



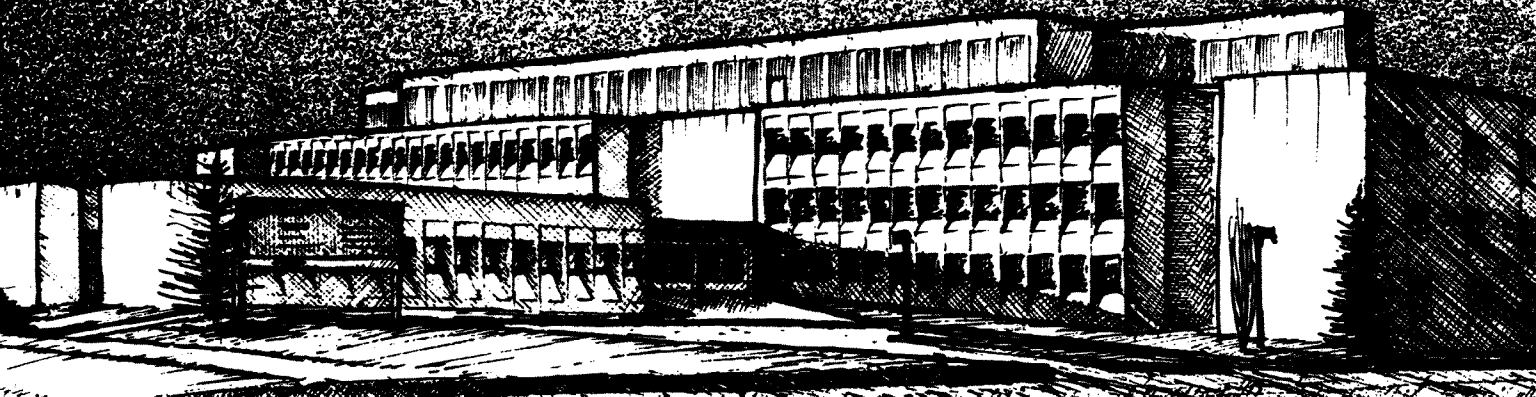
Forestry  
Canada

Forêts  
Canada

Canada

**S T U D Y   W O R K   P L A N S**  
**1   9   8   9   -   9   0**

**N O R T H W E S T   R E G I O N**  
**N O R T H E R N   F O R E S T R Y   C E N T R E**  
**5 3 2 0 - 1 2 2   S t r e e t**  
**E D M O N T O N ,   A L B E R T A**



STUDY WORK PLANS

1989-90

NORTHERN FORESTRY CENTRE

FORESTRY CANADA

5320 - 122 STREET

EDMONTON, ALBERTA

T6H 3S5

MARCH 1989



development agreements in Manitoba, Saskatchewan, Alberta and NWT.

3. Prepare Alberta agreement report on the Secondary wood-using industry in Alberta.
4. Develop terms of reference and act as scientific authority for a small study of marketing opportunities for wood products from Saskatchewan's Cypress Hills Provincial Park.

Economics Research, Reports and Publications

5. Provide regional input to the Forestry Canada national study on Canada's timber supply.
6. Develop economic and fire effects models required for fire damage appraisal. Complete Elan fire study.

Reviews, Comments, Briefings

7. Continue to provide reviews/comments on journal articles, Forestry Canada reports, proposals, and briefings.

Added Goals:

8. Develop terms of reference, evaluate proposals, organize facilities, and manage a contract for an independent consultant to prepare for and provide a 3 day seminar on forest products and the forest industry in the prairie region. Also, undertake a post course assessment.
9. Administer and manage a contract to develop a micro-computer based data-base management system for fire damage appraisal purposes.
10. Serve as the federal project officer for two Canada-Alberta Forest Resource Development Agreement (FRDA) projects.
11. Review, in detail, the report: Manitoba's forest industry - 1985 for converting to Information Report status.
12. Provide input and advice to the Environment Council of Alberta concerning forest management and development. Information will be used as background for the ultimate development of an Alberta Conservation Strategy.
13. Respond to information requests from the public and client agencies on a wide variety of topics. Maintain a reference library containing various information sources.

10. Accomplishments for 1988-89:Scientific Authority for Contract Resource

1. The final report documenting the results of the study "Commercial timber default values in Manitoba" has not been completed. (Williamson)

Regional Development Analysis, Policy and Planning, Evaluation Documentation

2. A report profiling the current forestry situation in Alberta was prepared. This report will be incorporated into the planning document Forestry Perspectives 88. (Refer to NOR-3-01 goal 5). (Williamson)
3. Two reports were prepared on Alberta's secondary wood-using industry; a technology transfer note and an article recently published in the Forestry Chronicle. (Bohning)
4. Guidelines re: the development of a small marketing study for forest products from Cypress Hills Provincial Park were provided to the Saskatchewan District Office. (Bohning)

Economics Research, Reports and Publications

5. A report entitled "Aggregate timber supply in Alberta: current status and future outlook" was prepared, reviewed, revised, and submitted to the project leader of part 1 of the National Timber Supply Study. (Williamson)
6. The Elan fire damage appraisal case study was completed and a report was forwarded with recommendations to the Saskatchewan Dept. of Parks, Recreation and Culture. (Williamson, Bohning)

Reviews, Comments, Briefings

7. Numerous technical reviews were provided and briefing notes were prepared. (Williamson, Bohning)

Added Accomplishments

8. A successful 3 day seminar on the forest industry was presented by Bowell Management to NoFC personnel. (Bohning)
9. The terms of reference were developed and a contract was let to Silvacom Ltd. Discussion regarding the design and development of the software system have been ongoing. (Williamson)
10. Initial discussions were held to assist in establishing the terms of reference for two Canada-Alberta FDRA projects including a mill residue study by Solutions Management Inc. and a two-year Field Trial study to assess a Chain Flail Delimber and Portable Chipper Operation by FERIC. (Bohning)

11. Final review comments on Manitoba's forest industry - 1985 have been provided to the scientific and technical editing and publishing group. The report will be published this fiscal year as a Forestry Canada Information Report. (Williamson)
12. Information regarding forestry in Alberta was provided to the Public Advisory Committee of the ECA for use in the continuing process to develop a conservation strategy for Alberta. (Williamson)
13. Numerous responses to requests for information from the public, Forestry Canada personnel and client agencies were provided. The Regional Development program reference library was established in cooperation with the NoFC library and maintained. (Bohning)

11. Goals for 1989-90:

Scientific/Project Authority for Contract Research

1. Complete the Canada-Manitoba File report "Commercial timber default values in Manitoba".
2. Evaluate the final software provided from the research contract with Silvacom to develop a computer based Fire Damage Appraisal System (FDAS). Develop a technology transfer strategy including determination of an appropriate publication medium.
3. Continue to provide input to and act as the federal project authority for various Canada-Alberta FRDA projects including a mill residue study by Solutions Management Inc. and a field trial study of a flail delimeter portable chipping system by FERIC.
4. Continue to provide socio-economic and statistical data, analysis and documentation for policy and program development for new forestry development agreements in Manitoba, Saskatchewan, Alberta, and the NWT.
5. Continue to provide assistance to the Public Advisory Committee in developing the Alberta Conservation Strategy.
6. Prepare a publication outlining the procedures and results of the Elan Fire damage appraisal case study.
7. Continue to develop economic and fire effects models required for fire damage appraisal and in particular in support of satisfying the information requirements of the Fire Damage Appraisal System.
8. Continue to provide reviews/comments on articles, CFS reports, proposals, and to prepare briefing notes.
9. Continue to respond to requests for information from the public and to maintain the Regional Development reference library.

12. Present Status of Study:

Each of the three objectives stated in section eight continue to be relevant to the past and proposed activities undertaken within the sphere of study 03-03. Objective one captures those ongoing activities undertaken in support of program development (i.e., Federal-Provincial Agreements). Objective two relates to the provision of regional input into national level analyses such as Forestry Perspectives and the National Timber Supply Project. Objective three applies to activities related to the development of decision aids in wildland fire management. Activities related to this objective include: The Elan Fire damage appraisal study, the Manitoba commercial timber default values study, and the fire economics concept paper.

13. Publications 1988-89:

Heit, M.J.; Bohning, R.A. 1988. Secondary forest products industry in Alberta, 1986. For. Chron. 64 (6):461-463.

Heit, M.J.; Bohning, R.A. 1988. Secondary forest products industry in Alberta, 1986. Can. For. Serv., North. For. Cent., Edmonton, Alberta. Tech. Transfer Note A-004.

Steele, T.W.; Williamson, T.B. 1989. Manitoba's forest industry, 1985. ForCan, North. For. Cent., Edmonton, Alberta. Inf. Rep. NOR-X-304.

Williamson, T.B. 1989. Forestry Perspectives 88. Alberta profile. Draft copy.

Williamson, T.B. 1988. Aggregate timber supply in Alberta: Current status and future outlook. Draft file report submitted as part 1 of the National Timber Supply Study.

