Overseas Use of CFFDRS

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Alaska Fire Science Consortium

CFFDRS in Alaska Summit – October 28-30, 2014

Fort Wainwright, AK

JOINT FIRE SCIENCE PROGRAM

This presentation is based on the following article:

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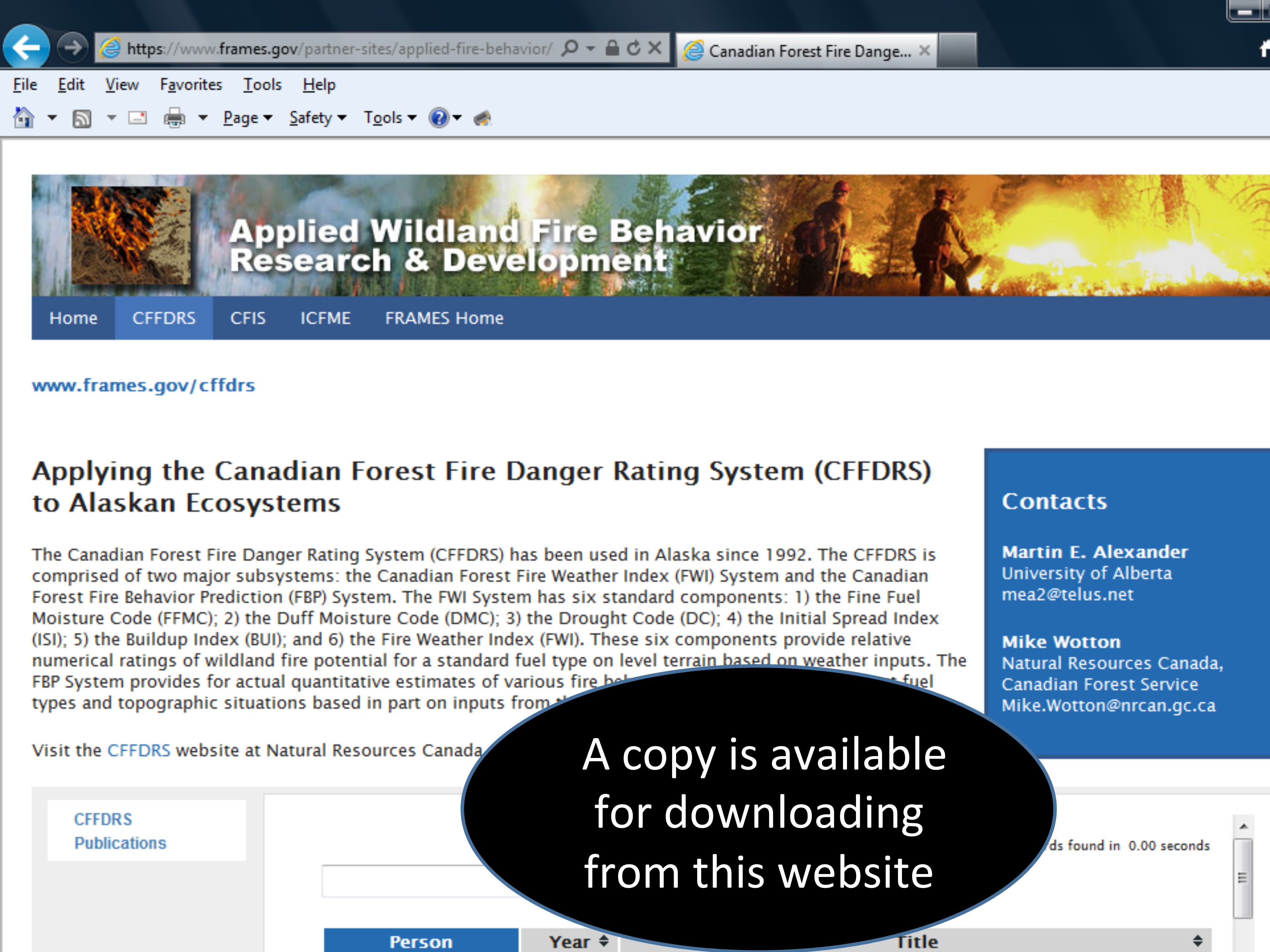
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Applying the Canadian Forest Fire Danger Rating System (CFFDRS) to Alaskan Ecosystems
The Canadian Forest Fire Danger Rating System (CFFDRS) has been used in Alaska since 1992. The CFFDRS is comprised of two major subsystems: the Canadian Forest Fire Weather Index (FWI) System and the Canadian Forest Fire Behavior Prediction (FBP) System. The FWI System has six standard components: 1) the Fine Fuel Moisture Code (FFMC); 2) the Duff Moisture Code (DMC); 3) the Drought Code (DC); 4) the Initial Spread Index (ISI); 5) the Buildup Index (BUI); and 6) the Fire Weather Index (FWI). These six components provide relative numerical ratings of wildland fire potential for a standard fuel type on level terrain based on weather inputs. The FBP System provides for actual quantitative estimates of various fire
types and topographic situations based in part on inputs from
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FIREHouse

The Northwest and Alaska Fire Research Clearinghouse www.fs.fed.us/pnw/fera/firehouse

Applying the Canadian Forest Fire Danger Rating System (CFFDRS) to Alaskan Ecosystems

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Predicting and Interpreting Fire Intensities in Alaskan Black Spruce Forests Using the Canadian System of Fire Danger Rating
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Duff Moisture Dynamics in Black Spruce Feather Moss Stands and Their Relation to the Canadian Forest Fire Danger Rating System
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Science, technology, and human factors in fire danger rating: the Canadian experience

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Abstract. The present paper reviews the development of the Canadian Forest Fire Danger Rating System (CFFDRS) and its implementation in Canada and elsewhere, and suggests how this experience can be applied in developing fire danger rating systems in other forest or wildland environments. Experience with the CFFDRS suggests that four key scientific, technological, and human elements need to be developed and integrated in a national forest fire danger rating system. First among these is a sustained program of scientific research to develop a system based on relationships between fire weather, fuels, and topography, and fire occurrence, behavior, and impact appropriate to the fire environment. Development of a reliable technical infrastructure to gather, process, and archive fire weather data and to disseminate fire weather forecasts, fire danger information, and fire behavior predictions within operational agencies is also important. Technology transfer and training in the use of fire danger information in fire operations are necessary, as are cooperation and communication between fire management agencies to share resources and set common standards for information, resources, and training. These elements must be appropriate to the needs and capabilities of fire managers, and must evolve as fire management objectives change. Fire danger systems are a form of media; system developers should be careful not to overemphasize scientific and technological elements at the expense of human and institutional factors. Effective fire danger systems are readily assimilated by and influence the organizational culture, which in turn influences the development of new technologies. Most importantly, common vision and a sense of common cause among fire scientists and fire managers are needed for successful implementation of a fire danger rating system.

Additional keywords: Canada; Canadian Forest Fire Danger Rating System; fire behavior; technology transfer; wildland fire research.

Introduction

Forest fire danger rating schemes underlie all contemporary fire management systems. These systems are the principal means by which scientific knowledge of fire potential is synthesized and integrated with operational experience into practical fire management applications. Many forest fire danger rating systems have been developed throughout the world (Lin 2000; San-Miguel-Ayanz *et al.* 2003), although no universal or leading system has emerged. Fire management agencies developing new systems often look to use or adapt such well-developed existing systems as the US National Fire Danger Rating System (Deeming *et al.* 1977), the McArthur fire danger rating meters used in Australia (Luke and McArthur 1978) or the Canadian Forest Fire Danger Rating System (CFFDRS) (Stocks *et al.* 1989). The CFFDRS, for example, has been fully implemented in parts of the USA and in New Zealand, and components of the system have been used in countries such as Fiji, Argentina, Mexico, Indonesia, and Malaysia. The CFFDRS is accepted outside of Canada likely because it is relatively simple to use, robust in a variety of environments, and has strong interpretive products (i.e. posters, look-up tables, electronic data processing and display systems) that are useful in a variety of situations.

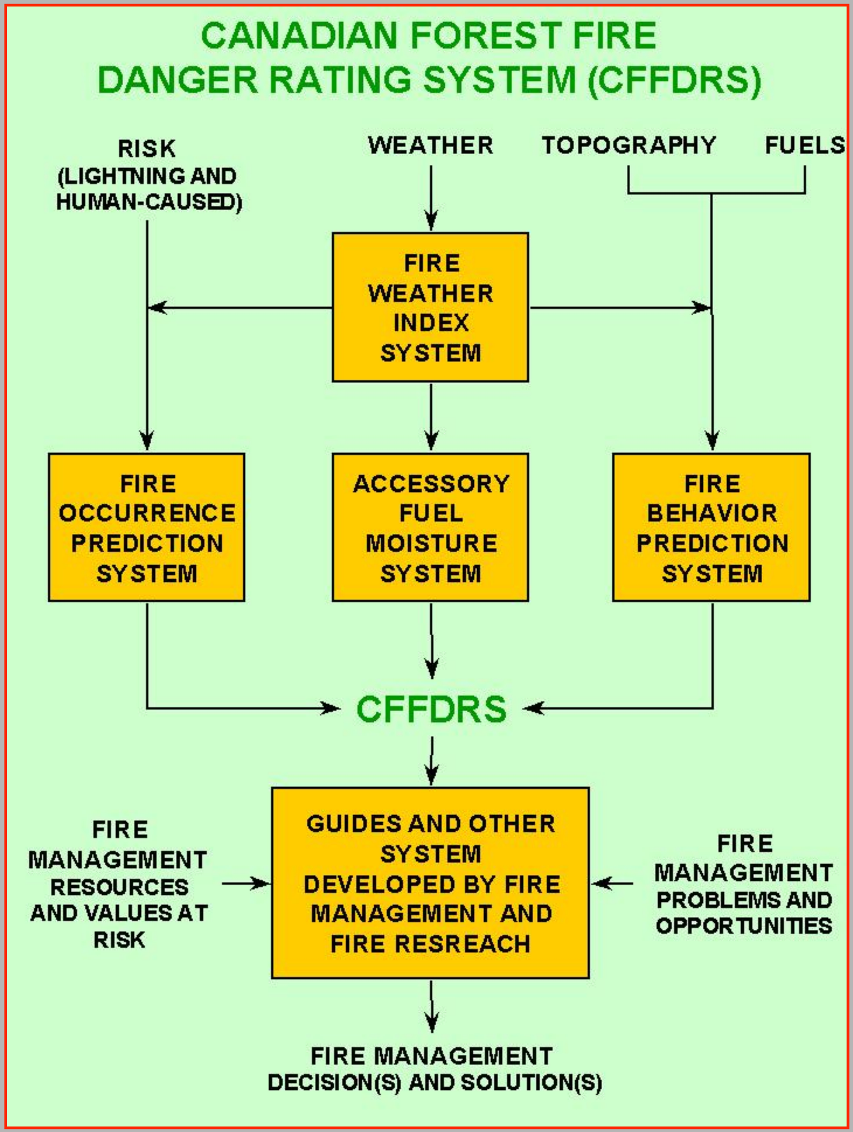
In Canada, the CFFDRS is the principal source of fire intelligence for all forest fire management agencies. It is used to support fire management decision making at strategic and tactical levels, from fire prevention to firefighter safety. The development and implementation of the CFFDRS was challenging. Canada is a large country; although boreal forests are the predominant forest-cover type, fire environments

