

**FBP System Fuel Type C-2 (Boreal Spruce) Fire Intensity Classes  
vs. Fire Weather Index (FWI) and Buildup Index (BUI)<sup>1</sup>**

Prepared for the Alaska Division of Forestry  
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FBP System Fuel Type C-2 (0% Slope & 85% Foliar Moisture Content)

Fire Intensity Class	Fire Intensity (kW/m)	BUI					
		20	40	60	80	100	120
				FWI*			
1	<10	0	0	0	0	0	0
2	10-500	1-5	1-4	1-3	1-3	1-4	1-5
3	500-2000	6-11	5-9	4-9	4-9	5-11	6-11
4	2000-4000	12-14	10-13	10-13	10-13	12-14	12-16
5	4000-10 000	15-24	14-20	14-21	14-22	15-23	17-23
5+	>10 000	>25	>21	>22	>23	>24	>24

\*This is the approximate FWI and will increase in late summer with high foliar moisture content values.

NOTE: In preparing this tabulation I used the Head Fire Intensity Class Graph (Alexander and Cole 1995; Cole and Alexander 1995)<sup>2</sup> and Table 9 in the FWI System Tables (CFS For. Tech. Rep. 25, pages 36-37).

<sup>1</sup> Retyped largely as is from the original hand-written version.

<sup>2</sup> Alexander, M.E.; Cole, F.V. 1995. Predicting and interpreting fire intensities in Alaskan black spruce forests using the Canadian system of fire danger rating. Pages 185-192 in Managing Forests to Meet People's Needs, Proc. 1994 Soc. Am. For./Can. Instit. For. Convention (Sep. 18-22, 1994, Anchorage, AK.). Soc. Am. For., Bethesda, Md. SAF Publ. 95-02.

Cole, F.V.; Alexander, M.E. 1995. Head fire intensity class graph for FBP System Fuel Type C-2 (Boreal Spruce). AK. Dep. Nat. Resour., Div. For., Fairbanks, AK. and Nat. Resour. Can., Can. For. Serv., Edmonton, Alta. Poster (with text).

## POSTSCRIPT – September 3, 2012

When Alaska adopted the Canadian Forest Fire Danger Rating System back in the early 1990s it didn't take the time to derive a standard set of fire danger classes that everyone would agree on. Various criteria were floated out there from time to time. For example, a tabulation generally appeared in various editions of the Alaska "Handy Dandy" Fire Suppression Guide over the years. Unfortunately to my knowledge no one ever took the time to write up an explanation of its derivation.

The tabulation that I prepared in 1995 was to illustrate how one might go about deriving fire danger class criteria for Alaska based on the FWI component of the Canadian Forest Fire Weather Index System which is the practice in all the provinces and territories in Canada, except British Columbia which uses a FWI/BUI matrix for broad fire danger class regions of the province. The assumptions made in preparing the tabulation were as follows

- **Black spruce** represented by Canadian Forest Fire Behavior Prediction (FBP) System Fuel Type C-2 would serve as a nominal **fuel type** for all of Alaska from a broad fire danger rating perspective.
- **Level topography** was implied.
- Fire danger would be equated to **suppression difficulty** as dictated by Byram's **fireline intensity** (e.g., Low - < 10 kW/m; Moderate – 10-500 kW/m etc.) should at ignition occur.

Thus, given variations in **fire weather** from day to day, there was a means of gauging the "fire danger" on a daily basis.

For several years, the fire danger classes associated with the FWI component presented on the fire danger display maps produced by the Alaska Interagency Coordination Center website did not match the class ranges associated with the tabulation given in the Handy Dandy. I now see that this has been rectified. The present fire danger classes are as follows:

Low 0-8, Moderate 9-17, High 18-27, Very High 28-34, and Extreme >35

Again, I'm not aware that the rationale or basis for these class ranges has ever been enunciated on paper. My opinion regarding this fire danger class criteria? Considering what is presented in the tabulation and other evidence (e.g., wildfire documentation – see the following page), I would consider all these class ranges to be too high for a landscape that tends to be dominated by black spruce on flat terrain. Consider that the Northwest Territories of Canada, a relatively flat boreal landscape also dominated by black spruce, has set the criteria for Extreme fire danger at a FWI of  $\geq 25$  for example.