Williamson, T.B. 1988. An appraisal of economic damage incurred by the Elan Fire, May 1987. File report submitted to the Sask. Dept. of Parks, Recreation and Culture.

14. Environmental Implications:

The NoFC Environmental Screening Committee has evaluated the proposed study activities. On the basis of information provided by the study leader, the committee concludes that these activities are not potentially detrimental to the environment.

15. Duration:

Started: 1980                      Completion: continuing

16. Resources 1989-90:

PYs:	Prof.:	Williamson	1.0
	Tech.:	Bohning	0.9
	Total:		1.9

Term/Student: 0.3

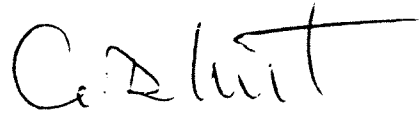
O & M: \$10,000  
Capital:

17. Signatures:

Investigator

Program Director, Development



Regional Director General





ecosystems in the region, and (g) testing and formulating ecologically sound and economically feasible methods for securing adequate postcut forest reproduction by the use of controlled burning and various supplementary treatments including seed-tree systems, direct seeding and planting. The work is of both fundamental and practical nature.

9. Study Objectives:

1. To determine fire spread and intensity for major fuel complexes under various weather combinations.
2. To assess fire effects in terms of fuel reduction and plant succession over a range of burning conditions.
3. To establish guidelines for rational uses of fire in manipulation of various fuel combinations.
4. To assist fire control agencies in application of the resulting guidelines.

10. Goals for 1988-89:

1. Conclude publication of a journal article on "Regressions between weather-based moisture codes and actual moisture contents of mor humus on a clear-cut jack pine site, central Saskatchewan".
2. Conclude publication of a journal article on "Metric roundwood classification and dry-weight regression equations in jack pine stand biomass studies, central Alberta".
3. Conclude publication of an Information Report on "Fire behavior and effects in semimature jack pine stands, central Alberta".
4. Conclude publication of a journal article on "Regressions between weather-based moisture codes and the actual moisture contents of mor humus under diverse forest conditions, central Alberta".
5. Prepare a report on "Microclimatic differences between the open and four diverse forest ecosystems in central Alberta."
6. Prepare a report on "Regressions predicting silvicultural effects of burning on jack pine cutovers".
7. Prepare a report with "Tables for silvicultural burning prescriptions on jack pine cutovers".
8. Remeasure postburn jack pine stand growth on seven 0.04-ha plots within the seed-tree area in central Saskatchewan.
9. Initiate preparation of a report on "Jack pine stand recovery from severe browsing by snowshoe hares in central Saskatchewan".
10. Provide advisory services as required.

Added Goals:

11. Commence preparation of an invited paper on "Postcut burning and black spruce regeneration" for the 1989 IUFRO SI.05.12 Symposium in Gander and Grand Falls, Newfoundland.
12. Plot by computer sets of regressions re. raw humus sorption, desorption, and equilibrium moisture contents over a wide range of temperature and humidity permutations.

11. Accomplishments in 1988-89:

1. The journal article on (new title) "Prediction of forest-floor moisture content on jack pine cutovers" was prepared, revised, and accepted for publication.
2. The journal article on (new title) "Dimensional roundwood classification and forest biomass studies" is nearing completion.
3. Analyses of data and all supporting material for inclusion into an information report on "Fire behavior and effects in semimature jack pine stands, central Alberta" were completed.
4. The journal article on (new title) "Prediction of forest-floor moisture content under diverse stand on site conditions" was prepared and submitted for publication.
5. Sets of regressions were computer-plotted for inclusion into a journal article on (new title) "Predictions of wind speed and available rainfall under diverse stand and site conditions".
6. Sets of regressions were computer-plotted for inclusion into a journal article on (new title) "Prediction of postburn forest-floor conditions on jack pine cutovers".
7. "Tables for silvicultural burning prescriptions on jack pine cutovers" were computer-printed.
8. Jack pine stand growth within the burned seed-tree area in central Saskatchewan was measured as planned.
9. The growth data for inclusion into an information report on "Jack pine stand recovery from severe browsing by snowshoe hares in central Saskatchewan" were analysed.
10. On request, provided advisory services, and also critically reviewed five manuscripts for publication by other authors.
11. Completed a preliminary review of literature and submitted for review to the IUFRO Symposium Organizing Committee an abstract of the proposed paper.

12. Sets of regressions re. raw humus sorption, desorption, and equilibrium moisture contents in relation to temperature - humidity permutations were computer-plotted for publication. About 400 individual regressions were involved.

## 12. Present Status of Study:

The new Canadian Fire Weather Index was introduced to the Region in 1970 through a series of training sessions for the user agencies. Since then, fire behavior and fire effects were studied by means of experimental burning on a number of cutover sites and in uncut stands.

Varying in area from 0.09 to 33.35 ha, the tests included: 2 burns of black spruce slash, plus 17 burns of jack pine slash in Manitoba; 31 burns of jack pine slash in Saskatchewan; and 22 burns of lodgepole pine slash, 2 burns of undisturbed black spruce stands, plus 20 burns of undisturbed jack pine stands in Alberta.

While this work was nearing completion, variations in moisture content, dry-weight content, chemical content, and heat content of green conifer foliage (jack pine, black spruce, white spruce and balsam fir) were studied in Alberta to determine their seasonal lows and highs that may contribute substantially to the incidence and the spread of crown fires.

Postburn treatments such as seed-tree systems, direct seeding, and planting were routinely tested in conjunction with all experimental fires on cutover areas to provide authentic prescription data for silvicultural purposes.

Other work included development of methods for fuel classification, stand biomass assessments, stand fire hazard ratings, and microclimate studies in diverse forest ecosystems.

In all this, results are being published as they become available. About 30 journal articles, in-house reports, and notes have been published on the basis of this study. The specific contributions by the objectives listed can be summarized as follows:

Objective #1. Fire spread and intensity values were determined for (a) lodgepole slash (22 burns), (b) undisturbed black spruce stands (2 burns), and (c) undisturbed old jack pine stands (8 burns). Further fire spread and intensity values will be forthcoming for (d) undisturbed semimature jack pine stands (12 burns).

Objective #2. Fuel reduction values and information on plant succession, including forest regeneration, were provided for (a) black spruce slash (2 burns) and (b) jack pine slash (48 burns). In addition, fuel reduction values alone were provided for (c) lodgepole pine slash (22 burns), (d) undisturbed black spruce stands (2 burns), and (e) undisturbed old jack pine stands (8 burns). Further fuel reduction values will be forthcoming for (f) undisturbed semimature jack pine stands (12 burns).

Objective #3. Explicit guidelines were published for postcut disposal of fuels as well as for formulation of specific prescriptions in preparation of favorable seeding and planting sites by fire. Further 24 regressions and readout tables will be forthcoming for more precise setting up of silvicultural burning prescriptions over a wide range of jack pine-black spruce cutover sites.

Objective #4. Fire control agencies, silviculturists, educators, and all those willing to listen were instructed on the use of available guidelines. This was done by means of personal contacts, through various handouts, and through a series of some 18 more or less formalized, often illustrated lectures, seminars, and workshops. The process of instruction will continue.

It is expected that the incumbent will retire during 1989-90 and will seek a part-time status in order to complete a number of publications including a manual on "Controlled burning prescriptions for postcut regeneration of jack pine and black spruce".

13. Goals for 1989-90:

1. Conclude publication of a journal article on "Prediction of forest-floor moisture content under diverse stand and site conditions".
2. Complete preparation of a journal article on "Dimensional roundwood classification and forest biomass studies".
3. Carry out a followup regeneration and growth survey on burned in 1967 lowland black spruce cutovers, southeastern Manitoba.
4. Prepare and present a paper on "Postcut burning and black spruce regeneration" at the forthcoming IUFRO Symposium, August 12-20, 1989, central Newfoundland.
5. Provide advisory services as required.

14. Publications in 1988-89:

- Chrosiewicz, Z. 1988. Jack pine regeneration following postcut burning under seed trees in central Saskatchewan. For. Chron. 64:315-319.
- Chrosiewicz, Z. 1988. Forest regeneration on burned, planted, and seeded clear-cuts in central Saskatchewan. Can. For. Serv., North. For. Cent., Edmonton, Alta. Inf. Rep. NOR-X-293.
- Chrosiewicz, Z. 1988. Burning for black spruce regeneration on a lowland cutover site in southeastern Manitoba (a summary). Can.-Man. Econ. Reg. Dev. Agreement, Winnipeg, Man. For. Manage. Demo. Note No. 9.
- Chrosiewicz, Z. 1989. Prediction of forest-floor moisture content on jack pine cutovers. Can. J. For. Res. 19 (in press).

Chrosciewicz, Z. 1989. Site conditions for jack pine seeding. Pages  
 .... in W.D. Towill (compiler). Towards prime site management.  
 Symposium proceedings. Ont. Min. Nat. Resour. (in press).