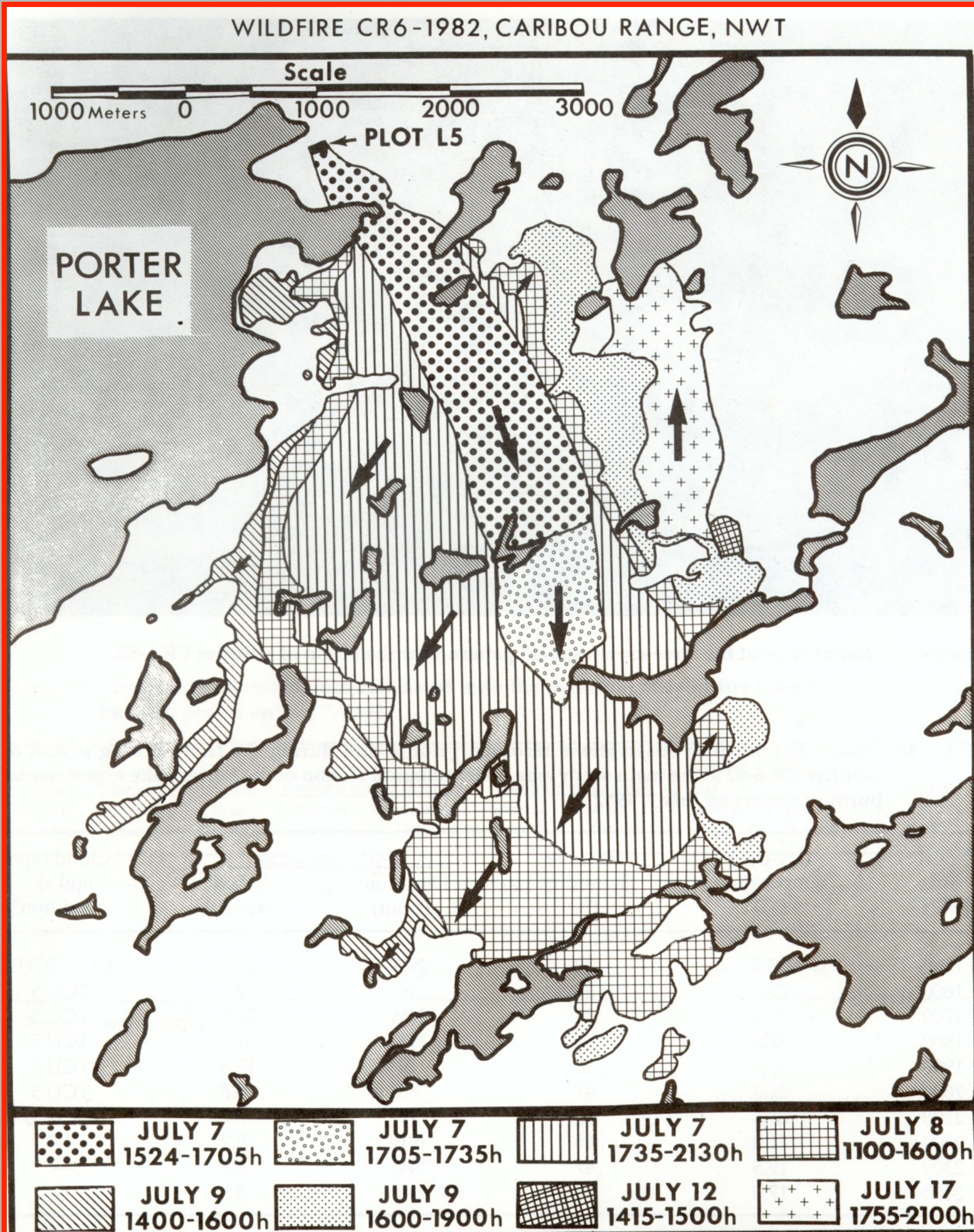
 10.1071/WF05021 1049-8001/06/010121

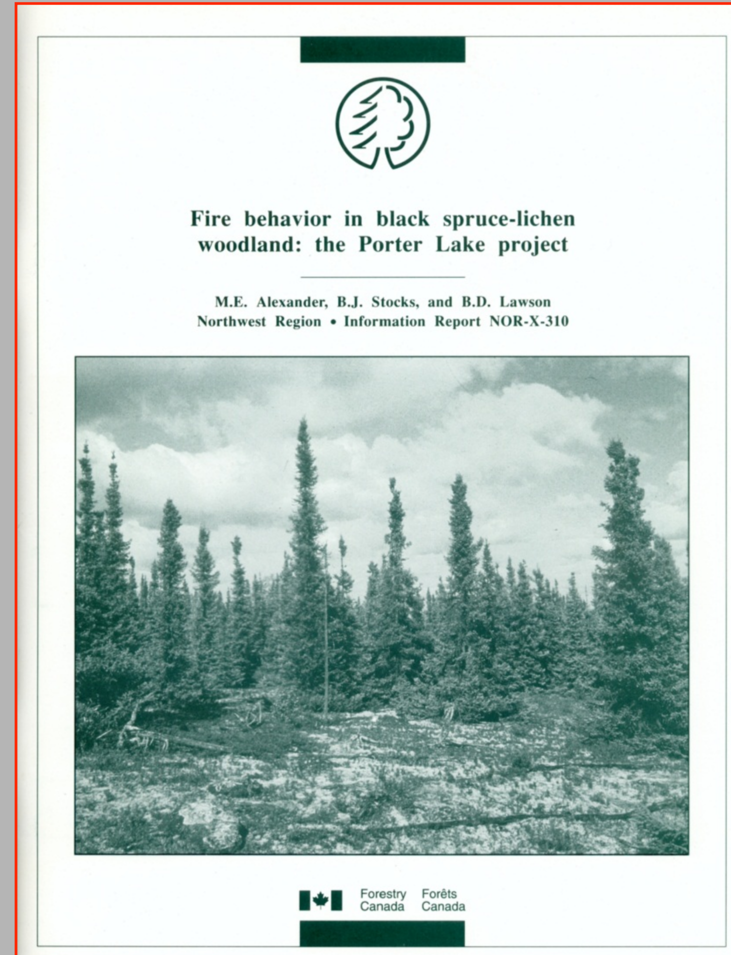
Several key scientific, technological and human elements need to be considered in developing a national system of fire danger rating system.

Key Element #1

A modular system of fire danger indicators or models of fire occurrence and behavior in important fire environments developed through a sustained program of scientific research and based on relationships between fire weather, fuels, topography, and ignition sources.






Fire behavior in black spruce-lichen woodland: the Porter Lake project

M.E. Alexander, B.J. Stocks, and B.D. Lawson

Northwest Region • Information Report NOR-X-310

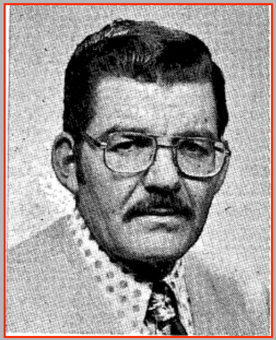
Forestry Canada Forêts Canada

1004 hectare escape fire


International Crown Fire Modelling Experiment,
NWT:
“Burn to Learn”

The Alaskan Situation

U.S. Forest Service Fire Behavior Researchers



- **Von Johnson**, early 60s, Juneau

- **Dick Barney**, mid to late 60s & early 70s, Institute of Northern Forestry (INF), Fairbanks

- **Nonan Noste**, late 60s and early 70s, INF

- **Rod Norum**, late 70s and 80s, INF

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PNW RESEARCH NOTE

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PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION

PNW-332 April 1979

PRELIMINARY RESULTS OF EXPERIMENTAL FIRES IN THE
BLACK SPRUCE TYPE OF INTERIOR ALASKA

by
L. A. Viereck, *Principal Plant Ecologist*[1]
Joan Foote, *General Bi*
C. T. Dyrness, *Program*
Keith Van Cleve, *Professor of*
Douglas Kane, *Professor of Water Resour*
and
Richard Seifert, *Research*

Abstract

Four units totaling 1 hectare in area were bur
the Washington Creek experimental fire site near
vegetation on the site consisted of an unevenly
approximately 70 years old, with an understory of
continuous cover of moss and lichen. One plot w
remainder on August 26 during two periods in the
burning conditions were met. Measurements taken
ference of fire intensity among the four plots,
percentage of area in each of five forest floor fir
the fires on vegetation, thickness of the organic
phosphorus content of the forest floor, and the
Seed fall from black spruce and revegetation of
season are given. Although the units were small
weather conditions and with extra fuels placed o
a wide variation in the severity of burns and sl
severe wildfire.

KEYWORDS: Fire effects, fire use, black spruce,
taiga.

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[2]University of Alaska, Fairbanks.
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U.S. DEPARTMENT OF AGRICULT

The effects of experimental fires on black spruce forest floors in interior Alaska

C. T. Dyrness and Rodney A. Norum
Institute of Northern Forestry, United States Department of Agriculture Forest Service, Fairbanks, AK, U.S.A. 99701

Received October 18, 1982[1]
Accepted March 10, 1983

Dyrness, C. T., and R. A. Norum. 1983. The effects of experimental fires on black spruce forest floors in interior Alaska. Can. J. For. Res. 13: 879–893.

Seven units (about 2 ha each) of black spruce – feather moss forest were experimentally burned over a range of fuel moisture conditions during the summer of 1978. Surface woody fuels were sparse and the principal carrier fuel was the forest floor (largely mosses and their decomposition products). Forest floors after burning comprised a small-scale mosaic of unburned, scorched, lightly burned, moderately burned, and heavily burned (organic materials entirely consumed) conditions. Percentage of the unit area in the moderately and heavily burned condition ranged from 11.2 to 77.2% and percent decrease in forest-floor thickness varied from 27.4 to 63.1% in the seven units. Forest-floor consumption was most closely correlated with the moisture content of lower moss (01 horizon) and lower duff layers (022 horizon) at the time of burning. For the first 3 years after fire, biomass production was greater on heavily burned than on lightly burned sites (58 vs. 37 g/m^2 on an annual basis). Heavily burned sites were completely dominated by the invading species *Epilobium angustifolium* L., *Ceratodon purpureus* (Hedw.) Brid., and *Marchantia polymorpha* L., whereas lightly burned plots were occupied by sprouting species such as *Calamagrostis canadensis* (Michx.) Beauv., *Vaccinium uliginosum* L., and *Ledum groenlandicum* Oeder. Soil pH and amounts of total P and available P in the forest floor increased significantly as a result of burning; and in all cases, increases reached a maximum in moderately and heavily burned areas. Total N in the forest floor increased significantly in moderately burned, but decreased slightly in heavily burned areas. Total N and total P showed smaller increases in the surface mineral soil as a result of burning. Supplies of available P in the mineral soil increased almost 4-fold in moderately burned and over 16-fold in heavily burned areas.

Dyrness, C. T., et R. A. Norum. 1983. The effects of experimental fires on black spruce forest floors in interior Alaska. Can. J. For. Res. 13: 879–893.

Sept parcelles (d'environ deux ha chacune) d'une forêt d'épinettes noires et de mousse ont été brûlées expérimentalement sous diverses conditions d'humidité du combustible, durant l'été 1978. Les combustibles de surface étaient rares et le progrès de l'incendie s'est effectué aux dépens de la couverture morte (surtout des mousses et leurs produits de décomposition), ce qui après le brûlage s'est traduit par une mosaïque à petite échelle de diverses conditions de couverture non brûlée, roussie, légèrement, modérément ou densément brûlée (où toute la matière organique était entièrement consumée). Le pourcentage de la superficie modérément ou densément brûlée d'une parcelle a varié de 11,2 à 77,2 et la réduction de l'épaisseur de la couverture a varié de 27,4 à 63,1 pour cent dans les sept parcelles. On a observé une corrélation très étroite entre la destruction de la couverture morte et le pourcentage d'humidité de la couche inférieure de mousse (horizon 01) et la litière inférieure (horizon 022) lors du brûlage. Au cours des trois premières années après le feu, la production de biomasse a été supérieure sur les stations densément brûlées que sur celles légèrement brûlées (58 versus 37 g/m^2, moyenne annuelle). Les espèces envahissantes comme *Epilobium angustifolium* L., *Ceratodon purpureus* (Hedw.) Brid. et *Marchantia polymorpha* L. ont complètement dominé les stations densément brûlées alors que des espèces à rejet comme *Calamagrostis canadensis* (Michx.) Beauv., *Vaccinium uliginosum* L. et *Ledum groenlandicum* Oeder se sont manifestées dans les endroits légèrement brûlés. Suite au brûlage, le pH du sol et les quantités de P total et assimilable de la couverture morte ont augmenté significativement, atteignant, dans tous les cas, un maximum dans les parties modérément et densément brûlées. L'azote total de la couverture a augmenté significativement dans les parties brûlées modérément pour décroître légèrement dans les parties densément brûlées. Suite au brûlage, on a observé de légères augmentations de N total et de P total à la surface de sol minéral. Les quantités de P assimilable dans le sol minéral ont presque quadruplé dans les conditions de brûlage modéré et de plus de 16 fois dans les endroits densément brûlés.

[Traduit par le journal]

Introduction

In 1978, we conducted a series of experimental fires in typical upland black spruce stands for the purpose of measuring fire behavior and subsequent fire effects. The fires were burned over a range of conditions typical of most summer fire seasons in interior Alaska. Seven units of approximately 2 ha each were burned individually between July 19 and August 8, 1978. All fires were in well-drained, permafrost-free black spruce (*Picea mariana* (Mill.) B.S.P.) forests with a predominately feather-moss understory. The primary objectives of the fires were to: (*i*) document fire behavior (rate of forward spread and flame length); (*ii*) record the differential plant responses to different fire intensities and

[1]Revised manuscript received March 3, 1983.

A Publication of the
National Wildfire
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National Association of
State Foresters

Measuring Fuel Moisture Content in Alaska: Standard Methods and Procedures

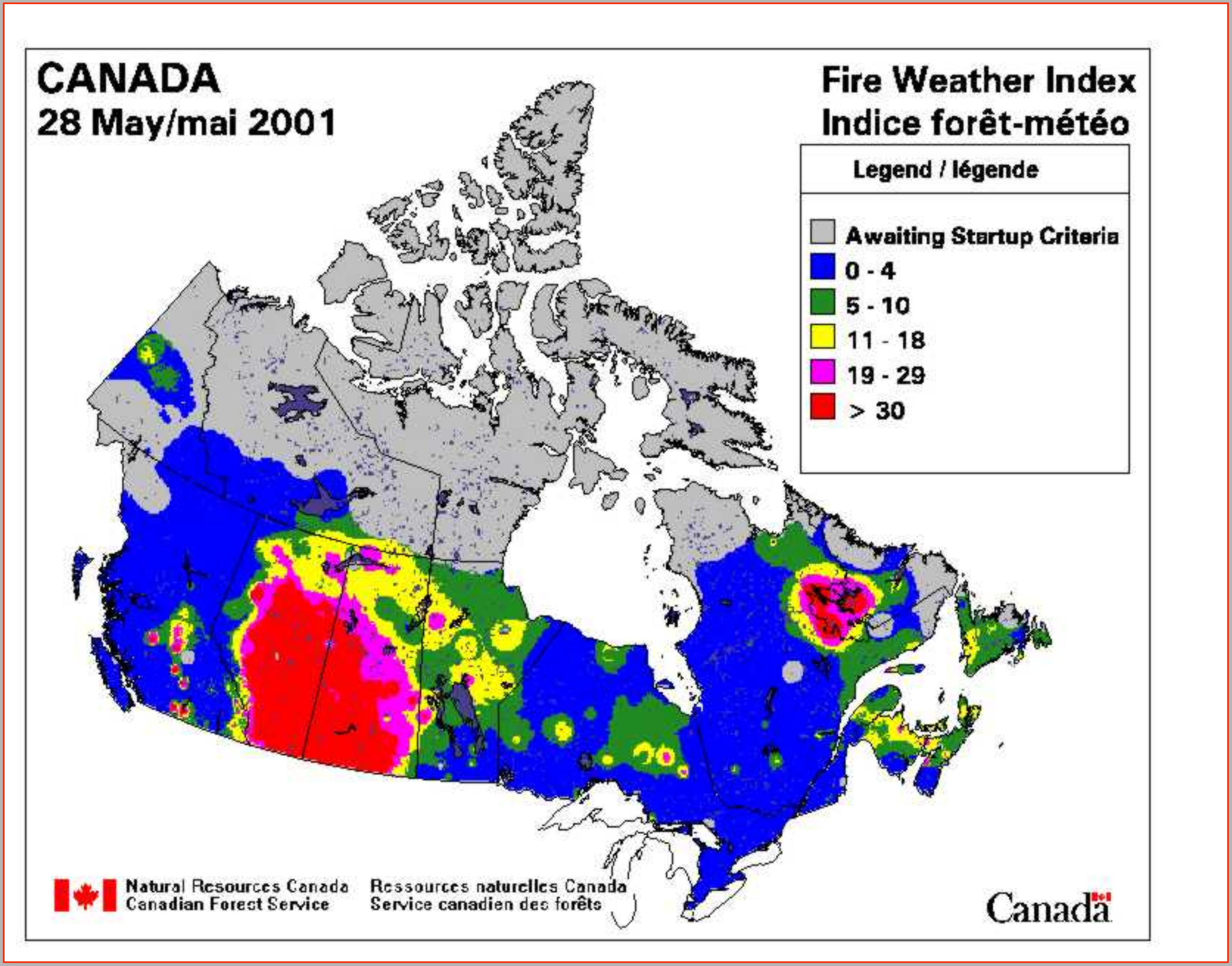
Rodney A. Norum
Melanie Miller

PMS 813 August 1984
NFES 2127

Key Element #2

A reliable technical infrastructure to gather, process, disseminate, and archive fire weather data and forecasts (weather instruments/ stations, standards, communications) and fire danger predictions (text and map displays) within operational agencies.

