

Principles of Fire Behavior: **A CD-ROM Based Interactive Multimedia Wildland Fire Training Course**

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Abstract. This paper constitutes a revised/expanded version of Thorburn et al. (2001). A copy of the poster associated with this paper is available for viewing at: <http://www.gov.ab.ca/env/resedu/etc/mmp.html>. All of the poster images are also included here within.

The development of formalized wildland fire behavior and related training courses for fire suppression personnel began in earnest in the mid to late 50s (e.g., Cochran 1957). Although the basic fundamentals being taught haven't changed greatly, the method of delivery has gradually evolved to take advantage of technological developments (e.g., video tapes have replaced 16 mm films). While conventional classroom-style lecturing supplemented with outdoor field demonstration (Pearce and Alexander 1995) is still a valid approach, the application of computer technology to wildland fire behavior training has steadily increased in the past decade or so (e.g., Jenkins and Matsumoto-Grah 1986).

In Canada, computer-based wildland fire behavior training was initiated in the late 80s by the Environmental Training Centre (ETC). The first venture involved the "Canadianizing" of the U.S. National Wildfire Coordinating Group's "Fire Behavior Interactive Computer - Videodisc Program" course (NWCG 1989; Jenkins 1990) by D. Quintilio (formerly with ETC), M.E. Alexander and T.A. Van Nest, with some minor revisions by W.R. Thorburn and K.G. Hirsch (Canadian Forest Service) in 1991. The result was the "Principles of Fire Behavior Laserdisc" which was used by nearly all fire management agencies across Canada since 1989. Laserdiscs have now been replaced by CD-ROM based technology.

Principles of Fire Behavior (ETC 1998) is an intermediate fire behavior training course developed specifically for a Canadian audience (Fig. 1). ***Principles of Fire Behavior*** constitutes a Canadian conversion of the CD-ROM based training course ***Intermediate Fire Behavior, S-290*** (ETC and NWCG 1997) both of which were developed by the authors based initially on the text material provided by NWCG (1994a, 1994b). By using the interaction of video, audio, text, graphics, photos, and animation, student interest and retention is increased while learning time is decreased. ***Principles of Fire Behavior*** contains over 50 video clips, 300 audio clips, and 800 graphics and photos (Figs. 2-9).

Principles of Fire Behavior was developed and reviewed by a Canadian team of experts in fire operations, fire behavior and fire weather. ***Principles of Fire Behavior*** begins with an ***Overview Activity*** which is then followed by a pre-test of introductory level wildland fire behavior. Following the pre-test, the course is divided into six main sections. Each section contains a section test(s) to help learners review material and ensure they are ready to proceed. The six components or sections are:

- **Fire Environment** – the ***Fire Environment Activity*** introduces learners to basic fire behavior and appropriate terminology. It provides a review of the factors that affect fire behavior and the components of the wildland fire environment (Countryman 1972).
- **Topography**– the ***Topography Section*** contains two activities: ***Topographical Features***; and ***Topography and Fire***. These two activities teach the topographic characteristics that influence fire behavior.



Fig. 1. Cover of the CD-ROM ***Principles of Fire Behavior***.



Fig. 2. Sample screens from the *Principles of Fire Behavior* CD-ROM illustrating the **Fire Environment** section.



Fig. 3. Sample screens from the *Principles of Fire Behavior* CD-ROM illustrating the **Topography** section.



Fig. 4. Sample screens from the *Principles of Fire Behavior* CD-ROM illustrating the **Fuel** section.



Fig. 5. Sample screens from the *Principles of Fire Behavior* CD-ROM illustrating the **Weather** section.



Fig. 6. Sample screens from the *Principles of Fire Behavior* CD-ROM illustrating the **Extreme Fire Behavior** section.



Fig. 7. Sample screen from the *Principles of Fire Behavior* CD-ROM illustrating the **Assessing Fire Behavior** section.



Fig. 8. Sample screens from the *Principles of Fire Behavior* CD-ROM illustrating test questions.



Fig. 9. A *Principles of Fire Behavior* CD-ROM training session in progress.

- **Fuel** – the *Fuel Section* consists of two activities. *Fuel Characteristics* teaches the main characteristics of wildland fuels. *Fuel and Fire* describes the relationship between fire behavior and fuels.
- **Weather** – *Weather* is the largest section of the course, with activities on *Atmosphere, Wind, Clouds, Weather Observation, Weather Forecasting, and Weather and Fire*. All weather activities focus on the important link between the atmosphere and weather to fire behavior (Schroeder and Buck 1970).
- **Extreme Fire Behavior**– the *Extreme Fire Behavior Activity* teaches learners how to recognize fire behavior in the third dimension and understand some of the causes of this phenomenon.
- **Assessing Fire Behavior** – this section really sums it all up, showing learners how to use their knowledge of the fire environment, topography, fuel, weather, and extreme fire behavior to be able to recognize indicators of problematic fire behavior and identify situations which might be hazardous to fireline personnel.

Once learners have completed these six sections, they are given a final test. Scores on all tests – section tests and final – are recorded by a performance tracking system which can be used by course administrators for certification purposes. It takes learners 8-10 hours to complete the course; however learners can take the course in a shorter time duration, using a bookmarking feature to return where they have left off. The course can be run on a stand alone computer or over a network. All computers, workstations, local computers, etc. where a course will be run should have: Pentium 100 or better (with Windows 95), a minimum of 16 MB of total RAM memory and 100 MB of free hard drive space (4 MB actually required for software), color SVGA monitor set (for 640 x 480, 16 bit color), “Video for Windows” software (included on the CD-ROM), 16 bit sound card (SoundBlaster), an 8X or better CD-ROM and its driver(s) (on every workstation) and mouse.

To order a copy of the CD-ROM *Principles of Fire Behavior* (Fig. 10) contact: Raincoast Distributors, 8680 Cambie Street, Vancouver, British Columbia V6P 6M9.



Fig. 10. The CD-ROM *Principles of Fire Behavior* lets you take an intermediate fire behavior training course at home using the latest in interactive multimedia technology.

Telephone: +1 800 663 5714; fax: +1 800 565 3770; email: custserv@raincoast.com (cost: \$CAN 98.95 + shipping charges). To order the American equivalent (i.e., ETC and NWCG 1997) refer to NWCG (2001).

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