15. Environmental Implications:

The NoFC Environmental Screening Committee has evaluated the proposed study activities. On the basis of information provided by the study leader, the committee concludes that these activities are not potentially detrimental to the environment.

16. Duration:

Start: 1970. Estimated Completion: 1983. Revised: 1990.

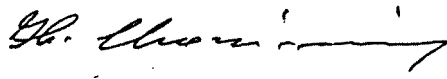
17. Resources 1989-90:

PYs: Prof.:	Chrosciewicz	1.0	
Tech.:		0.0	
Total:		1.0	
Term/Student:			(Manitoba Agreement)

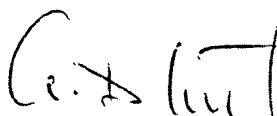
O & M: \$5.0 K

Capital: Nil

18. Signatures:

  
 \_\_\_\_\_  
 Investigator

  
 \_\_\_\_\_  
 Program Director, Environment

  
 \_\_\_\_\_  
 Regional Director General

## FORESTRY CANADA

## STUDY WORK PLAN

1989-90

---

Responsibility Centre: NORTHERN FORESTRY CENTRE

Date: February 14, 1989  
Amended: February 27, 1989

1. Project: Fire Management Research
2. Title: Evaluation and development of fire detection-suppression technology
3. New:                    Cont.: X
4. No.: NOR-5-02
5. Study Leader: C.J. Ogilvie
6. Key Words: Aerial patrols, lookouts, detection, storm tracking, wildfire mapping, remote sensing, retardants, combustion lab, air tankers, suppression, fire control, fire planning, foam
7. Location of Work: Northwest Region
8. Problem:

Each year fire starts number at least 2000 in the prairie provinces and Northwest Territories. Many of these fires become unmanageable resulting in costly suppression and mop-up activities. The objective of this study is to improve fire detection, surveillance and suppression methods. It is oriented towards the immediate needs and requests of the client agencies and so provides an excellent opportunity to improve operations which will reduce total fire losses and minimize fire suppression costs.

Many of the results achieved in this study have already been implemented, and the prospects of further findings being put to practical use are excellent.

The following general course of action is being followed:

1. Discussion with respective user agencies to define and outline the problems to be solved.
2. On-site evaluations of existing installations and analysis of available data.
3. Formulation of objectives to be met by new systems or equipment.

4. Design of new systems or modification of existing systems in order to achieve optimum returns under given local conditions and accepted restraints.
5. Assistance to user agencies during implementation including solving day-to-day problems that have a bearing on systems design and operation.

9. Study Objectives:

1. Develop techniques and equipment for wildfire surveillance and mapping.
2. Identify the most advantageous primary detection medium for given conditions.
3. Develop techniques to evaluate fire retardants and determine the optimum application required to inhibit fire spread in different fuels under varying burning conditions.
4. Develop fire suppression production information for a variety of methods and conditions.
5. To analyze and disseminate information to fire management agencies through technical assistance, consultation, and training.

10. Goals for 1988-89:

1. Prepare and publish a Fire Management Report Note on: Real-time observation and analysis of large prescribed burns using digitized infrared scanner.
2. Complete co-authored report on 1986 Daedalus line scanner trials for publication.
3. Complete and publish a Technology Transfer Note on the application of the U.S. Operational Retardant Evaluation study to Canadian conditions.
4. Prepare and publish a Fire Management Note on The Water Misters.
5. Initiate preparation of a report on procedures for fire tower seen-area mapping.
6. Initiate work to develop methods of using infrared technology operationally for optimum placement of air tanker loads and at the same time evaluate retardant effectiveness under operational conditions. Load placement effectiveness can probably be doubled using infrared information which provides a clear view of the fire and the retardant drop. In addition, effectiveness information on the applied retardant will provide basic data for use in upgrading the materials composition and rates of application. This goal is to be conducted in cooperation with PNFI, the Canada-Saskatchewan Forestry Development Agreement and the province of Saskatchewan.



7. In cooperation with GLFC and contractor further develop methods of observing wild and prescribed fires to study rates of spread, fire intensity, fire spotting, fire whirlwinds and other aspects of fire behavior.
  8. Act as technical representative for detection study contracts of Manitoba and Saskatchewan.
  9. Provide technical services and training to client agencies.
11. Accomplishments in 1988-89:
1. Paper entitled "Real time observation and analysis of prescribed and wildland fires using digitized infrared imagery" has been submitted to USFS Management Notes.
  2. The report on the 1986 line scanner trials was combined with the report on the 1985 trials and has been published.
  3. This report is being revised to include experience gained in 1988 while working with the U.S. Forest Service Operational Retardant Evaluation team in California.
  4. A report on the water mister was submitted to the periodical "smoke signals" and is in press.
  5. A report on procedures for fire tower seen-area mapping has been initiated.
  6. A field trial was conducted in the LaRonge district of Northern Saskatchewan in June. The Canada-Saskatchewan development agreement supplied funding to rent an infrared scanner and the province of Saskatchewan provided air transportation. The two member (PNFI and NoFC) evaluation team accompanied a Regional Initial Attack Control Team to a number of fires. One member of the evaluation team made ground measurements of drop length, width and effectiveness while the other operated the infrared scanner from the air. Enough experience was gained to show that using infrared to assist in tanker load placement and material effectiveness assessment is a viable concept.
  7. The camera pod and radar altimeter developed for R. Hall (NoFC) was integrated into the Airborne Infrared Data Management and Analysis System (AIDMAS). The pod allows for a fast and neat installation of the system on any Bell 206B helicopter and the radar altimeter greatly improves the accuracy of ground measurements. In addition a 76 degree lens was used on the AIDMAS scanner which allowed a lower (5000') observation altitude with the same field of view.

Two fires in the Timmins, Ontario area were imaged with good results showing ignition patterns, spread rates, intensities and a whirlwind. Funding for the Ontario work was provided by the Canada-Ontario development agreement and the Ontario Ministry of Forests.

Funding was also obtained from the Canada-Alberta FRDA to image experimental fires in Alberta, however, due to wet weather the project was put on hold for 1989.

8. The detection study for Manitoba has been completed to their satisfaction.

The Saskatchewan study was extended into the spring of 1989 to allow Saskatchewan to provide the necessary data to the contractor.

9. Provided technical services and liaison as follows:

- a) Will be attending the GIS workshop in Vancouver in March, 1989.
- b) Attended an international fire foam workshop in Kamloops in April.
- c) Gave a presentation on the Airborne Infrared Data Management and Analysis System (AIDMAS) at the CCFM Fire Equipment Subcommittee meeting in Quebec City in October.
- d) Assisted in the preparation of and attended the Interior West Fire Council meeting in Kananaskis in October.
- e) Participated in the in-house R&D evaluation.
- f) Attended the Western Region fire weather meeting in March.
- g) Made a presentation on the AIDMAS to a group from the N.W.T.
- h) Attended a regional foam workshop in November and made a presentation regarding the US For. Service Operational Retardant Evaluation program.  
As follow up to the workshop helped develop an action plan to evaluate foam effectiveness and co-authored a Technology Transfer Note entitled "Interim guidelines for aerial application of foam on forest fires", which is under review for publication before the next fire season.
- i) Took part in a FLIR demonstration flight in Edmonton in May.
- j) Assisted the AFS detection section in an evaluation trial of a new infrared detection system in Rocky Mountain House in May/June.
- k) Reviewed 3 publications.

12. Present Status of Study:

1. The use of hand-held infrared scanners for forest fire mop-up was initiated and methods developed for their use.

A "scan-extender" designed to expand the capabilities of hand-held infrared scanners was conceived, built and tested.

An "area estimator" designed to measure ground distances from the air was developed and built.

A large capacity battery and charging system capable of powering various instruments for long periods was developed.

An inexpensive portable lookout fire finder was developed.

Equipment for gathering and analyzing infrared imagery of large prescribed burns has been identified, modified and tested.

Development is ongoing and the Aerial Infrared Data Management and Analysis System (AIDMAS) has proven to be an essential part of the fire behavior analysis of large prescribed fires.

2. Detection appraisal studies have been completed for Manitoba (1987), Riding Mountain National Park, (1981), Saskatchewan (1978), Prince Albert National Park (1978), Wood Buffalo National Park (1978), Northwest Territories (1975), and Yukon (1974).

An attempt was made to integrate the LLP system and the For Can scan extender to improve the ability to locate holdover fires. This met with limited success due to inaccuracies in the LLP system at that time and the lack of a reliable lightning fire prediction model.

Data was collected at the source of lightning ignitions in support of a lightning fire prediction model.

Nine detection tower sites have been evaluated for effectiveness, following recommendations made in the detection appraisal studies in Saskatchewan.

Extensive tests were conducted to determine the suitability of the Daedalus 1260-1268 line scanner for detecting holdover fires.