Canadian Wildland Fire Information System



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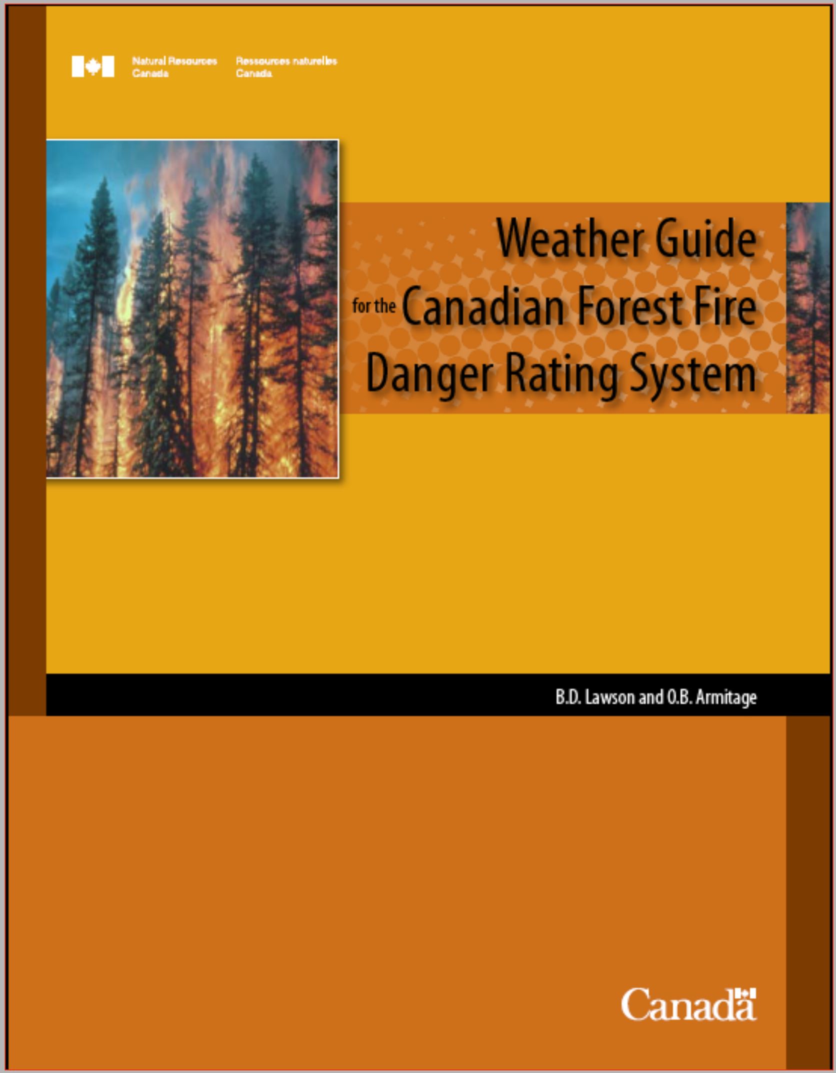
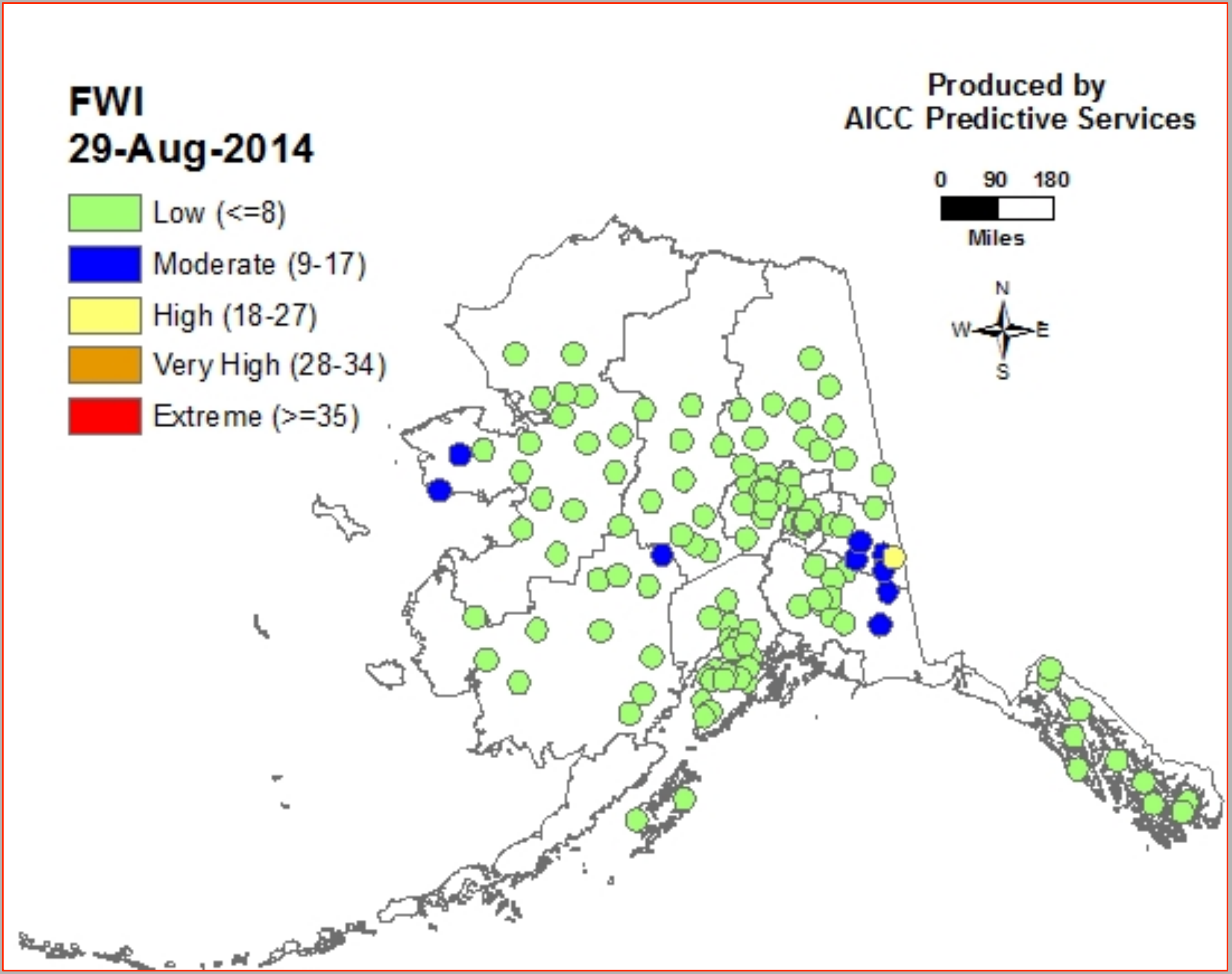
Quality control in fire danger rating

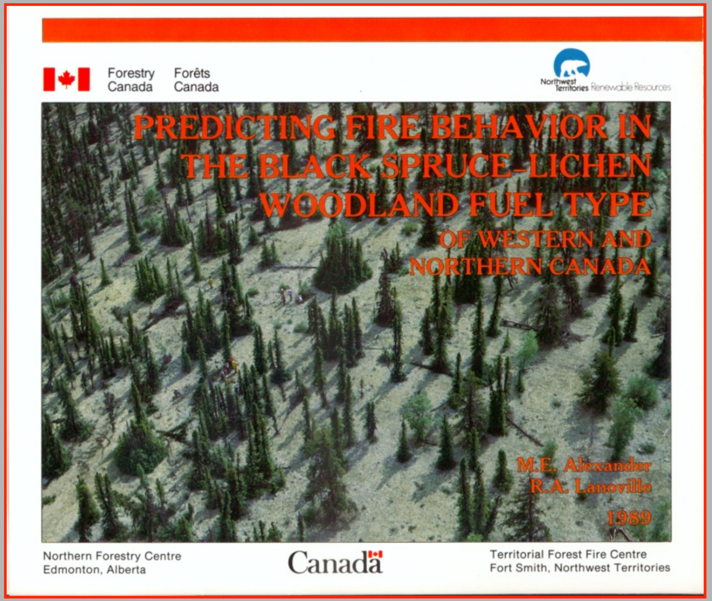


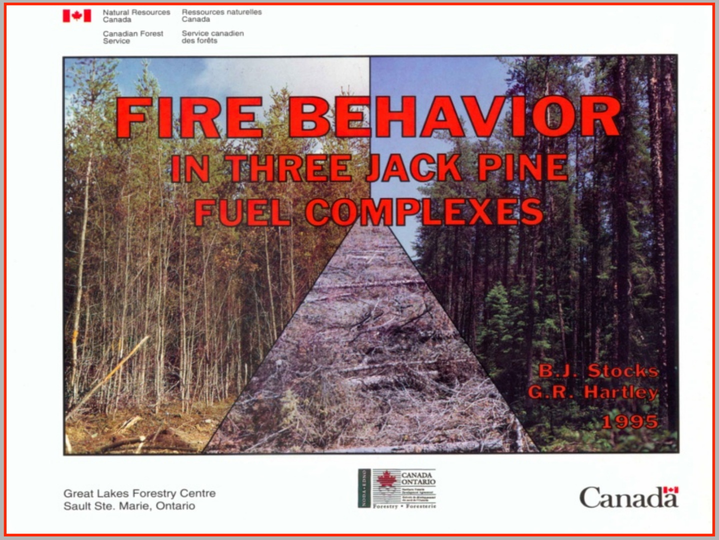
The Alaskan Situation



Key Element #3

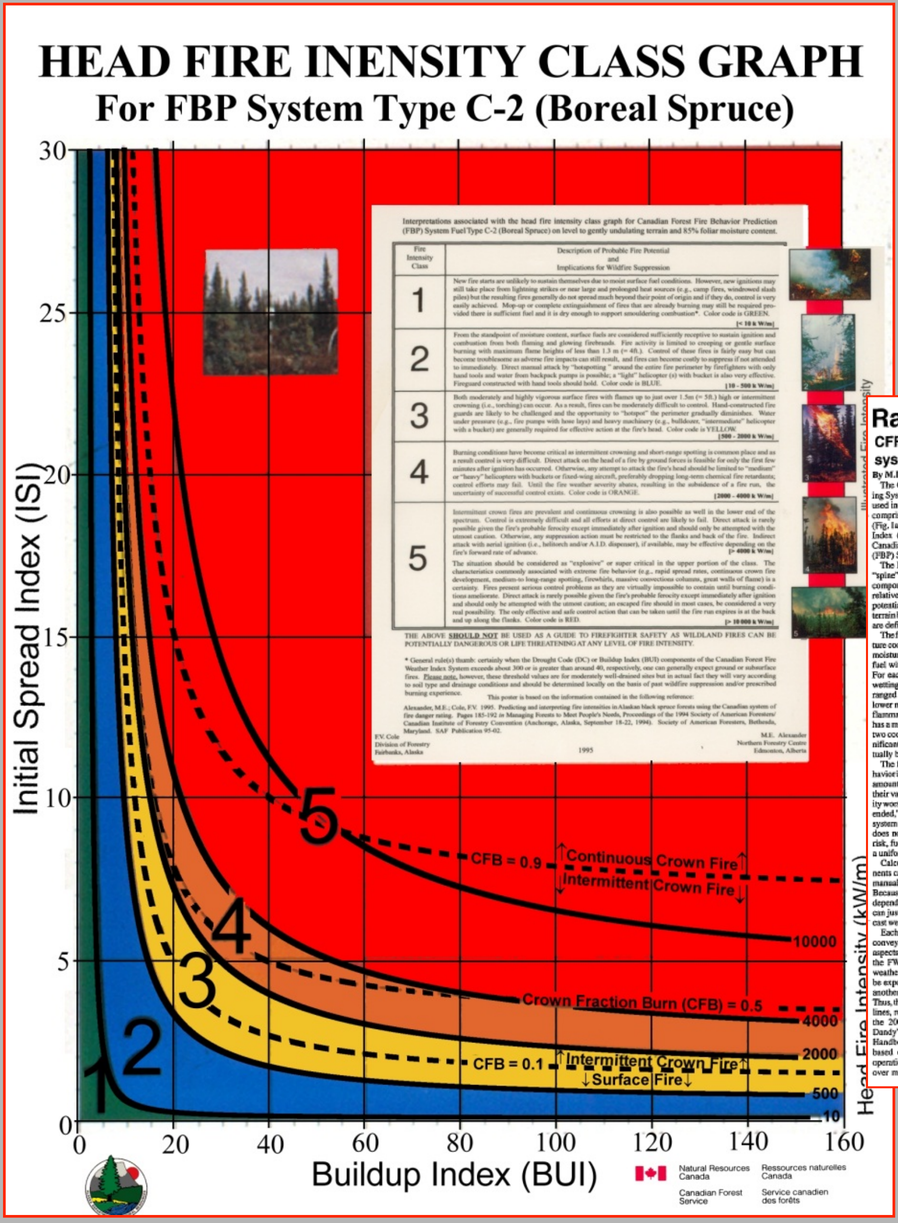
Guidelines, decision aids, and training for fire managers in the application of fire danger indicators appropriate to the needs and capabilities of operational agencies based on research and operational experience.






Understanding the FWI System
fwi system
Canadian Forest Fire Behavior Prediction (FBP) System Interactive Training and Reference
ISBN 0-660-17600-9
Alberta
Made in Canada
FIRE BEHAVIOR IN JACK PINE STANDS
Plate 1
FWI 9
FWI 14
Examples of
FUEL TYPES
in the
CANADIAN FOREST FIRE BEHAVIOR PREDICTION (FBP) SYSTEM
Forestry Canada
Forêts Canada
Canada
Plate 3
FWI 15
Plate 4
FWI 17
Plate 6
Plate 7
FWI 34
Canadian Forest Fire Behavior Prediction (FBP) System: user's guide
K.G. Hirsch
Special Report 7
Plate 8
Graph 2
Table 1
Acknowledgments
References
FIELD GUIDE TO THE CANADIAN FOREST FIRE BEHAVIOR PREDICTION (FBP) SYSTEM
S.W. Taylor
R.G. Pike
and
M.E. Alexander
Natural Resources Canada
Ressources naturelles Canada
Canadian Forest Service
Service canadien des forêts
Canada

The Alaskan Situation



PREDICTING AND INTERPRETING FIRE INTENSITIES IN ALASKAN BLACK SPRUCE FORESTS USING THE CANADIAN SYSTEM OF FIRE DANGER RATING[1]

M.E. Alexander and F.V. Cole[2]

ABSTRACT: A graph has been constructed for determining one of five possible head fire intensity classes as well as the general type of fire (i.e., surface, intermittent crown or continuous crown) for Canadian Forest Fire Behavior Prediction System Fuel Type C-2 (Boreal Spruce) based on the Initial Spread Index and Buildup Index components of the Canadian Forest Fire Weather Index System as inputs. An accompanying table offers free-burning fire potential and wildfire suppression interpretations.

In July 1992, after several seasons of informal field testing, Alaska's interagency fire management community decided to adopt the Canadian Forest Fire Danger Rating System (CFFDRS) in lieu of continuing to use the U.S. National Fire Danger Rating System. The CFFDRS actually comprises two primary ... Fire Weather Index (FWI) System and the Canadian Forest ... al. 1989). The six standard component outputs of the FWI ... ratings for various aspects of ignition ease, fire persistence ... (i.e., mature jack or lodgepole pine forest) on flat ground ... servations (i.e., temperature, relative humidity, 10-m open ..., if any) recorded at noon local standard time or 1:00 p.m.

... des actual quantitative estimates of certain fire behavior ... consumption, type of fire, fire size and shape) for specific ... ituations (Forestry Canada Fire Danger Group 1992). Two ... Initial Spread Index (ISI) and Buildup Index (BUI), are ... BUI are relative numerical ratings that incorporate the ... conditions on potential rate of fire spread and fuel available ... Service 1984).

