

SOFTWARE CAN ASSESS FUEL TREATMENT EFFECTIVENESS ON CROWN FIRE BEHAVIOR

CFIS—Crown Fire Initiation and Spread—is a new (nonprofit) software system that incorporates several recently developed models designed to simulate crown fire behavior (Alexander and others 2006).

The main outputs of CFIS are its ability to determine the:

- Likelihood of crown fire initiation or occurrence,
- Type of crown fire (active vs. passive) and its rate-of-spread, and
- Minimum spotting distance required to increase a fire's overall forward rate-of-spread.

The onset of fire crowning can be predicted through two distinct approaches via this software tool. One method relies on the knowledge of canopy base height and certain components of the Canadian Forest Fire Weather Index System or the 10-m (33-foot) open wind speed. The other requires the 10-m (33-foot) open wind, the estimated fine fuel moisture, fuel strata gap (or canopy base height), and an estimate of surface fuel consumption as inputs.

Required inputs to predict crown fire rate-of-spread are 10-m (33-foot) open wind speed, estimated fine fuel moisture, and canopy bulk density. The minimum spotting distance to affect overall crown fire rate-of-spread—which assumes a point ignition and subsequent fire acceleration to an equilibrium rate-of-spread—requires the predicted crown fire spread rate and an ignition delay as inputs.

This new software application can serve as a decision support aid in a wide variety of fire management activities—ranging from near real-time prediction of fire behavior to analyzing the impacts of fuel treatments on potential crown fire behavior.



CFIS is available for downloading—at no charge—at <<http://www2.dem.uc.pt/antonio.gameiro/ficheiros/CFIS.exe>>.

The primary models incorporated into CFIS have been evaluated against experimental and wildfire observations (Alexander and Cruz 2006; Cruz and others 2005), as well as other available fire behavior decision support systems with good results (Alexander 2006).

In addition, CFIS has applicability as a decision support aid in a wide variety of fire management activities—ranging from near real-time prediction of fire behavior to analyzing the impacts of fuel treatments on potential crown fire behavior.

The development of CFIS was a joint venture between the Forest Fire Research Centre of the Association for the Development

of Industrial Aerodynamics in Coimbra, Portugal (a private, nonprofit research organization linked to the Department of Mechanical Engineering at the University of Coimbra), and the Wildland Fire Operations Research Group of the Forest Engineering Research Institute of Canada.

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References

- Alexander, M.E. 2006. Models for predicting crown fire behavior – a review. In: V Short Course on Fire Behavior, November 25-26, 2006, Figueira da Foz, Portugal. Coimbra, Portugal. Association for the Development of Industrial Aerodynamics, Forest Fire Research Centre. CD-ROM: 173–225.
- Alexander, M.E.; Cruz, M.G. 2006. Evaluating a model for predicting active crown fire rate-of-spread using wildfire observations. *Canadian Journal of Forest Research*. 36: 3,015–3,028.
- Alexander, M.E.; Cruz, M.G.; Lopes, A.M.G. 2006. CFIS: a software tool for simulating crown fire initiation and spread. In: Viegas, D.X., ed. *Proceedings of 5th International Conference on Forest Fire Research*, November 27-30, 2006, Figueira da Foz, Portugal. Amsterdam, The Netherlands: Elsevier B.V. CD-ROM.
- Cruz, M.G.; Alexander, M.E.; Wakimoto, R.H. 2005. Development and testing of models for predicting crown fire rate of spread in conifer forest stands. *Canadian Journal of Forest Research*. 35: 1,626–1,639. ■