Tests were also conducted to compare the For Can scan extender AGA scanner combination, The Barr and Stroud scanner and the Daedalus line scanner.

3. The apparatus and methods were developed for doing comparative evaluations of retardants in the combustion laboratory.

An orientation trip were made to California to become familiar with the retardant evaluation program.

Preliminary trials have been made to develop methods of guiding the air tanker operation and evaluating drops using infrared technology.

4. The University of Alberta has been conducting fireline production work which started in 1986 with a PRUF grant. The work continued in 1987 and 1988 under a Canada/Alberta FRDA contract and will be extended through 1989. Several papers have been published or are in progress covering production rates for both crews and equipment. An interim report and a Bulldozer Use Manual have been received.
5. Information dissemination takes up an estimated 25% of the PY time in this study and is ongoing.

### 13. Goals for 1989-90:

1. Co-operate with the Alberta Forest Service, and Government Northwest Territories, Dept. of Renewable Resources, and possibly other agencies within the region to evaluate forest fire foam. The evaluation will employ ground observations and measurements as well as airborne infrared to determine foam effectiveness under operational conditions.

Reporting will be in the form of immediate information dissemination such as through TT Notes and a Fall follow up workshop. The TT Note by Ogilvie, et al. entitled "Interim guidelines for aerial application of form on forest fires" will be published.

2. Expand the AIDMAS capability to include a video down link and conduct trials in cooperation with GLFC, NoFC (05-05), PFC, and Compuheat Canada.
3. Obtain and become proficient in the use of a digital video analysis system which will then be used to analyze the AIDMAS imagery.
4. Publish the revised Tech. Transfer note on the application of the U.S. Operational Retardant Evaluation study to Canadian conditions.
5. Act as technical authority for the Saskatchewan detection study contract.
6. Provide technical services and liaison to client agencies.

14. Publications 1988-89:

- Ogilvie, C.J.; Young, R.W. 1988. Daedalus line scanner trials in Alberta, 1985-86. Forestry Canada, North. For. Cent., Edmonton, Alberta, Inf. Rep. NOR-X-298.
- Ogilvie C.J. 1988. Using a blower mister for fighting grass fires. Nat. Res. Council. Can. Com. on For. Fire Management, Smoke Signals (in press).

15. Environmental Implications:

The NoFC Environmental Screening Committee has evaluated the proposed study activities. On the basis of information provided by the study leader, the committee concludes that these activities are not potentially detrimental to the environment.

16. Duration:

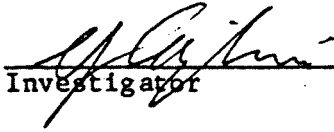
Start: 1971.                      Completion: 1994

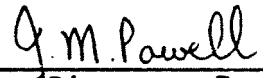
17. Resources 1989-90:

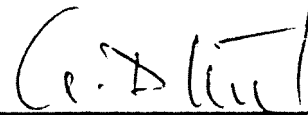
PYs: Prof.:	
Tech.:	Ogilvie 1.0
Total:	1.0
Term/Student:	0.0

O & M: \$ 7.0 K  
Capital: \$5.2 K

18. Signatures:

  
Investigator

  
Program Director, Environment

  
Regional Director General

## FORESTRY CANADA

## STUDY WORK PLAN

1989-90

---

Responsibility Centre: NORTHERN FORESTRY CENTRE

Date: February 14, 1989

1. Project: Fire Management Research
2. Title: Evaluation of the role of fire in forest and intermingled vegetation in the prairie provinces, Rocky Mountains, and far north
3. New:            Cont: Terminated
4. No.: NOR-5-03
5. Study Leader: Terminated
6. Key Words: Fire ecology, fire history, fire cycle, fire type, fire climax, fire scar rating
7. Location of Work: Northwest Region
8. Problem:

Within broad climatic limitations, fire has been the most important single, natural influence on vegetation throughout the region for about the past 10,000 years. Areal and temporal patterns of burning have varied along with fire intensity. Fire has played a significant role in influencing the physical-chemical environment; in regulating dry-matter accumulation; in controlling plant species and communities, in determining wildlife habitat patterns and populations; in controlling forest insects, parasites, fungi, etc.; in controlling major ecosystem processes and characteristics such as nutrient cycles and energy flow, succession, diversity, productivity and stability. The "natural" fire regime has been obscured by man's intervention and the long-term consequences of fire suppression are now becoming clear.

Resource management problems are developing which require an understanding of the historical role of fire, the effects of fire on a variety of landscapes, the alternatives available to resource managers and approaches required to implement alternatives.

9. Study Objectives:

1. To develop and implement fire management programs in designated national parks.
2. To define the needs and priorities of client agencies in the area of fire impact assessments.

10. Goals for 1988-89:

1. Supervise completion of all pending publications.
2. Remeasure Vermillion Pass plots with Parks Canada and University, Boreal Institute or other personnel.
3. Complete project continuation assessment and formulate recommendations for future direction of study including personnel recommendations.
4. Present recommendations to senior management for approval prior to next FY planning cycle.

Added Goal:

5. Complete summarization of Nahanni National Park and Wood Buffalo National Park fire data.

11. Accomplishments in 1988-89:

1. The three publications arising from Delisle's thesis that were "in press" last year were all published during the year, as a Can. J. For. Res. paper b) Occasional Forestry Note of U. of Alberta, and c) For. Management Note.
2. Remeasuring of Vermillion Pass plots with Parks Canada was postponed until possibly 1989.
3. Some discussions about the future of study area were discussed with PNFI and others. Felt that much could be accomplished by cooperating with other groups which had the expertise in forest ecology especially the university, but no final decision was made.
4. Recommended that this area of work be put on hold until a need is identified and resources are made available. Study will be terminated.
5. Data for the Nahanni and Wood Buffalo National Parks were transferred to D. Dubé for summarization.

12. Present Status of Study:

Reports from field work in Jasper National Park have been published. Efforts are underway to clean up other summarization reports for Wood Buffalo and Nahanni National Parks. If work goes ahead with remeasuring the Vermillion Pass plots in 1989 this will be reported under another study, NOR-05-07. Study terminated.

13. Goals for 1989-90:

Study terminated; Ongoing active goals are transferred to NOR-05-07.

14. Publications 1988-89:

Delisle, G.P.; Woodard, P.M. 1988. Constants for calculating fuel loads in Alberta. Can. For. Serv., North. For. Cent., Edmonton, Alberta. For. Manage. Note 45.

Delisle, G.P.; Woodard, P.M.; Titus, S.J.; Johnson, A.F. 1988. Sample size and variability of fuel weight estimates in natural stands of lodgepole pine. Can. J. For. Res. 18(5):649-652.

Woodard, P.M.; Delisle, G.P. 1988. Biomass regression equations for common tree seedlings and shrubs in Jasper National Park, Alberta. Univ. Alberta, Dep. For. Sci., Edmonton, Alberta. For. Notes 1.

15. Environmental Implications:

The NoFC Environmental Screening Committee has evaluated the proposed study activities. On the basis of information provided by the study leader, the committee concludes that these activities are not potentially detrimental to the environment.

16. Duration:

Start: 1974                      Completion: 1989

17. Resources 1989-90:

Nil - Terminated

O & M:

Capital:

18. Signatures:

\_\_\_\_\_  
Investigator

J. M. Powell  
Program Director, Environment

C. D. H. T.  
Regional Director General



## FORESTRY CANADA

## STUDY WORK PLAN

1989-90

---

Responsibility Centre: NORTHERN FORESTRY CENTRE

Date: February 14, 1989

1. Project: Fire Management Research
2. Title: Fire management systems and modelling
3. New:            Cont.: X                           4. No: NOR-5-04
5. Study Leader: B.S. Lee
6. Key Words:    Fire physics, fuels, fire line production, fire statistics, fire effects, decision models, fire management, computer systems, geographic information systems.
7. Location of Work: Northwest Region
8. Problem:

Fire management is becoming more complex every day. Increasing costs, changing values, higher risk, as well as hosts of other factors make any fire management decision difficult at best. At the same time we are entering into the age of "high technologies" which offer new opportunities for fire management decision support. Hence, it is becoming increasingly more important that Forestry Canada investigate the application of these "high technologies" to forest fire management problems. A significant research, development, and technology transfer role exists to develop new processes, conduct applications research, and provide support for the integration of the new technology into day-to-day forest fire management.

The application and integration of management science techniques such as numerical models (i.e., simulation and gaming), expert systems, and artificial intelligence into forest fire management emphasizes the development and technology transfer components of the innovation (research) process. Fire management needs computerized decision-aids, database management structures and/or systems, and associated technology transfer documents to operate effectively in today's environment. This role is well within the mandate of Forestry Canada and the capability of NoFC.