... of the CFFDRS amongst Alaskan fire managers, a head fire ... Type C-2 (Boreal Spruce) has been prepared similar to the ..., 1989), utilizing the mathematical relationships and related ... ground and surface fuel consumption versus BUI) contained ... computerized version of the head fire intensity class graph ... personal communication) of the USDI Bureau of Land ... inwright, which allows the user to plot the values for a ... inistrative unit (e.g., district, region, area).

... rical data derived from experimental fires and wildfires, ... ne of the basic data included in the head fire rate of spread ... obtained from previous Alaskan studies (Johnson 1964,

[1]A paper presented at the Fire Working Group Technical Session and the Poster Session at the Society of American Foresters/Canadian Institute of Forestry Joint National Convention held at Anchorage, AK, on September 18-22, 1994.

[2]M.E. Alexander, Fire Research Officer, Natural Resources Canada, Canadian Forest Service, Northwest Region, Northern Forestry Centre, 5320 - 122 Street, Edmonton, AB T6H 3S5; and F.V. Cole, Intelligence Coordinator, State of Alaska, Department of Natural Resources, Division of Forestry, Alaska Interagency Fire Coordination Center, P.O. Box 35005, Ft. Wainwright, AK 99703.

Rating fire danger in Alaska ecosystems:

CFFDRS provides an invaluable guide to systematically evaluating burning conditions

By M.E. ALEXANDER & F.V. COLE

The Canadian Forest Fire Danger Rating System (CFFDRS) has officially been used in Alaska since 1992. The CFFDRS comprises chiefly two major subsystems. (Fig. 1a): the Canadian Forest Fire Weather Index (FWI) System (Fig. 1b) and the Canadian Forest Fire Behavior Prediction (FBP) System (Fig. 1c).

The FWI System really constitutes the "spine" of the CFFDRS. The six standard components of the FWI System provide relative numerical ratings of wildland fire potential for a standard fuel type on level terrain based on four weather inputs. These are defined in Figure 1d.

The first three components are fuel moisture codes that follow daily changes in the moisture contents of three classes of forest fuel with different drying rates (Table 1). For each, there are two phases – one for wetting by rain and one for drying – arranged so that the higher values represent lower moisture contents and hence greater flammability. The Fine Fuel Moisture Code has a maximum value of 101, but the other two codes are "open ended," although significant differences in fire potential eventually become inconsequential.

The final three components are fire behavior indexes, representing rate of spread, amount of available fuel, and fire intensity; their values increase as fire weather severity worsens (all three indexes are also "open ended," but there are practical limits). The system is dependent on weather only and does not consider differences in ignition risk, fuel types or topography. It provides a uniform method of rating fire danger.

Calculation of the FWI System components can be accomplished with the use of manual tables or by a computer program. Because calculation of the components depends solely on weather readings, they can just as easily be calculated from forecast weather to yield a fire danger forecast.

Each component of the FWI System conveys direct information about certain aspects of wildland fire potential. Because the FWI System is dependent solely on weather, the actual fire behavior can in turn be expected to vary from one fuel type to another at the same code or index value. Thus, the following "quick and dirty" guidelines, recently formulated for inclusion in the 2001-2002 edition of the "Handy-Dandy" Alaska Fire Suppression Field Handbook, are *general* interpretations based on fire research information and operational experience with the system over many years in conifer stands in the boreal forest.

- **Fine Fuel Moisture Code (FFMC):** There is little chance of ignition, and surface fire spread with an open flame is unlikely at 74 or less. Continuous surface fire spread begins to occur when 80 is exceeded. Spot fire ignition potential approaches certainty at 90, and the onset of extreme fire behavior generally occurs at 92, depending on the wind and BUI level.
- **Duff Moisture Code (DMC):** The duff layer doesn't generally become involved in the combustion process until about 20 is reached, which coincidentally represents the threshold for lighting fire ignitions. At 40, the influence of the duff layer on surface fire behavior noticeably increases. The onset of extreme fire behavior often occurs at 60, depending on the wind and FFMC. Very little decrease in duff moisture content occurs when a level of around 150 is attained.
- **Drought Code (DC):** The potential for significant ground or sub-surface fire activity is relatively minimal at levels less than 300. However, the tendency for persistent smouldering increases as values of around 500 are approached in which case mop-up and extinguishment gradually becomes increasingly more difficult as the DC continues to rise.
- **Initial Spread Index (ISI):** Fires tend to spread on the ground surface until values of about 10 are exceeded at which time the onset of crowning can be expected, especially in the spring, in fuel types that will support crown fires. Extreme fire behavior is generally associated with values in excess of 20, depending on the BUI. Severe fires or major conflagrations occur when 70 is approached, a level of fire danger severity that is rarely exceeded.
- **Buildup Index (BUI):** Low-intensity surface fires are commonly associated with values less than 30. A fire's behavior or vigor noticeably increases once the BUI climbs above this level as the additional fuel for combustion becomes available. A BUI of 60-80 is commonly viewed as the transition threshold for extreme fire behavior, although this does depend on the ISI. A value of 90 is regarded as representing severe fire behavior potential.
- **Fire Weather Index (FWI):** An FWI of 3 constitutes a threshold for sustained flaming combustion and fire growth. The onset of crowning and other characteristics associated with extreme fire behavior occur at values of 25-30. Most wildfire disasters have occurred when the FWI exceeds 50.

More specific interpretations of potential fire behavior should be sought through the use of the FBP System and other CFFDRS based guides (e.g., Lawson and Dalrymple 1996; Lawson et al. 1997).

In contrast to the FWI System, the FBP System provides for actual quantitative estimates of various fire behavior parameters for 16 distinct fuel types (Table 2) and topographic situations based in part on inputs from the FWI System (principally the ISI and BUI). For example, head fire rate of spread is outputted in metres/minute or chains/hour. For further information, fire personnel are encouraged to consult the FBP System "Red Book" field guide (Taylor et al. 1997).

As an aid to fostering a greater appreciation of the CFFDRS amongst Alaskan fire managers, readers are reminded that a head fire intensity class graph and interpretive table for FBP System Fuel Type C-2 (Boreal Spruce) has been produced (Alexander and Cole 1995), and a color wall poster version also made available (Cole and Alexander 1995).

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Key Element #4

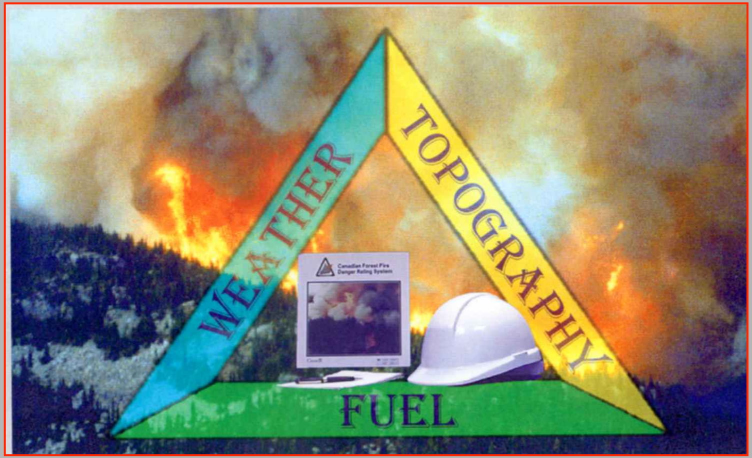
Cooperation between fire management agencies and with research agencies to foster communication, to share resources, and to set common standards for information, resources, and training (policies, cost-sharing agreements, national training courses, working groups).

Advanced Wildland Fire Behavior Course

- Delivered regionally (West, East + French)

Wildland Fire Behavior Specialist Course

- Delivered Nationally

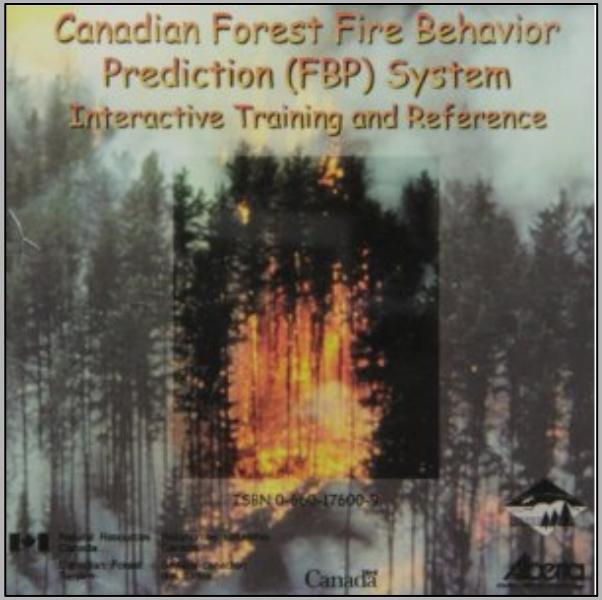


Course dates & locations Advertised on Canadian Interagency Forest Fire Centre web site: www.ciffc.ca

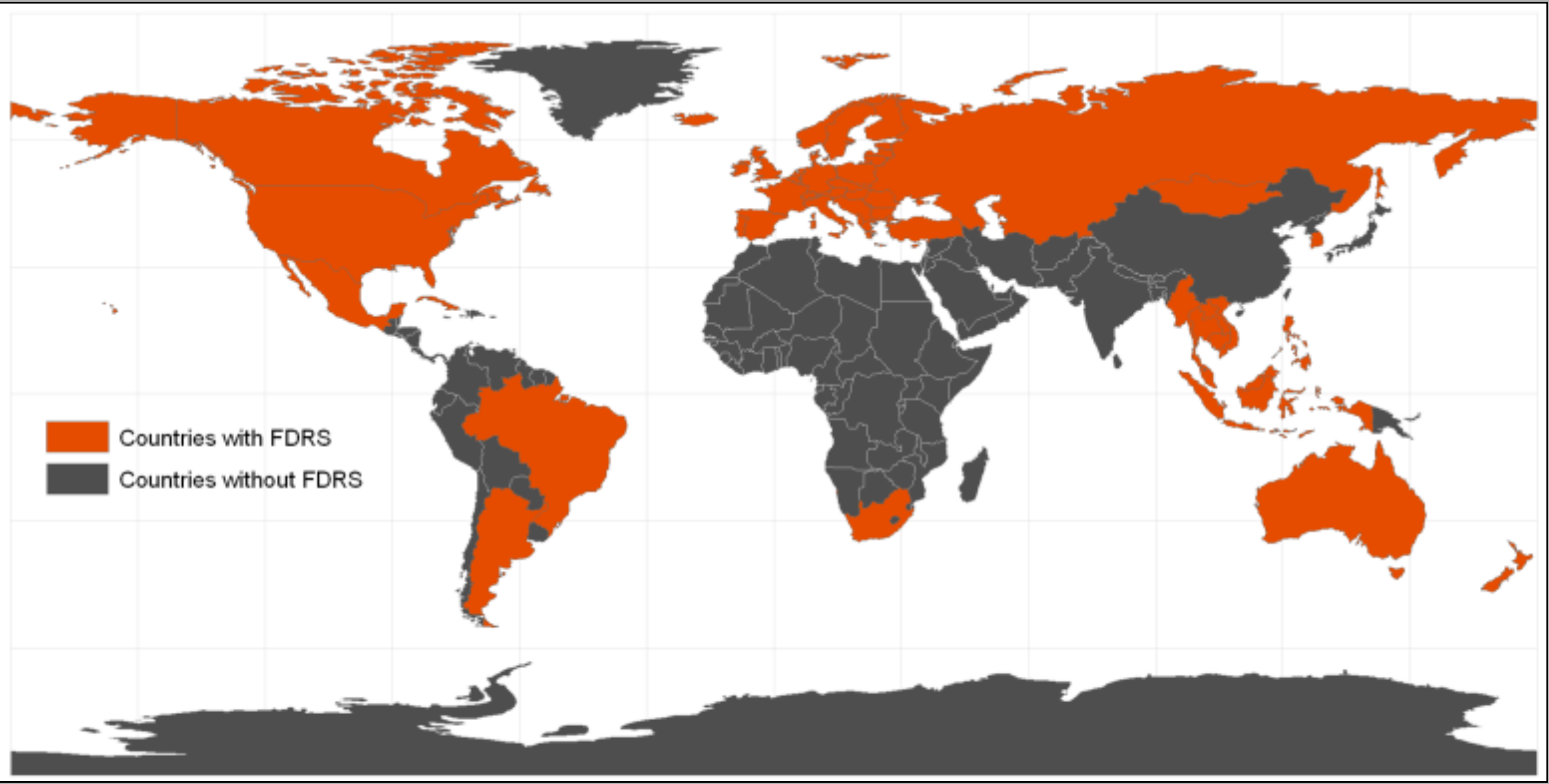
The Alaskan Situation

- Mar. 1996 – Anchorage – AK DOF/CFS CFFDRS Workshop
- Oct. 1996 – Fairbanks – CIFFC Advanced Wildland Fire Behavior Course (AWFBC)
- Alaskans attend AWFBC deliveries in Hinton, Alberta, etc.
- Alaskans attend CIFFC Wildland Fire Behavior Specialist Course in Hinton, Alberta
- CFFDRS content delivered in S-290 and S-390 courses by Frank Cole

CD-ROM based training Courses being converted to web-based training courses by CIFFC