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**Wildfire Documentation** – The photos presented below were taken by Frank V. Cole during an aerial patrol flight on the afternoon of June 21, 2004. These photos illustrate quite well the development of a point source fire in interior Alaska black spruce near the extreme fire danger class threshold as established in the tabulation prepared in 1995.

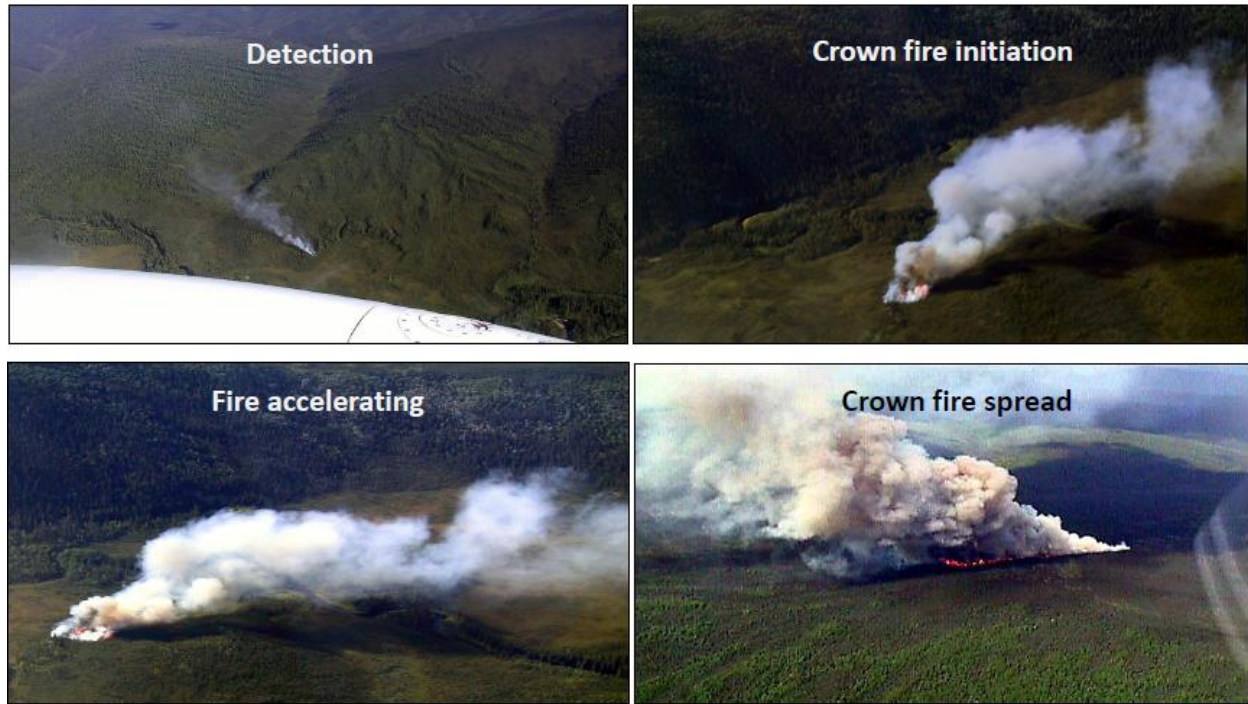


Photo sequence of the discovery, onset of crowning and the initial run of the Washington Creek Fire (299) of June 21, 2004. Photos by Frank V. Cole, Alaska Division of Forestry.

The 1400 h fire weather observations and FWI System components at the nearby RAWS were as follows:

Dry-bulb temperature – 80 °F (26.5 °C)  
Relative humidity – 41%  
Wind speed – 3.5 mph (6 km/h)  
Days since rain – 5

Fine Fuel Moisture Code (FFMC) – 90.7  
Duff Moisture Code (DMC) – 71  
Drought Code (DC) – 237  
Initial Spread Index – 6.3  
Buildup Index (BUI) – 81  
Fire Weather Index (FWI) – 21

By my criteria, this is very near the threshold for Extreme fire danger. According to the Handy Dandy “Relative Fire Danger for Interior Alaska” table it constitutes High fire danger. I think the photos speak for themselves as to the class of fire danger.