The maturing computer applications area of expert systems provides a new opportunity area for Forestry Canada. Such systems have the potential to provide enhanced day-to-day decision making for fire and natural resource managers. In future these systems will integrate factual information now

being derived from numerical models like the FWI and FBP systems with the knowledge and "expertise" of fire managers. They will add a new layer of information into the computer-assisted decision process and will provide better human - machine interfaces. Future expert systems will also automate the learning process, however such systems are probably 10 years away at this time.

9. Study Objectives:

1. To identify the key factors relating to the occurrence, behaviour, and effect of wildfires on the cost-effectiveness of fire control decisions.
2. To build, test, and operate relevant decision-aid models designed to assist fire management agencies in optimizing the allocation and use of available resources during demanding or multiple fire occurrence situations.
3. To develop and maintain regional data bases on fire weather, fire occurrence, fire environments, and fire management activities for use in fire research and fire management activities.

10. Goals for 1988-89:

1. Complete a M.Sc. thesis entitled "An evaluation of the application of expert systems for dispatching initial attack resources to wildfires". (B.L.)
2. Prepare and present a paper entitled "Use of advanced concepts in dispatching fire control resources" at the 1988 Interior West Fire Council Annual Meeting and Workshop, to be held at October 24-27, 1988 at Kananaskis Valley, Alberta. (B.L.)
3. Prepare and present a paper entitled "Application of computer-based information systems to fire management" at the 1988 Interior West Fire Council Annual Meeting and Workshop, to be held at October 24-27, 1988 at Kananaskis Valley, Alberta. (S.P.)
4. Prepare a report entitled "Implementing Ryan's WNDCOM model for predicting winds in mountainous terrain". (S.P.)
5. Revise version 1.1 of the FWI/PC program as per client requests and revise "A user's guide to FWI/PC: a computer program to calculate, report on, and archive Canadian Forest Fire Weather Index (FWI) System data". (B.L.)
6. Continue applied research in expert systems for initial attack dispatching by:
  - a. Conducting field trials of a prototype expert system in Whitecourt Forest during the 1988 fire season.

- b. Conduct knowledge engineering/acquisition in the provinces of Saskatchewan and Manitoba for similar prototype expert systems. (B.L.)
  - 7. Prepare a paper on estimating winds in mountainous terrain for predicting fire behaviour for presentation at the Fourth West. Reg. Fire Weather Comm. Sci. Tech. Seminar. (S.P.)
  - 8. Test the WNDCOM surface wind model prediction against observed surface winds at a site near 67 N, and determine its useability in the sub arctic. (S.P.)
  - 9. Continue development of the Northwest Region Fire Weather Data Library by: (R.M.S.)
    - a. capturing and archiving fire weather data from client agencies who voluntarily make their data available to the library.
    - b. Preparing a File Report summarizing the fire weather stations, years of record, and quality of the data currently in the library.
  - 10. Explore and initiate cooperative research and development opportunities with P. Kourtz at PNFI and the Manawaki Technology Transfer Centre in the area of Fire Management Systems. (B.L.)
  - 11. Provide advisory services to client agencies, universities, and others as required. (B.L., S.P.)
11. Accomplishments for 1988-89:
- 1. Continued thesis work on the application of expert systems for dispatching initial attack resources to wildfires. Simulations of selected 1988 fires in the Whitecourt Forest provide the data set for the validation of the detection assessment expert system.(B.L.)
  - 2. Prepared a paper entitled "Use of advanced concepts in dispatching fire control resources" at the 1988 Interior West Fire Council Annual Meeting and Workshop, held October 24-27, 1988 at Kananaskis Valley, Alberta. (B.L.)
  - 3. This paper to be presented by Dr. S. Pickford following the termination of a S.T.E.P. assignment was cancelled due to family illness. (S.P.)
  - 4. A paper entitled "Implementing Ryan's WNDCOM model for predicting winds in mountainous terrain" was prepared and is currently under review. (S.P.)
  - 5. Version 1.21 of the FWI/PC program was released prior to the 1988 fire season. The user manual entitled "A user's guide to FWI/PC: a computer program to calculate, report on, and archive Canadian Forest Fire Weather Index (FWI) System data" was updated and is provided "on-disk". (B.L.)

6. The Intelligent Fire Management Information System (IFMIS) continued its evolution from expert system for initial attack to a full featured system for fire management planning, operations and training. IFMIS has been totally revised to accommodate client wishes and to eliminate problems identified during the 1988 Whitecourt Forest Field trials. The revised prototype will be put into operation in four locations for the 1989 fire season: Whitecourt Forest, Grande Prairie Forest, Prince Albert Region, and the AFS Provincial Headquarters. (B.L.)

Features of the 1989 IFMIS version include:

- Pre-suppression Planner: a daily pre-suppression planning tool.
  - Resource Blackboard: positioning and graphic display of fire control resources.
  - Appropriate Suppression Response Expert System: presents information on fire weather, fire behaviour potential, resource availability, initial attack times, and recommended suppression response.
  - FWI System: FWI calculation, spatial assignment of fire weather between stations using either interpolation or nearest neighbour analyses, FWI forecasting, FWI reporting, and frequency and display charts.
  - FBP System: manual FBP calculations, forest fuel data base calculations, fire intensity chart displays.
  - Map Display System: two dimensional geographic displays, user selected themes and map windows, color and black & white output, partial GIS implementation, browse files and map statistics.
  - DBMS Interface: data base management system interface.
7. A paper on "Estimating winds in mountainous terrain for predicting fire behavior" was prepared and presented at the Fourth West. Reg. Fire Weather Comm. Sci. Tech. Seminar. (S.P.)
8. Wind data was collected by the GNWT at a site near 67 N to determine the applicability of the WNDCOM surface wind model at high latitudes. These data have been forwarded to S.G. Pickford at the University of Washington for preliminary analysis. Subject to this analysis, the GNWT will consider collecting one more season (1989) of data in order to complete the field work component of this study. (S.P. & B.L.)
9. The Northwest Region Fire Weather Data Library received increasing interest by clients during the 1988-89 fiscal year.
- a. Over 80,000 daily fire weather records from the Province of Alberta were added to library as a result of a request for assistance from the Alberta Forest Service. (B.L., R.M.S.)

The 1987 and 1988 fire weather records for the Province of Saskatchewan were also processed in order to provide historical fire weather data for the IFMIS software. (R.M.S.)

- b. On the reporting side, the newly developed IFMIS software permits both spatial display and interactive reporting of the data base. (B.L.)
10. A cooperative agreement was initiated with the Manawaki Technology Transfer Centre in the area of Fire Management Systems. The agreement provides for the exchange of information, software and expertise between NoFC, MTTC, and indirectly PNFI. NoFC will provide PC software to MTTC for distribution and long-term maintenance. The agreement also provides for NoFC access to the QNET fire management (computer) network, assistance from MTTC staff in the area of communications, and participation in cooperative programs which require applied fire management systems research. (B.L.)
  11. Advisory and consultative services were supplied to client agencies, universities, and others as follows: (B.L.)
    - a. Fire and GIS applications presentation, Yellowknife, Jan, 1988.
    - b. Participation on the AFS Pre-suppression Preparedness Resource System (PPRS) Committee (three meetings).
    - c. Two manuscripts reviewed for AI in Natural Resource Applications and Can. J. of For. Sci.
    - d. Met with officials of the Govt. of the Northwest Territories to advise on strategies for implementing forest fuels inventories and an integrated fire management information system for the NWT (Feb. 22-24, 1989).
  12. Present Status of Study:

Fire Management in the Northwest Region is becoming increasingly more sophisticated. All clients in the region have deployed microcomputers at their HQ and forest level operations, with minicomputers being considered. Similarly, with the advent of this computing capability, is a new and budding demand for the so-called "high technologies". These technologies include mathematical programming, artificial intelligence, expert systems, computer graphics and GIS, along with others too numerous to mention. It would appear that the timing is right for this study to capitalize on applications research opportunities in these new technology areas.

Specific contributions by study objectives listed can be summarized as follows:

1. Knowledge engineering and systems analysis approaches with client agencies have served to identify key factors related to fire management as well as to develop conceptual models of fire management systems, both existing and in the future.
2. Computer-based decision aid models developed at NoFC such as the Initial Attack Planning Model, FWI/PC, the Intelligent Fire

Management Information System (IFMIS), and the Appropriate Suppression Response Expert System are being used by client agencies. Future initiatives in GIS along with new mathematical models for expert systems for deployment planning and fire effects will also contribute to fire management within the region, as well as nationally.

3. A large historical fire weather data library has been developed for clients of the Northwest Region. This data library has assisted clients in developing the data bases required to evaluate fire management effectiveness and will provide the data bases essential for future fire occurrence prediction models.