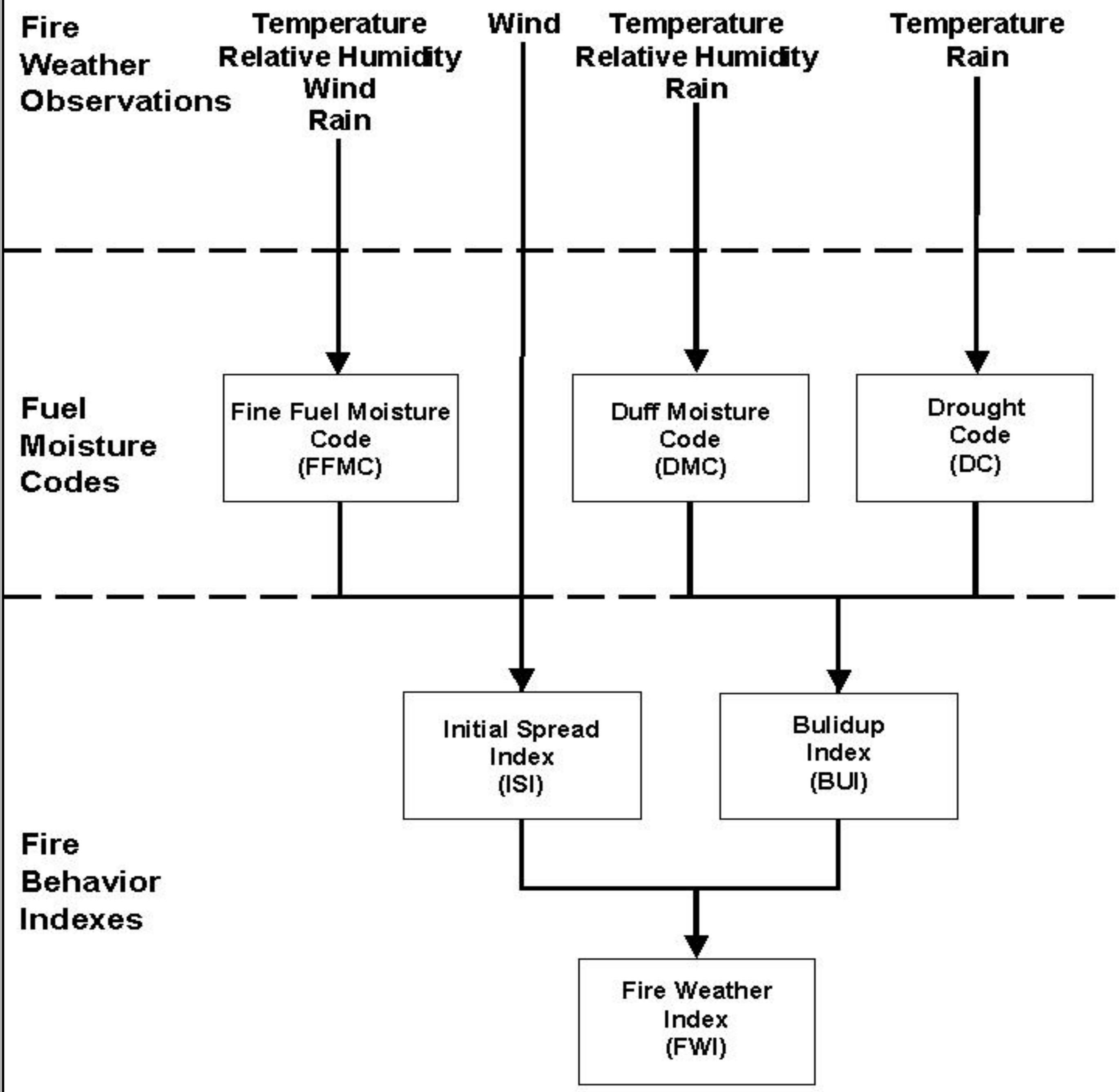
Status of wildland fire danger rating systems globally in late 2010 according to the Global Fire Monitoring Centre



The Canadian Forest Fire Danger Rating System (CFFDRS)

consists of two major subsystems or modules

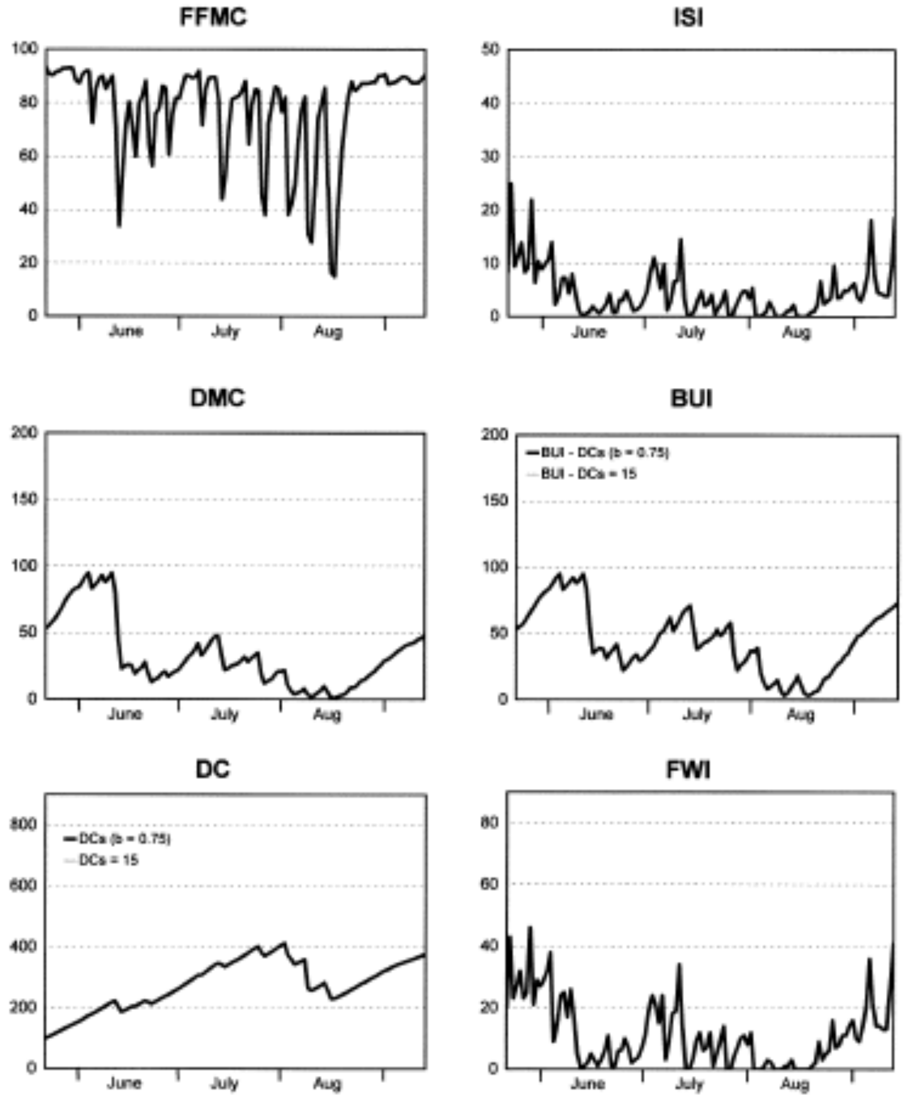
Structure of the Canadian Forest Fire Weather Index (FWI) System



