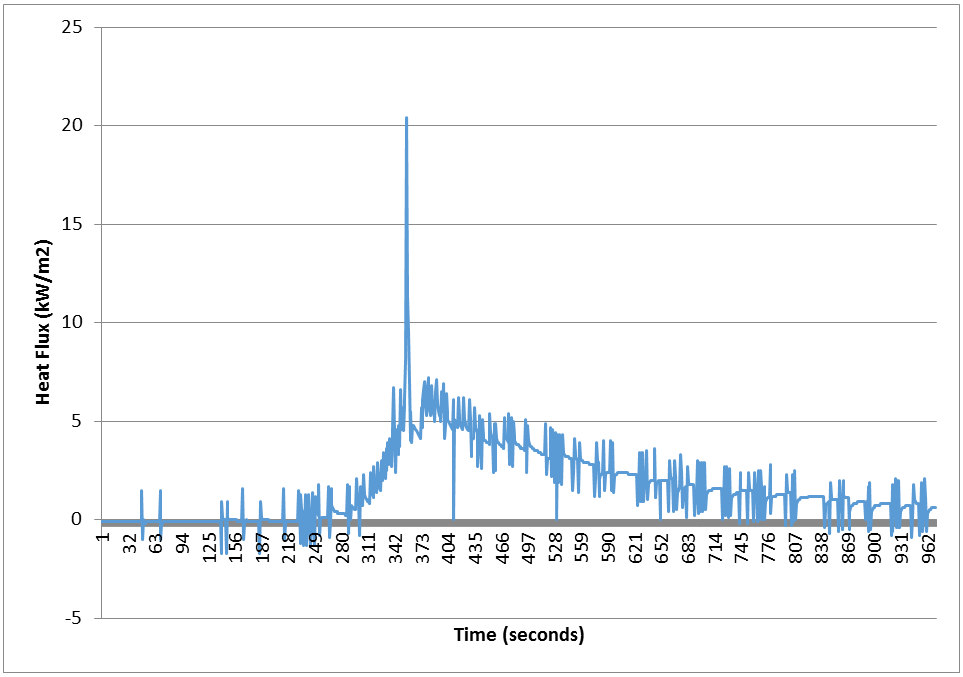

Figure 2. Heat flux profile from the sensor in the short box.

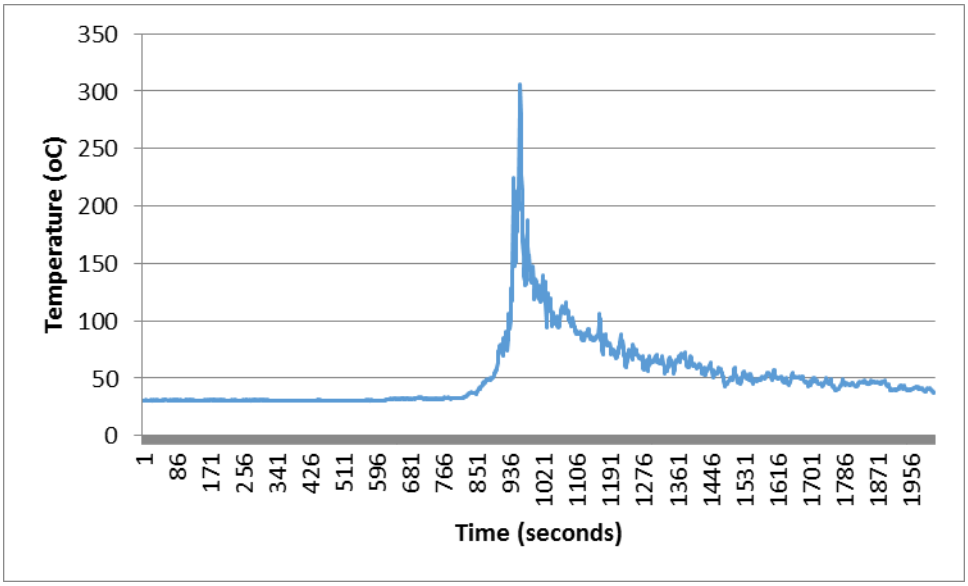

Figure 3. Temperature profile from the sensor in the short box.

Carbon Monoxide

Unfortunately, the carbon monoxide sensors malfunctioned and no data was recorded.

PRELIMINARY CONCLUSIONS

Our data suggests that a firefighter in standard PPE (personal protective equipment) lying on the ground has a chance of surviving in this opening if not near any trees and shrubs. The values we recorded are on the threshold for human survival.

ACKNOWLEDGEMENTS

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