13. Goals for 1989-90:

1. Submit a M.Sc. thesis entitled "An evaluation of the application of expert systems for dispatching initial attack resources to wildfires" for committee approval during the 1989 summer quarter. (B.L.)
2. Present an interactive presentation entitled "Preparedness planning using the Intelligent Fire Management Information System" at the 10th Conference on Fire and Forest Meteorology, to be held April 17 - 21, 1989 at Ottawa. (B.L., PC-2)
3. Present an interactive presentation entitled "A geographic information systems approach to fire growth modelling" at the 10th Conference on Fire and Forest Meteorology, to be held April 17 - 21, 1989 at Ottawa. (B.L.)
4. Present a paper entitled "Models for forest fire decision making" at the Forest Modeling Symposium, to be held March 13-15, 1989 at Saskatoon, Sask. (B.L.)
5. Present an interactive presentation entitled "The Intelligent Fire Management Information System - decision support for initial attack dispatching" at the Meeting Global Wildland Fire Challenges conference, to be held July 23-26, 1989 at Boston. (B.L.)
6. Present a paper entitled "IFMIS: the Intelligent Fire Management Information System", at the Canadian Prairie and Northern Section of the Air and Waste Management Association to be held May 17-18, 1989 at Edmonton.
7. Continue the applications research and system development to support the Intelligent Fire Management Information System (IFMIS) by:
  - completing IFMIS documentation to include a system overview, user manual, software maintenance manual, and data dictionaries; (B.L., R.M.S., PC-2, Term/Contract)
  - monitoring the implementation of the IFMIS software and the performance of the Detection Assessment Expert System in the

Grande Prairie and Whitecourt Forests of Alberta, Alberta PHQ, and Prince Albert Region, Saskatchewan; (B.L.)

- installing the IFMIS software in one region of the Province of Manitoba; (R.M.S., PC-2)
  - continuing with IFMIS research and development in the areas of expert system applications, optimal resource deployment, containment modelling, and ground-based initial attack assessment; (B.L.)
  - continuing with IFMIS research and development in the areas of automatic vehicle location, lightning data integration, surface wind modelling, and interpolation of fire weather and fire behaviour data; (PC-2, B.L.)
  - continuing the development and enhancement of the IFMIS user interface, three dimensional modelling, GIS interface, communications, and multi-tasking. (B.L. Term/Contract)
8. Continue cooperative research program with PAMAP Graphics Ltd. in the area of fire and GIS applications. Initiate an information report on the potential applications of GIS for forest fire management planning and operations. (B.L., R.M.S., PC-2)
  9. Prepare a file report on the application of the WNDCOM surface wind model in high latitudes. (S.P., PC-2, B.L.).
  10. Continue to provide advisory services to client agencies, universities, and others as required. (B.L., PC-2, R.M.S)
  11. Continue development of the Northwest Region Fire Weather Data Library by:
    - a. capturing and archiving fire weather data from client agencies who voluntarily make their data available to the library. (R.M.S.)
    - b. Preparing a File Report summarizing the fire weather stations, years of record, and quality of the data currently in the library. (R.M.S.)
    - c. Initiate the preparation of a forest management note describing the Northwest Region Fire Weather Data Library. (R.M.S., B.L.)
  14. Publications 1988-89:

Alexander, M.E.; Smith, R.M.; Mann, C.L. 1988. A diagrammatic guide to elliptical shapes of wildland fires. ForCan., North. For. Cent., Edmonton, Alberta, Tech. Trans. Note A-002, 4p.

15. Environmental Implications:

The NoFC Environmental Screening Committee has evaluated the proposed study activities. On the basis of information provided by the study leader, the committee concludes that these activities are not potentially detrimental to the environment.

16. Duration:

Start: 1984.

Completion: 1994.


17. Resources 1989-90:

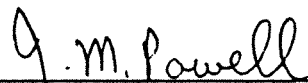
PYs: Prof:	Lee	1.0	
	vice Delisle	1.0	(Proposed PC-2)
Tech:	Smith	1.0	
Total:		3.0	
Student:		0.3	
Others:		1.0	(Contract-Alberta Agreement)


O&amp;M: \$8.5 K (Agreement \$28.5 (Alberta) ?? Others)

Capital: 12.5 K

18. Signatures:

  
 Investigator

  
 Program Director, Environment

  
 Regional Director General



## FORESTRY CANADA

## STUDY WORK PLAN

1989-90

Responsibility Centre: NORTHERN FORESTRY CENTRE

Date: February 14, 1989

1. Project: Fire Management Research
2. Title: Fire danger and behavior rating in forest and rangeland environments
3. New:                      Cont.: X    4. No.: NOR-5-05
5. Study Leaders: M.E. Alexander and vice McAlpine
6. Key Words: Canadian Forest Fire Danger Rating System, wildfire case histories and studies, fire behavior estimation, fire environment
7. Location of Work: Northwest Region
8. Problem:

Embedded in nearly every fire management decision is the need to accurately evaluate fire danger and/or predict fire behavior for a variety of fuel types/topographic situations over a range of possible fire weather conditions. The goal of fire danger/fire behavior research should be to provide fire managers with simple, timely answers to the following questions given an actual or potential wildfire occurrence:

What will be the head fire rate of spread? What will be the area, perimeter length, and forward spread distance at 1 hour, 2 hours, 3 hours and so on after it starts?

Will it be a high-intensity or low-intensity fire? Will it be a crown fire or a surface fire? How difficult will it be to control? Will mechanical equipment and/or airtankers be required or can it be handled by a suppression crew?

Is there a possibility of it "blowing-up"? If so, will it produce a towering convection column or have a wind-driven smoke plume? What will be the spotting potential? -- short- or long-range? Are fire whirls likely to develop? Is so, when and where?

The Canadian Forest Fire Danger Rating System (CFFDRS) represents the practical output of the continuing Forestry Canada (ForCan) fire

behavior research programme (i.e., experimental burning projects and wildfire investigations).

The CFFDRS is the national system of rating fire danger in Canada. The CFFDRS includes all guides to the evaluation of fire danger and the prediction of fire behavior such as the Canadian Forest Fire Weather Index (FWI) System and Canadian Forest Fire Behavior Prediction (FBP) System. This study formalizes the need for the continuing development, evaluation, interpretation, and application of the CFFDRS in the region serviced by the Northern Forestry Centre (NoFC) in order to further extend its usefulness in fire management planning and operational decision-making. Secondly, it recognizes the opportunity to formulate improved methods for the assessment and prediction of wildfire behavior in terms which are useful to fire management agencies by regional adaptation of existing and new knowledge, techniques, etc. The principal aim or thrust of Study NOR-5-05 is to develop practical systems or schemes for evaluating fire danger and predicting fire behavior for use in fire management and fire suppression programs. Note that this study is designed to compliment rather than duplicate some of the RD&A efforts covered under studies NOR-5-01 and NOR-5-04.

9. Study Objectives:

1. To develop, evaluate, interpret, and apply the Canadian Forest Fire Danger Rating System.
2. To improve the assessment and prediction of wildfire behavior in terms and by methods which are useful to fire management agencies.

10. Goals for 1988-89:

1. Complete the publication of FMN on the "Relationship between the Fine Fuel Moisture Code and the Cladonia Fire Hazard Index". [M.E.A. & K.G.H.]
2. Continue to participate in cooperative activities of the national ForCan Fire Danger Working Group as outlined in the "Strategic and Operational Plan for Forest Fire Danger Rating Research and Development in Canada, 1987-92" (i.e., Completion of the first full edition of the FBP System). [M.E.A. & R.S.M.]
3. Complete the publication of IR on "Fire Behavior in Black Spruce-Lichen Woodland: the Porter Lake Project". [M.E.A.]
4. Continue to provide advice and services with respect to fire danger rating and fire behavior as required, including serving on the Central and Western Region Fire Weather Committees (e.g., compile/edit proceedings of the 4th WRFWC scientific and technical seminar). [M.E.A. & R.S.M.]
5. Complete the publication of IR on "Spring Fires in a Semi-mature Trembling Aspen Stand, Central Alberta". [M.E.A.]