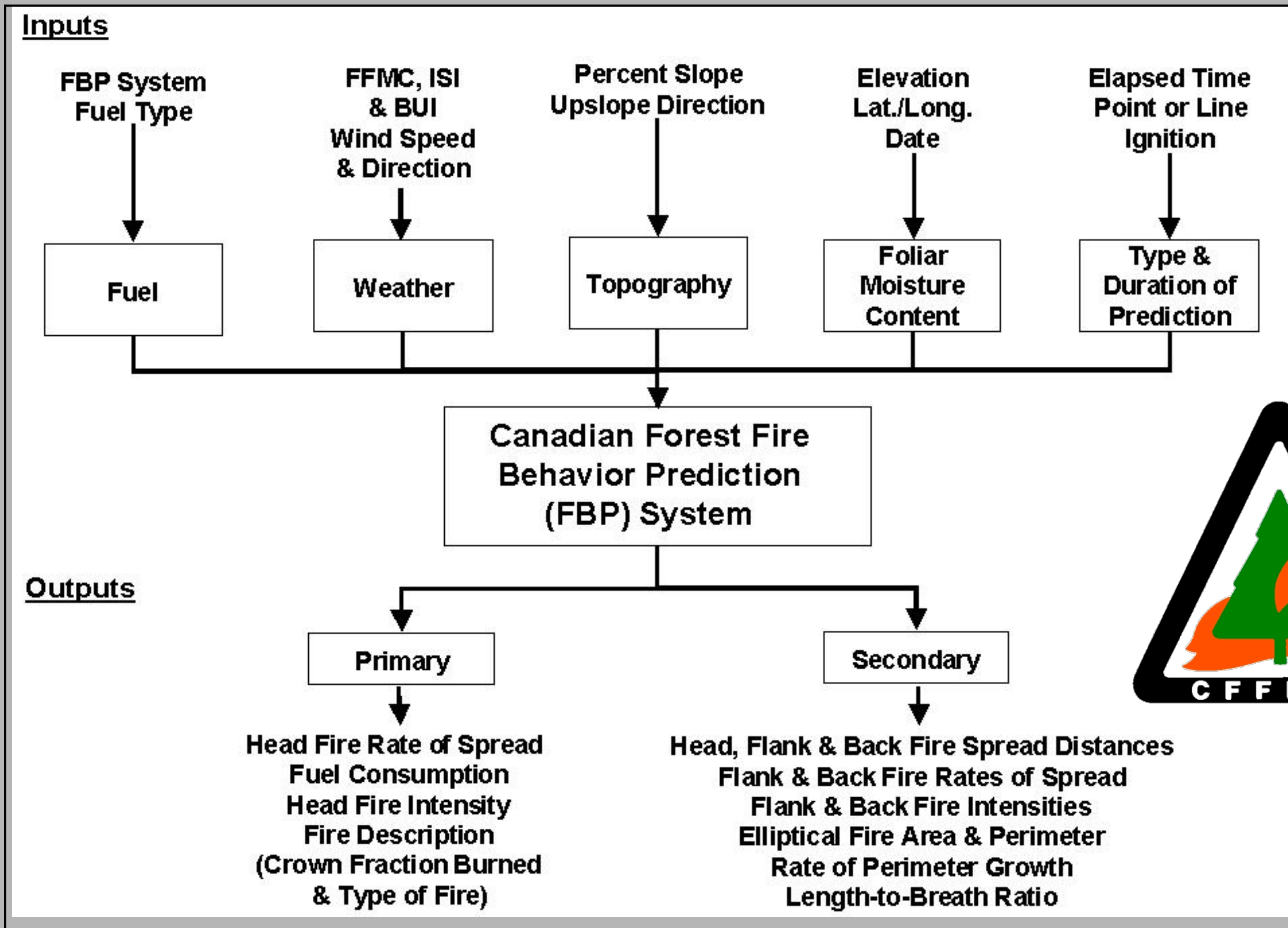
CFFDRS

FWI System Components

Fairbanks, Alaska 1963

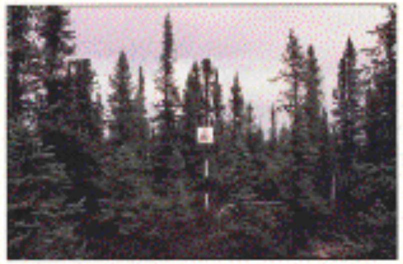


Structure of the Canadian Forest Fire Behavior Prediction (FBP) System



FBP System Fuel Types


C-1


C-2


M-1


M-2


C-3


C-4


M-3


M-4


C-5


C-6


S-1


S-2


C-7


D-1

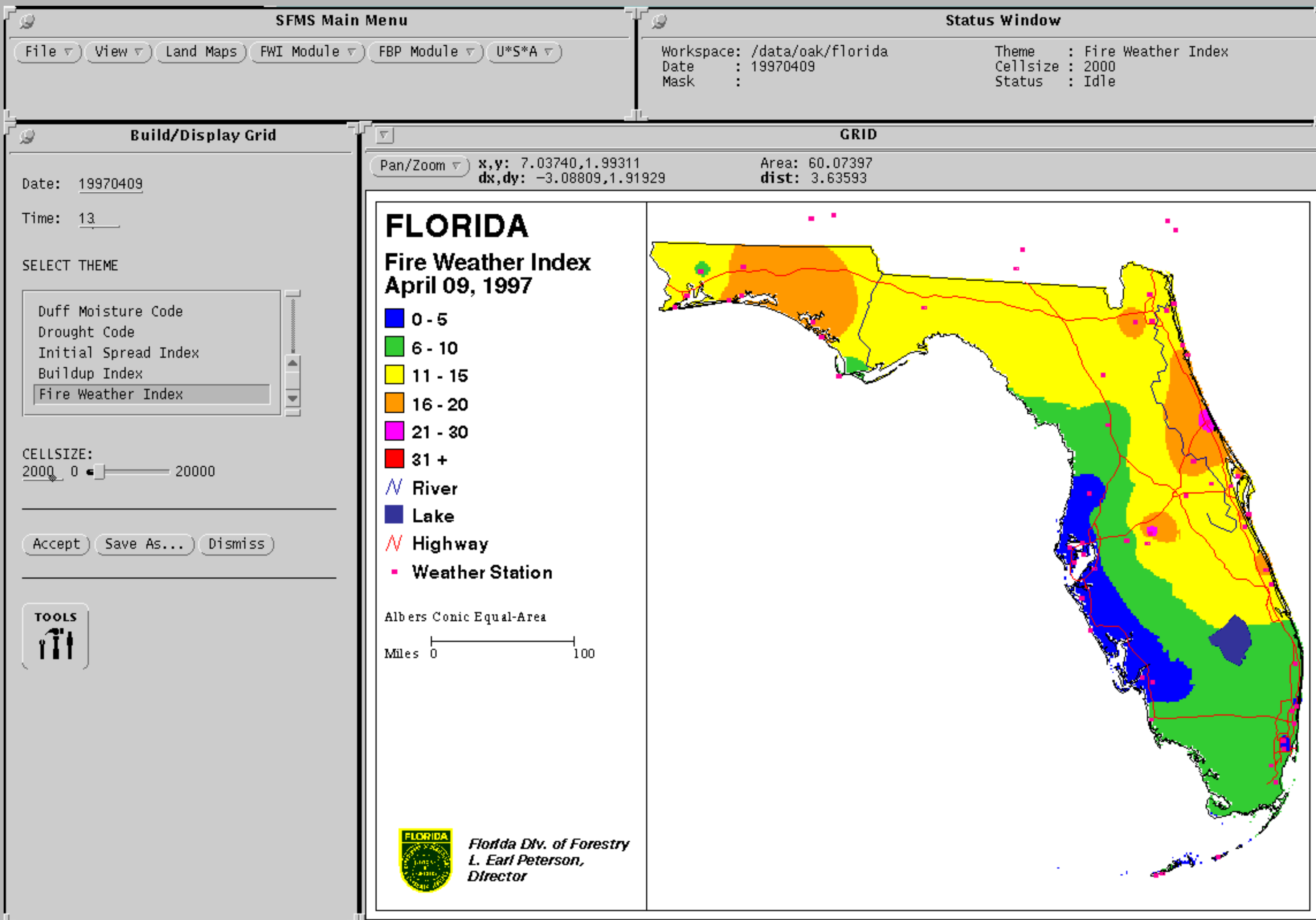

S-3


O-1

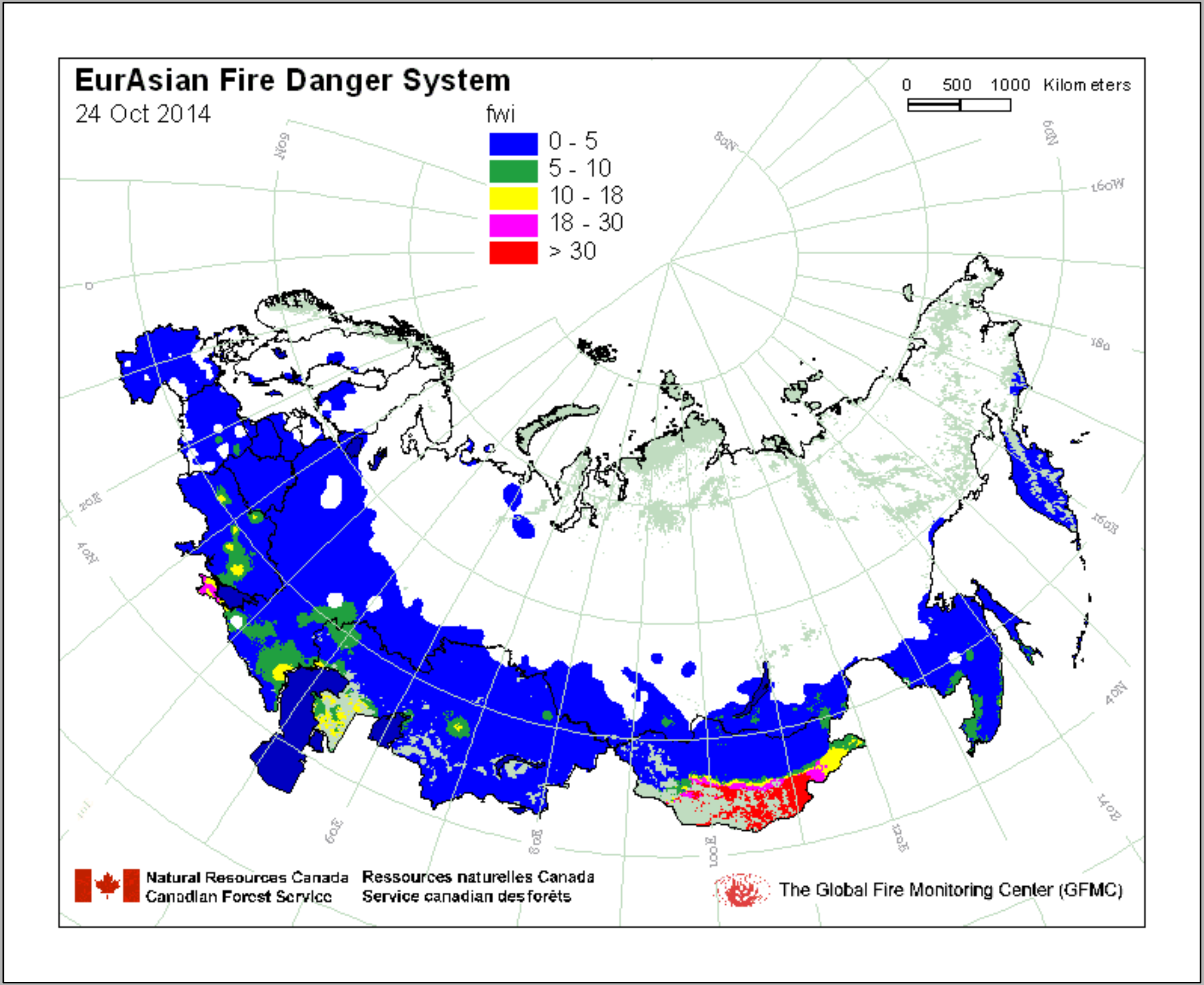
Overseas Use of the Canadian Forest Fire Weather Index (FWI) System at one time or another:

- Argentina
- Australia
- Chile
- China
- Cyprus
- Fiji
- France
- Indonesia
- Malaysia
- Mexico
- New Caledonia
- New Zealand
- Portugal
- Samoa
- South Africa
- Spain
- Sweden
- Thailand
- United Kingdom
- USA
- Venezuela
- Vietnam

Florida has since dispensed with using the FWI System



Several regional implementations of the FWI Systems exist



http://glffc.utah.edu/

Great Lakes Fire and Fuels

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U of Utah Dept. of Atmospheric Sciences

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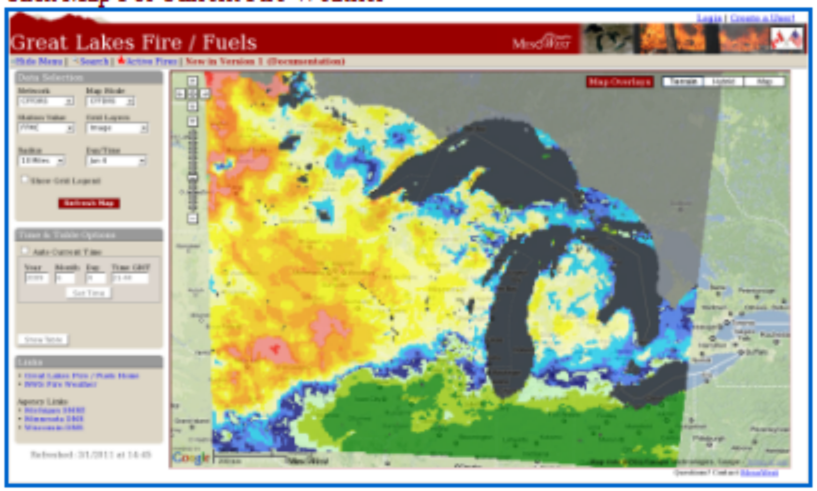
Michigan DNR

Contact MI DNR

Great Lakes Surface Weather and Fire Indices

Click Map For Current Fire Weather



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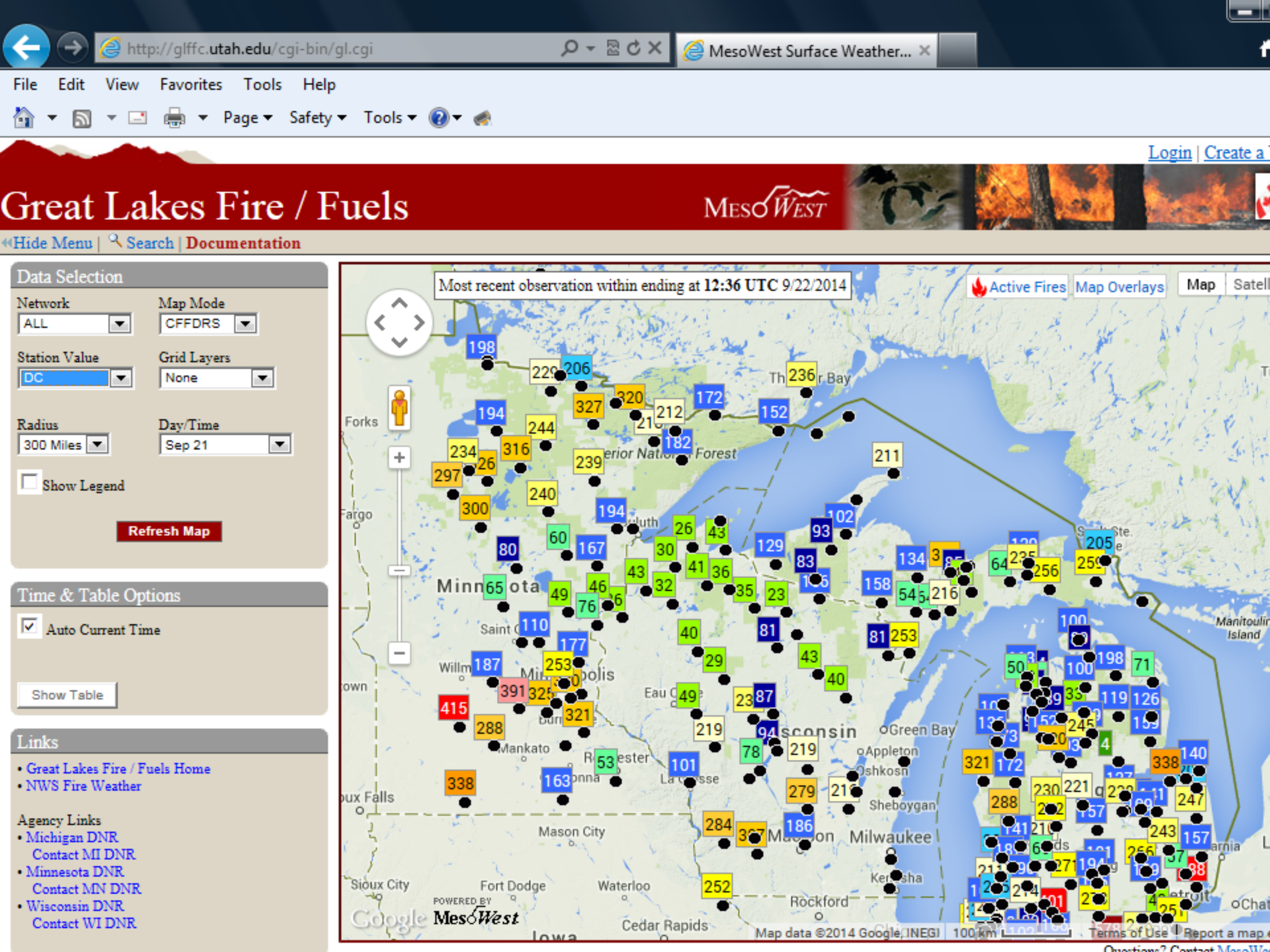
Technical Guide 11-1: Working With the Great Lakes Fire and Fuels Information System Tools in Lake States Fire Management

Click here to read what's new in Version 1

Tabular Fire Weather Products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Minnesota DNR
Contact MN DNR
Wisconsin DNR
Contact WI DNR
Most recent observation within ending at 12:36 UTC 9/22/2014
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Map Overlays
Map
Minnesota
Wisconsin
Fargo
Duluth
Minneapolis
Mankato
Rochester
Eau Claire
La Crosse
Mason City
Green Bay
Appleton
Oshkosh
Sheboygan
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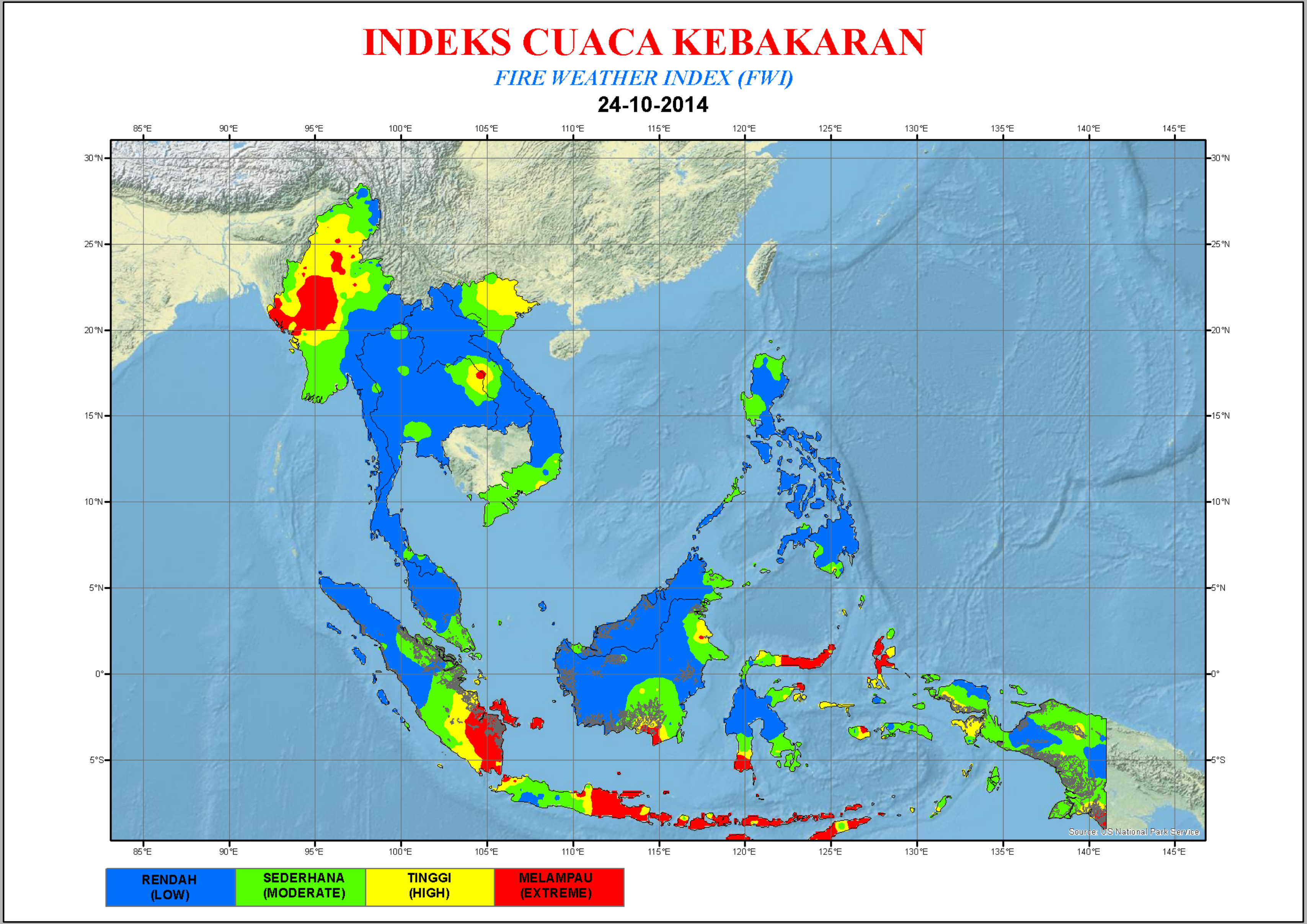
Southeast Asia Fire Danger Rating System



European Commission
Joint Research Centre
Institute for Environment and Sustainability

European Forest Fire Information System

Wednesday 17th of August 2011

☑ Fire Danger Forecast 2011

Source: DWD (36 km resolution)

Indice: Fire Weather Index (FWI)

17-8-2011 ◂ Day ▸

Aug : 17 18 19 20 21 22 23

☐ Daily Modis

Wednesday 17th of August 2011

☐ Hot Spots (Last Update: 17/08 : 18:08)

Latest | Last 7 Days | Last 90 Days

☐ Burnt Areas (Last Update: 17/08 : 18:08)

Last 7 Days | Last 30 Days | All season

Burnt Area Disclaimer!

Burnt Area Locator

Country: ...Select...

Province: ...Select...