6. Burn the remaining plots (7) associated with the Big Fish Lake experimental burning project and begin preparation of IR on the project for publication in 1989. [M.E.A. & R.S.M.]
  7. Begin preparation of M.Sc. thesis on the acceleration of point source fires to equilibrium spread from ignition. [R.S.M.]
  8. Complete the publication of IR on "Twenty-five years of Canadian Forestry Service fire research in the prairie provinces and far north, 1962-1987: an annotated bibliography". [M.E.A. & R.S.M.]
  9. Serve as program co-chairman of the 1988 Interior West Fire Council Annual Meeting and Workshop, including the compilation/editing of the proceedings as a IR. [M.E.A.]
11. Accomplishments in 1988-1989:
1. Draft manuscript of FMN on the "Relationship between the Fine Fuel Moisture Code and the Cladonia Fire Hazard Index" has been through first review and is currently being revised for second review. Recommend TT Note ('A' series) as publication outlet rather than FMN. [M.E.A.]
  2.
    - a) Attended two working sessions of the ForCan Fire Danger Group in 1988: Apr. 12-15, MDO, Winnipeg, Man. [M.E.A.] and Sept. 16-23, PNFI, Chalk River, Ont. [M.E.A. & R.S.M.]
    - b) Invited paper prepared for publication in the proceedings of the Conference on Bushfire Modelling and Fire Danger Rating Systems held July 11-12, 1988, in Canberra, Australia, (see Stocks et al. 1988) entitled "The Canadian system of forest fire danger rating." [M.E.A. & R.S.M.]
    - c) Manuscript entitled "The Canadian Forest Fire Danger Rating System: an overview" accepted for publication in the Forestry Chronicle. This effort was identified in the "Strategic and Operational Plan for Forest Fire Danger Rating Research and Development in Canada, 1987-92" which was approved by CORE in May 1988. [M.E.A. & R.S.M.]
    - d) Three publications related to the interpretation of the CFFDRS were produced (see Alexander and DeGroot 1988; Alexander et al. 1988; McAlpine and Alexander 1988). [M.E.A. & R.S.M.]
    - e) Manuscript entitled "Fire behavior and effects in aspen-northern hardwood stands", co-authored with R.W. Sando (Minnesota Dept. of Natural Resources), completed for the 10th Conference on Fire and Forest Meteorology. This paper is related to the development of the FBP System data base. [M.E.A.]
    - f) Manuscript entitled "Use of posters for interpreting fire behavior/danger research", co-authored with W.J. DeGroot (SDO), K.G. Hirsch (MDO) and R.A. Lanoville (GNWT Dept. of Renewable Resources), submitted to Fire Management Notes in advance of an

educational display to be presented at the International Conference on Meeting Global Wildland Fire Challenges, July 23-26, 1989, Boston, Massachusetts.

- g) Prepared 1987 supplement to bibliography contained in the CFFDRS Users' Guide. [M.E.A.]
3. Draft manuscript of IR on the "Fire behavior in black spruce-lichen woodland: the Porter Lake Project", co-authored with B.J. Stocks (GLFC) and B.D. Lawson (PFC) submitted to NoFC editor August 2, 1988 for final editing based on two review drafts. Review of original manuscript resulted in the operational applications of the research being formulated into a wall poster at the request and in cooperation with GNWT Dept. of Renewable Resources (see Alexander and Lanoville 1988). [M.E.A.]
  4.
    - a) Attended the annual business meeting of the Western Region Fire Weather Committee (WRFWC) held Feb. 19 at NoFC. Coordinated the fourth WRFWC scientific and technical seminar held Mar. 1 at NoFC and made a co-presentation with T. Van Nest (AFS) entitled "Use of the Canadian Forest Fire Danger Rating System to predict wildfire behavior in grasslands: a case study". [M.E.A.]
    - b) Served as instructor at the seventh annual AFS Advanced Fire Behavior Course held at Alberta Forest Technology School (AFTS) in Hinton Apr. 5-8 (topics: chemistry & physics of forest fires, CFFDRS, extreme fire behavior: 1968 Lesser Slave Lake Fire, and fire behavior estimation: FBP System mechanics). [M.E.A.]
    - c) Continued to serve on the standing AFS Presuppression Preparedness Resource System (PPRS) committee and attended two scheduled meetings in 1988 in Edmonton (Mar. 17 and Sept. 27). [M.E.A.]
    - d) Consulted with Synder & Company on several occasions in 1988 with respect to a hold-over fire situation/wildfire near Westlock, Alberta. [M.E.A.]
    - e) Reviewed three manuscripts: (i) Fire behavior in mature jack pine by B.J. Stocks (Can. J. For Res.), (ii) Documenting wildfire behavior: an example from the 1988 Brereton Lake Fire, Manitoba by K.G. Hirsch (TT Note 'M' series and Fire Management Notes); and (iii) Interpreting the Canadian Forest Fire Weather Index (FWI) System by W.J. De Groot (CRFWC seminar proc.). [M.E.A.]
    - f) Served as technical consultant to AFTS with respect to "Canadianizing" an interactive videodisc/micro-computer course on intermediate fire behavior developed by Utah State University. Travelled to Logan, Utah Nov. 15-16 to work on this project. Subsequent follow-up required (e.g., local slides needed). Involvement has resulted in ForCan being acknowledged as a contributor to the Canadian version of the course. [M.E.A.]

- g) Presented two lectures on the CFFDRS to undergraduate students enrolled in the forest fire management class at the University of Alberta (Feb. 9 and 16, 1989).
5. Draft manuscript of IR on "Spring fires in a semi-mature trembling aspen stand, central Alberta", co-authored with D. Quintilio (AFTS) and P.L. Ponto (Canalta Enviortech Ltd.), submitted to review board Feb. 3. [M.E.A.]
  6. Only one successful experimental fire (ROS: 2.5 m/min) was completed at the Big Fish Lake study area during the 1988 fire season due to the abnormally wet weather. Presentation on status/future plans of the project made at AFS Fall Fire Conference in Rocky Mountain House, Nov. 22-23. Poster paper abstract co-authored with A.C. Ascher (NoFC) on the video tape "Mounting the Attack on Wildfire" for the proceedings of the first Interior West Fire Council annual meeting and workshop. TT Note ('A' series) prepared on the propane ignition torch used for the project (see Maffey 1988). [M.E.A., R.S.M. & M.E.M.]
  7. M.Sc. thesis entitled "The acceleration of point source fire to equilibrium spread" approved December 1988 (see McAlpine 1988). Manuscript entitled "Temporal variations in elliptical forest fire shapes" submitted to Can. J. For. Res. for publication as a Note. Manuscript entitled CANADA vs. the USA: A test of two fire behavior prediction systems" completed for the 10th Conference on Fire and Forest Meteorology. Both of these proposed publications are results of the thesis research. [R.S.M.]
  8. Draft manuscript of IR on "Forest fire research in western and northern Canada, 1962-1987: an annotated bibliography" submitted for editorial review (Author Bibliography portion). [M.E.A. & R.S.M.]
  9. Served as the program co-chairman of the 1988 Interior West Fire Council Annual Meeting & Workshop held Oct. 24-27 at Kananaskis Village, Alberta, attended by 265 members. Organization of this event required numerous meetings, correspondence, etc. A 96-page "final program" booklet prepared, complete with abstracts of the formal presentations. Approximately 80% of the "editing" of the proceedings completed. Poster paper display and abstract (for proceedings) on "A Cartographic History of Forest Fires in Alberta" prepared for the meeting. [M.E.A.]
12. Present Status of Study:

The present project was initiated in early 1981 by M.E. Alexander who was joined in mid 1985 by R.S. McAlpine, on a part-time basis (0.5 PY at present), as a co-study leader (R.S. McAlpine will be transferring to PNFI in April 1989). M.E. Maffey serves as the study technician. Both study leaders are currently members of the ForCan Fire Danger Group. This group maintains liaison with regional, national, and international fire organizations, committees and agencies to ensure research,

development and applications of the CFFDRS continues in a timely and

relevant manner. The major accomplishments of the Group since 1981 have been:

- Production of an updated edition of the FWI System in 1984 (i.e., ForCan Forestry Technical Reports dealing with Tables and Equation/FORTRAN Program).
- Distribution of an interim edition of a user guide to the rate of spread component of the Canadian Forest Fire Behavior Prediction (FBP) System in 1984 which also includes a simple elliptical fire growth model.
- Development of a CFFDRS Users' Guide (i.e., a three-ring binder designed to house all national publications and associated material documenting the technical aspects of the (CFFDRS)).

The study leaders have been involved directly or indirectly in the application of the CFFDRS in the "system" of several user agencies in the region (e.g., AFS, Alberta Parks, GNWT).

A point worth emphasizing is the fact that the data base used in the development of the FBP System does include the various experimental fires documented by NoFC staff between 1965-1978. The principal field research activities since 1981 have been concerned with two experimental burning projects coordinated by NoFC but involving fire staff from the other ForCan research establishments:

- i) 1982: Porter Lake, Caribou Range, N.W.T. - upland black spruce-lichen woodland (FBP System Fuel Type C-1); a cooperative project with Indian and Northern Affairs Canada (INAC).
- ii) 1985-88: Big Fish Lake, Footner Lake Forest, Alta. -black spruce-Labrador tea-Cladonia fuel complex (FBP System Fuel Type C-2); a cooperative project with Alberta Forest Service (AFS).

Other notable achievements during the period 1981-88 include:

- Assistance with the regional implementation of spring Drought Code (DC) starting value determinations on a regular, yearly basis in 1981-82.
- Development of a 4-day advanced fire behavior course in cooperation with Alberta Forest Technology School and AFS Forest Protection Branch in 1982 (sustained participation has continued up to and including 1988). Fire management personnel from N.W.T., Manitoba and Parks Canada have also attended the course.
- Coordinated the development of a scientific and technical seminar series under the auspices of the Western and Central Region Fire Weather Committees beginning in 1983.
- Initiated and solicited support for a 3-yr. CFS-HQ sponsored PRUF (Program of Research of Alberta Meteorology Division) entitled "Climatology of Atmospheric Conditions Related to Extreme Forest

Fire Behavior in West-Central and Northern Canada" in 1984. This work is related to the prediction of blowup fire occurrences.