Last Update: 2011-08-16
Start Date: 2011-08-14
Location: **Not Available**
Province : Not Available(FYROM)
Size of Burnt Area: 128 (ha)

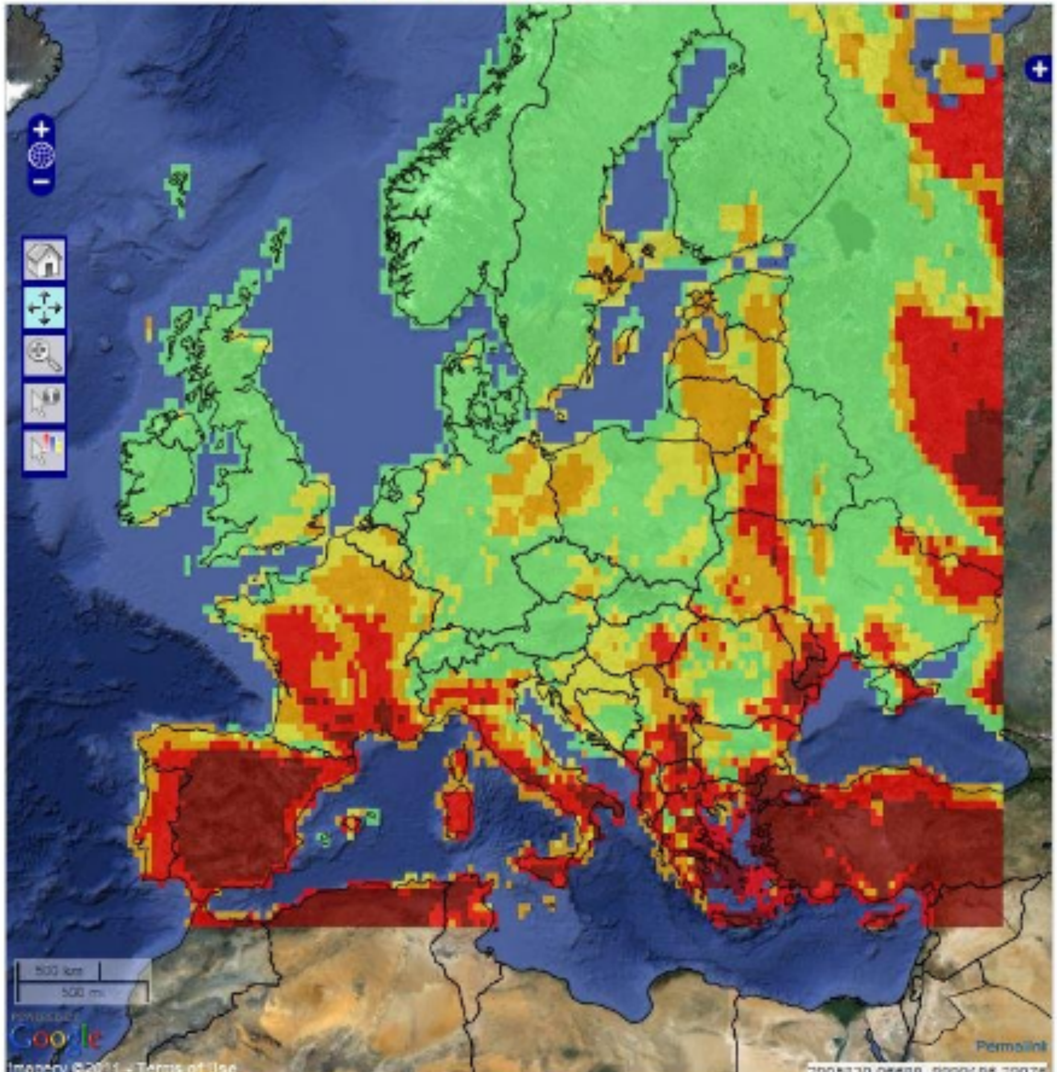
Last Update: 2011-08-16
Start Date: 2011-08-12
Location: **Ourense**
Province : Ourense(Spain)
Size of Burnt Area: 166 (ha)

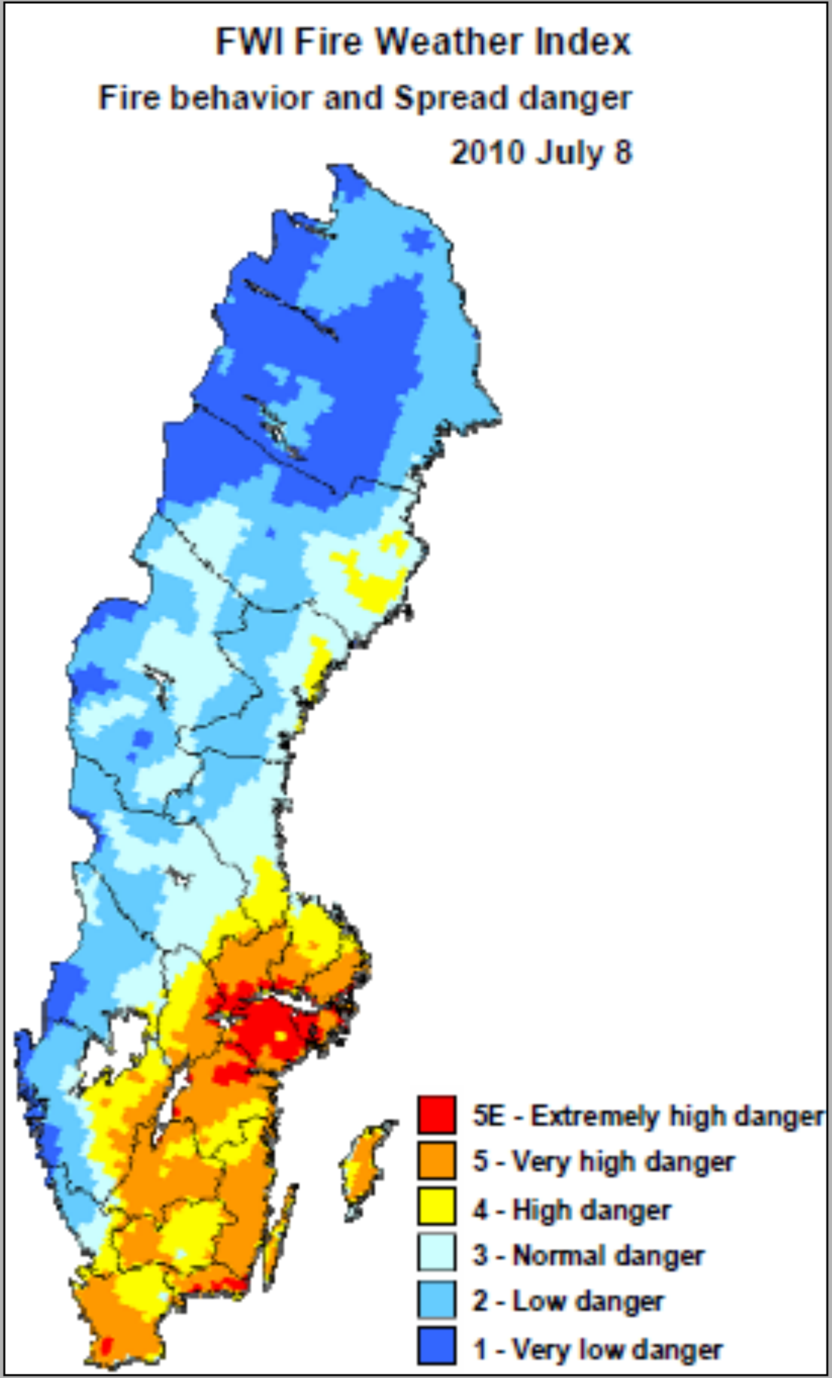
Fire Danger Forecast
- Very Low
- Low
- Moderate
- High
- Very High

layer information

◂ increase map

EFFIS - Current Situation





Sweden

Fire Danger Class	Fire Weather Index
1 – Very Low	<1
2 - Low	1-6
3 - Normal	7 -16
4 - High	17-21
5 – Very High	22-27
5E – Extremely High	>28

GOFC-GOLD GLOBAL OBSERVATION OF FOREST AND LAND COVER DYNAMICS

ISDR International Strategy for Disaster Reduction

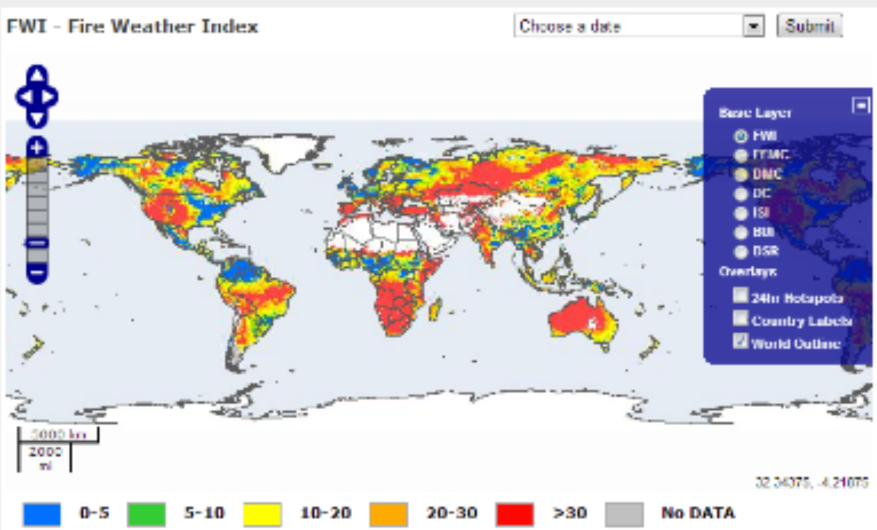
GlobalEWS

A GLOBAL EARLY WARNING SYSTEM FOR WILDLAND FIRES

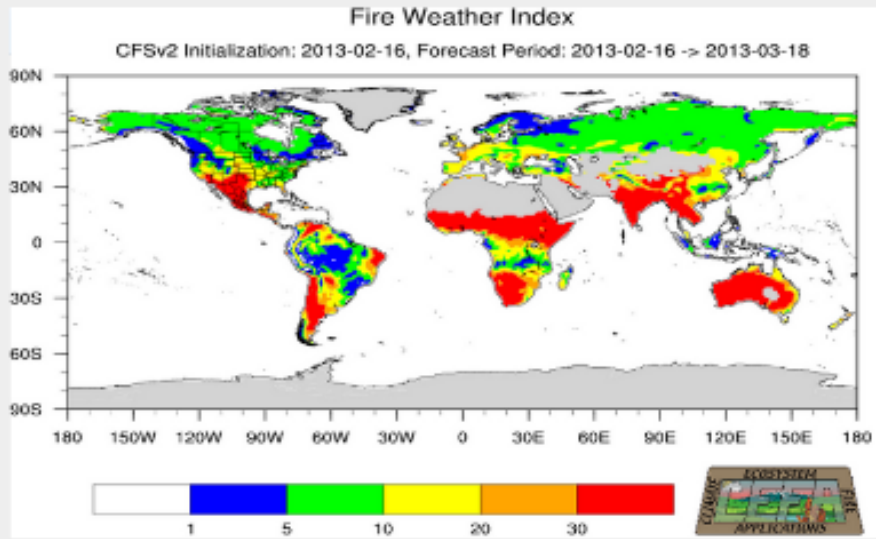
Global Fire and Early Warning

Mapping Products

Global Early Warning System 7-day Interactive Forecast
(for access click on map)



Global FWI Monthly Forecast
(for access click on map)



http://www.scionresearch.com/research/forest-science/rural-

Scion :: Rural Fire Research

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RURAL FIRE RESEARCH

Rural Fire Research

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Scion's Rural Fire Research Group is New Zealand's only provider of specialist fire research expertise in rural and forest landscapes.

...he science and technology needed to ...d property, and to manage fire in the ...nderstanding how fires are likely to ...ferent weather conditions, terrain and fuel ...e factors affecting public and firefighter ...ential to fire management and prevention.

...t 17 years Scion has developed a range ...guidelines now widely used by fire ...making effective decisions regarding firefighter and community safety.

...k closely with bushfire researchers at CSIRO in Australia to provide world-class ...e management agencies.

RELATED LINKS

Rural Fire Research Publications

KEY CONTACTS

Grant Pearce

Senior Fire Scientist

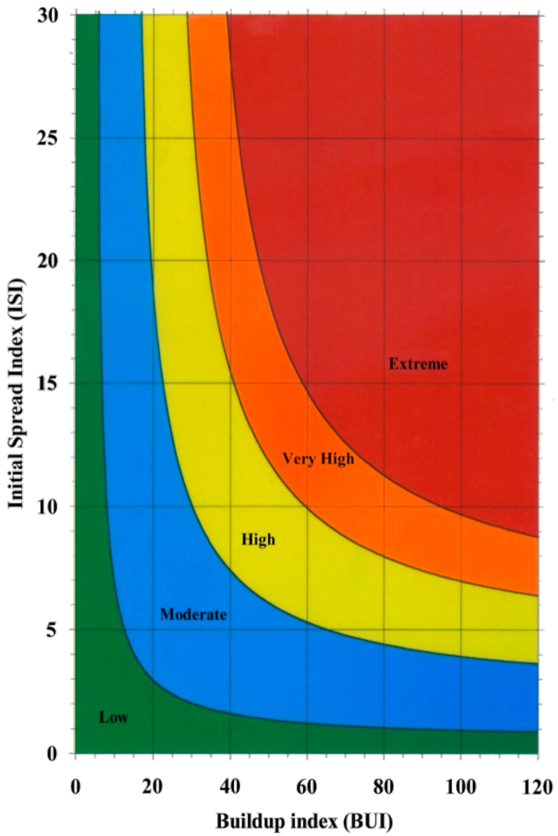
Grant Pearce

New Zealand
Forest Research Institute

New Zealand Fire Danger Classes

National Rural Fire Authority

Forest Fire Danger Class Graph



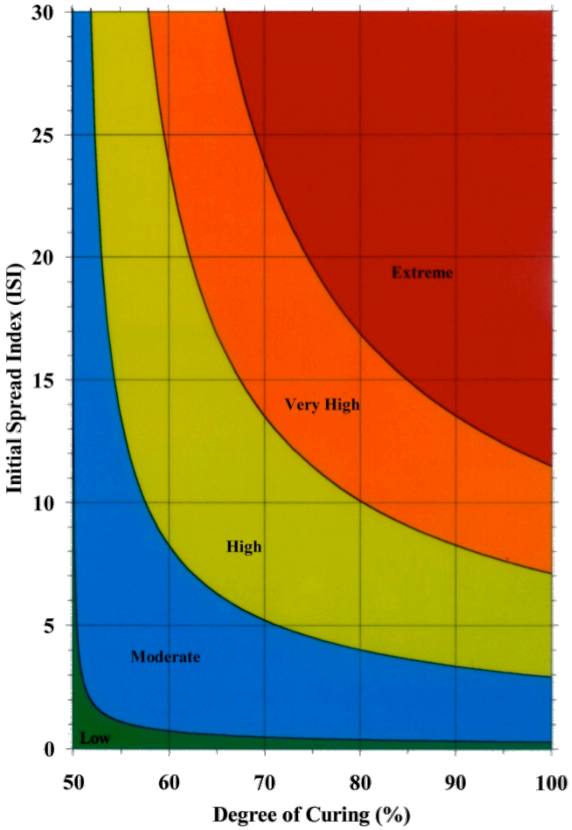
Fire Danger Class Interpretation

Fire Danger Class	Description of Probable Fire Potential and Implications for Fire Suppression	Nominal Max Flame Height
LOW	New fire starts are unlikely due to moist surface fuel conditions. However, Igition may take place near large and prolnged heat sources (e.g., camp fires, windrowed slash piles) but the resulting fires generally do not spread much beyond their point of origin and if they do, control is easily achieved. Mop-up or complete extingush-ment of fires tthat are already burning may still be required provided there is sufficient fuel and it's dry enough to support smouldering combustion.	no visible flame
MODERATE	From the standpoint of moisture contnet, fuels are considered to be sufficiently receptive, to sustain ignition and combustion from both flaming and non-flaming (e.g., glowing) firebrands. Creeping or gentle surface fires are common place. Control of such fires is comparatively easy but fire damage can still result and fires can become costly to suppress if they aren't attended to immediately. Direst manual attack around the entire perimeter by fire fighters with only hand tools and backpumps if possible.	Up to 1.3 meters
HIGH	Running or vigorous surface fires are most likely to occur. Any fire outbreak constitutes a serious problem. Control becomes incrasingly difficult it it is not completed during the early stages of fire growth following ignition. Water under high pressure (from ground tankers or fire pumpers with hose lays) and bulldozers are required for effective action at the fire's head.	1.4 to 2.5 meters
VERY HIGH	Burning conditions become critical as the likelihood of intense surface fires is a distinct possibility, torching and intermittent crowning in exotic forests can take place.Direct attact on the head of the fire is feasible for only the first few minutes after ignition has occurred, Otherwyse, any attempt to attack the fire's head should be limited to helicopter buckets or fixed wing aircraft preferably dropping long term chemical fire retardants. Until the fire weather severity abates, the uncertainty of success control exists.	2.6 to 3.5 meters
EXTREME	The situation should be considered "explosive" The characteristics associated with the violent physical behaviour of conflagration or firestomes is a certainty (e.g., rapid spreaad rates, crowning, medium to long range mass apotting, firewhirls, towering convection columns and great walls of flame). Fire poses a great threat to life and property. Breaching of roads or firebreaks occurs with regularity. Direct attack is rarely possible execpt immediately after ignition and should only be attempted with the utmost caution. The only effective and safe control option that can be taken until the fire run expires is at the back and up along the flanks	3.6 + meters

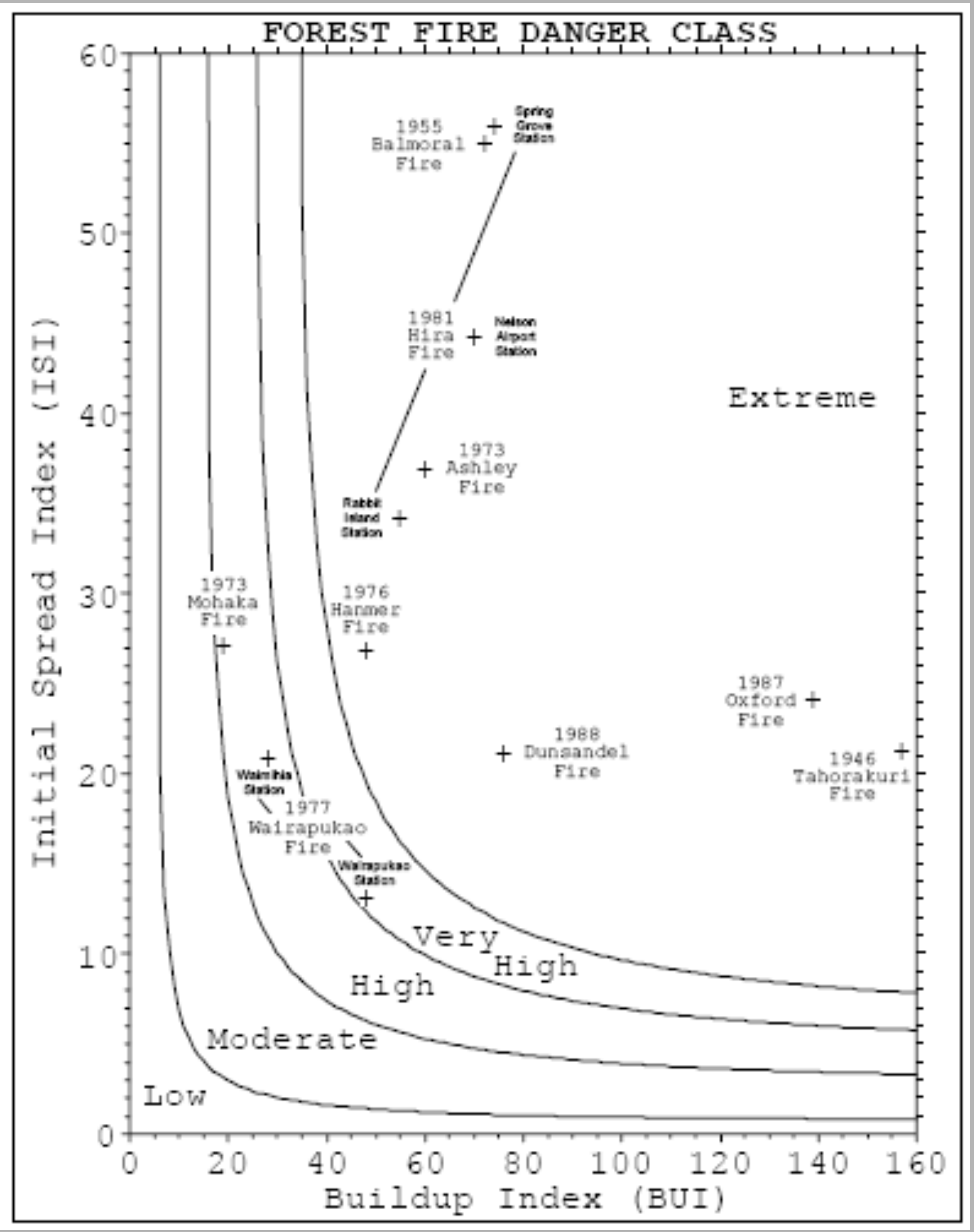
1 General rule of thumb when the Drought Code (DC) exceeds about 300 and/or the Buildup Index (BUI) is greater than around 40, these benchmark values will vary according to soil type and drainage conditions.

2 The forest and grass fire danger rating systems are based on the Canadian Forest Fire Behaviour prediction System Coniferous Plantation fuel type (C-6) and the Standing Dead Grass fuel type (O1-b) respectively. Details of these can be found in the "Development and Structure of the Canadian Forest Fire Behaviour Prediction System" by the Canadian Fire Danger Group (1992), and the NRFA Circular 1993/13, titled "Proposed revision of fire danger class criteria for firest and rural areas in New Zealand" by Marty Alexander (1993).

Grassland Fire Danger Class Graph



Evaluating Fire Danger Ratings



Major Exotic Pine Plantation Wildfires, New Zealand, 1946-1988

A MANUAL FOR
PREDICTING FIRE BEHAVIOUR
IN NEW ZEALAND FUELS

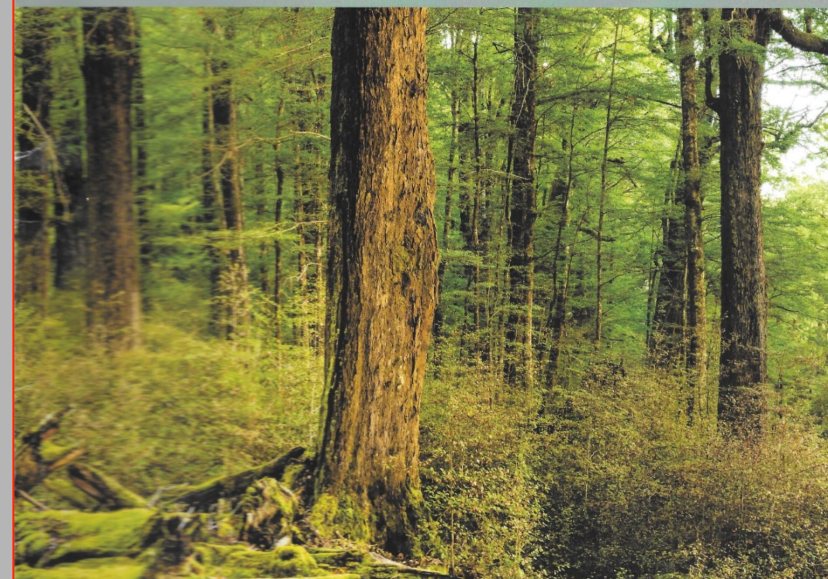
Scion Rural Fire Research Group,
Christchurch, New Zealand.

SCION
Next generation biomaterials

Guide to New Zealand Fuels

V.R. Clifford, H.G. Pearce & S.A.J. Anderson

A technical guide for selecting the most appropriate fuel type for Fire Behaviour Predictions



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Alexander (2003) *Fire Management Today* Essay

Technology Transfer and Wildland Fire Management/Research

Martin E. Alexander

I would like to see fire scientists and fire managers work much closer together… I see too many examples of researchers and managers pulling against each other, rather than working together. I regard the scientists as our motivators for change while the managers are implementers of change. Successful change will not be achieved unless it is managed properly, this is, presented in a positive and cooperative climate so that it is rapidly incorporated into the daily business of ecosystem management and community protection.

–Underwood (1995)

In 2001, I participated in a survey commissioned by the Canadian Interagency Forest Fire Centre's Forest Fire Science and Technology Working Group (MacKendrick 2001). The survey dealt with how fire managers and fire researchers could more effectively work together in the future.

Wealth of Information

There is a wealth of general information on the interaction between management (operations) and research. I recall attending an excellent session on "Management vs. Research" during the Seventh Conference on Fire and Forest Meteorology, which was jointly sponsored by the American Meteorological Society and the Society of American Foresters on April 25–28, 1983, in Fort Collins, CO. Unfortunately, the 10 papers presented at that conference session were not published as part of the conference proceedings.

There are a couple of excellent older documents that specifically relate to wildland fire (e.g., Underwood 1985; USDA Forest Service 1984). More recently, the subject was discussed during the Wildland Fire Research Future Search Conference on October 6–8, 1997, in Park City, UT (Saveland and Thomas 1998). I also had the opportunity to attend this conference.

Useful Reference

One of the more general but highly useful references I have found on the subject, discovered during the course of preparing a paper by Kiil and others (1986), includes recommendations resulting from the conference on "Technology Transfer in Forestry" held by the International Union of Forestry Research Organizations on 25 July–1 August, 1983, at Edinburgh University, Scotland (Moeller and Seal 1984). The recommendations are reprinted in their entirety on page 42 for the benefit of readers.

References

Kiil, A.D.; Quintilio, D.; Alexander, M.E. 1986. Adaptation of a national system of fire danger rating in Alberta, Canada: A case study in technology transfer. In: Proceedings of the 18th IUFRO World Congress; 7–21 September 1986; Ljubljana, Yugoslavia. Division 6: General Subjects. Vienna, Austria: International Union of Forestry Research Organizations: 410–421.

MacKendrick, N. 2001. Improving opportunities for knowledge exchange and collaboration between researchers and practitioners in fire science and technology. Final report submitted to the Canadian Interagency Forest Fire Centre, Fire Science and Technology Working Group, Winnipeg, MB.

Moeller, C.H.; Seal, D.T., eds. 1984. Proceedings of a Meeting of the International Union of Forestry Research Organizations: Technology Transfer in Forestry; 25 July–1 August, 1983; Edinburgh, Scotland. Subject Group S6.08: Applying the Results of Forestry Research. Bull. No. 61. London, England: Forestry Commission.

Saveland, J.; Thomas, D., tech. coords. 1998. Wildland Fire Research: Future Search Conference Notes; 6–8 October 1997; Park City, UT. Proc. RMRS–P–1. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station.

Underwood, R.J. 1985. Research for forest fire operations in Australia. In: Landsberg, J.J.; Parsons, W., eds., Research for forest management. Canberra, ACT: CSIRO Division of Forest Research: 269–282.

Underwood, R.J. 1995. Opening remarks. In: McCaw, W.L.; Burrows, N.D.; Friend, G.R.; Gill, A.M., eds. Landscape Fires '93: Proceedings of an Australian Bushfire Conference; 1993 September 27–29; Perth, WA. CALMScience Suppl. 4. Perth, WA: Western Australian Department of Conservation and Land Management: v–vii.

USDA Forest Service. 1984. User Needs/Research Planning Workshop: Fire Research To Meet User Needs—Immediate to Long Term; 17–19 April 1984; Missoula, MT. Washington, DC: USDA Forest Service, Forest Fire and Atmospheric Sciences Research. ■

Dr. Marty Alexander is a senior fire behavior research officer with the Canadian Forest Service at the Northern Forestry Centre, Edmonton, Alberta.

Technology Transfer in Forestry: Recommendations*

The final session of the conference on "Technology Transfer in Forestry" was used to assemble and record recommendations. Recommendations for forest managers, the users of research results, were distinguished from those intended for the researchers themselves. Both kinds of recommendations are set forth below.

There was some difference of opinion among conference participants as to the relative importance of the recommendations, and it was acknowledged that different or changing circumstances must change the order of value. Nevertheless, the degree of agreement was remarkable, considering the range of countries and experience represented by the conference participants. All points below deserve the most careful attention.

What can users of research and their organizations do to improve technology transfer?

Users must be actively involved in the early stages of research planning. They should:

- Identify and prioritize their research needs; and
- Make sure researchers understand these needs.

Users must create an organizational environment that encourages innovation. They should:

- Establish a person responsible for user liaison to research;
- Involve researchers in management teams;
- Encourage interaction and cooperation between researchers and managers;
- Provide managers with technology transfer training;
- Allocate staff time to attend meetings, demonstrations, workshops, etc.;
- Set up an administrative structure to ensure technology transfer;
- Monitor technology in primary and related fields;
- Be open to new ideas;
- Reward people who innovate;
- Establish a technology transfer advisor in a senior staff position;
- Interchange staff with research whenever possible; and
- Form user cooperatives to encourage innovation.

Users must be involved in research application and evaluation activities. They should:

- Help fund application efforts;
- Test and demonstrate innovations and inform research about results;
- Make a solid commitment to trying new technology; and
- Conduct benefit/cost and cost-effectiveness studies.

What can researchers and their organizations do to improve technology transfer?

Research must involve users in early stages of research planning:

- To help identify problems and set priorities;
- To establish reasonable expectations and commitments; and
- To understand the user market.

Researchers must create an organizational environment that encourages innovation. They should:

- Encourage direct contacts between researchers and users;
- Keep users informed and involved throughout the research process;
- Attend management meetings;
- Encourage staff exchanges between research and management;
- Train researchers in technology transfer and communication techniques;
- Commit adequate resources to technology transfer;
- Recognize and reward scientists for application work;
- Establish an organizational focal point for technology transfer;
- Take initiative to motivate managers; and
- Recognize technology transfer as a continuing commitment.

Researchers must be involved in application and evaluation activities. They should:

- Whenever possible, quantify the benefits of research;
- Concentrate on the most beneficial results;
- Involve users in application efforts;
- Understand the capability of users to implement research results;
- Provide state-of-the-art summaries;
- Use the most appropriate means of transferring results through demonstration and personal contacts, whenever possible; and
- Ask for and utilize evaluation feedback from users.

* From Moeller and Seal (1984) (see page 41).

A Caution

FIRE DANGER RATING PARADOX

(after Rothermel 1987)

- The systems aren't accurate enough.
- The systems are too complicated.

Presumably, crude but reliable decision aids are needed at the field level.