- Preparation of several user-oriented aids which have been immediately utilized by AFS and INAC. (e.g., procedures and an adiabatic chart for plotting helicopter soundings of temperature, dew-point (DP) tables for fire weather stations with ventilated thermometers, prototype chart/table for the fire intensity component of the FBP System); an excellent example of this is the AFS "Fire Behavior Officer Reference - 1986". The concepts currently incorporated into the WM-680 Wind Monitor produced by Forest Technology Systems Ltd. represents another practical example of an original study initiative.
- Production of a slide-rule device incorporating the existing information on the FBP System. The "Fire Growth Calculator" or FGC simply represents an alternative methods of calculating area, perimeter length, etc. in lieu of manual, table or computer calculation.
- A variety of fire-related programs (e.g., RH and DP computations from dry-and wet-bulb temperatures, spring DC starting value) written in BASIC have been prepared including present versions of the FWI and FBP Systems. The current application involves the NEC PC-8201A portable computer which is ideally suited to district level use and by a fire behavior officer on campaign fires.
- Increased the interest and set standard for wildfire case histories or studies in the Northwest Region of ForCan.

13. Goals for 1989-90:

1. Submit a manuscript entitled "Acceleration of point source fires to equilibrium spread" for publication in Forest Science. [R.S.M.]
2. Attend to any IR manuscripts currently in the "system" which may be returned by the NoFC editorial group. [M.E.A.]
  - a) Fire behavior in black spruce-lichen woodland: the Porter Lake Project
  - b) Spring fires in a semi-mature trembling aspen stand, central Alberta
  - c) Forest fire research in western and northern Canada, 1962-1987: An annotated bibliography.
3. Submit the "edited" proceedings of the 1988 Interior West Fire Council Annual Meeting and Workshop to the NoFC editorial group by March 1 for publication as a IR. [M.E.A.]
4. Burn the remaining seven plots at the Big Fish Lake experimental burning study area and submit a summary report to the Alberta Forest Service and other ForCan cooperators (PFC, GLFC, PNFI). [M.E.A.]

5. Continue to participate in cooperative activities of the ForCan Fire Danger Group as outlined in the "Strategic and Operational Plan for Forest Fire Danger Rating Research and Development in Canada, 1987-1992" (e.g., complete assignments related to completion of the FBP System, submit manuscript entitled "Annotated bibliography on the Canadian Forest Fire Danger Rating System: 1969-88" to ForCan HQ for publication as a FTR). [M.E.A.]
6. Continue to provide advice and services with respect to fire danger rating and fire behavior as required (e.g., instructor at AFTS Advanced Fire Behavior Course in April, complete the 'A' series TT Note on the FFMC vs. CFHI, edit proceedings of Mar. 1988 Western Region Fire Weather Committee seminar for distribution). [M.E.A.]
7. Beginning September 1, undertake longer term training (LTT) towards the completion of a Ph.D. degree at the Australian National University while occupying a visiting researcher position with the CSIRO National Bushfire Research Unit, Canberra, A.C.T. [M.E.A.]

14. Publications:

- Alexander, M.E.; De Groot, W.J. 1988. Fire behavior in jack pine stands as related to the Canadian Forest Fire Weather Index (FWI) System. Can. For. Serv., North. For. Cent., Edmonton, Alberta. Poster (with text).
- Alexander, M.E.; Lanoville, R.A. 1988. Predicting fire behavior in the black spruce-lichen woodland fuel type in western and northern Canada. For. Can., North. For. Cent., Edmonton, Alberta, and Gov. Northwest Territ., Dep. Renewable Resour., Territ. For. Fire Cent., Fort Smith, Northwest Territories. Poster (with text).
- Alexander, M.E.; Smith, R.M.; Mann, C.L. 1988. A diagrammatic guide to elliptical shapes of wildland fires. Can. For. Serv., North. For. Cent., Edmonton, Alberta. Technol. Transfer Note A-002. 4 p.
- Maffey, M. 1988. Construction of a propane ignition torch for igniting experimental and prescribed burns and for backfiring. Can. For. Serv., North. For. Cent., Edmonton, Alberta. Technol. Transfer Note A-006. 3 p.
- McAlpine, R.S. 1988. The acceleration of point source fire to equilibrium spread. M.Sc. Thesis, Univ. Mont., Missoula, Montana. 130 p.
- McAlpine, R.S.; Alexander, M.E. 1988. Recent developments in the Canadian Forest Fire Danger Rating System. Pages 19-57 in K.G. Hirsch, compiler and editor. Proceedings of the Fourth Central Region Fire Weather Committee Scientific and Technical Seminar (April 2, 1987, Winnipeg, Manitoba). Can. For. Serv., Man. Dist. Off., Winnipeg, Manitoba. Study NOR-36-03 File Rep. No. 3.



Stocks, B.J.; Lawson, B.D.; Alexander, M.E.; Van Wagner, C.E.; McAlpine, R.S.; Lynham, T.J.; Dube, D.E. 1988. The Canadian system of forest fire danger rating. in Proceedings of the Conference on Bushfire Modelling and Fire Danger Rating Systems (July 11-12, 1988, Canberra, A.C.T.). CSIRO Div. For. For. Prod., Natl. Bushfire Res. Unit, Canberra, Australian Capital Territory. (in press).

Stocks, B.J.; Lawson, B.D.; Alexander, M.E. Van Wagner, C.E.; McAlpine, R.S.; Lynham, T.J.; Dubé, D.E. 1989. The Canadian Forest Fire Danger Rating System: an overview. For. Chron. 65: (in press)

15. Environmental Implications:

The NoFC Environmental Screening Committee has evaluated the proposed study activities. On the basis of information provided by the study leader, the committee concludes that these activities are not potentially detrimental to the environment.

16. Duration:

Started: 1982 Estimated Completion: 1992

17. Resources 1989-90:

PYs: Prof.:	Alexander	1.0
	vice McAlpine	0.5
Tech.:	Maffey	1.0
Total:		2.5
Term/Student:		0.3

O&M: \$10,000

Capital: \$2.0 K

18. Signatures:

Martin E. Alexander

Investigator

Investigator

J. M. Powell

Program Director, Environment

Regional Director General



9. Study Objectives:

1. To determine fire use applications, problems and considerations for an array of management objectives and vegetative situations in the region.
2. To develop information and establish guidelines for the use of prescribed fire in various fuel types within the region.
3. To assess fire spread and intensity under various weather conditions for major fuel complexes appropriate for prescribed burning.

10. Goals for 1988-89:

1. Participate in cooperative projects of the Forestry Canada Prescribed Fire Working Group. (R.S.M., W.J.D.).
2. Continue development leave until July and complete field work and thesis preparation after that to obtain a masters degree in fire research at the University of Montana. (R.S.M.)
3. Provide advice and services with respect to prescribed fire. (R.S.M.)

Added Goal:

4. Act as secretary to the Regional Technical Subcommittee meeting discussing fire foam use within the Region. (R.S.M.)

11. Accomplishments in 1988-89:

1. Attended Prescribed Fire Working Group (PFWC) Meeting (Victoria B.C. April 26-28, 1988) (W.J.D.)
2. Completed development leave July 1, 1988, defended thesis Aug. 16, 1988, submitted final draft Sept. 1988, M.Sc. Degree granted Dec. 1988. (R.S.M.)
3. Conducted a series of hazard reduction and under burning prescribed fires in a ponderosa pine stand near Lolo, Montana. (R.S.M.)
4. Attended and acted as secretary for the Regional Technical Subcommittee meeting discussing fire foam in the region (Nov. 29-Dec. 1, 1988). Proceedings of agency presentations and subsequent discussions and resolutions, sent to chairman of committee for distribution. (R.S.M.)

12. Present Status of Study:

1. During the annual meeting of the PFWG the working groups terms of reference and strategic plan were discussed and finalized. Members presented the current status of their studies.

2. A total of 29 experimental laboratory fires were completed by April 1988. Subsequent analysis and refinement was completed by September 1988.

13. Goals for 1989-90:

1. Refill position vacated by McAlpine at end of March 1989 as soon as possible.
2. Participate in cooperative projects with the Forestry Canada Prescribed Fire Working Group as follows:
  - a) Begin draft copy of national prescribed fire planning guide following review of all current agency planning guidelines. Identified as item #1 in the Operational Plan for the Forestry Canada Prescribed Fire Working Group (1988-1991).
  - b) Assemble available information on inventory methods for non-slash fuels, preparing for subsequent development of a standardized system of fuel inventory. Identified as item 2.2 in the Operational Plan for the Forestry Canada Prescribed Fire Working Group (1988-1991).
  - c) Evaluate Ontario Ministry of Natural Resources and British Columbia Ministry of Forests slash inventory handbooks for applicability within the region and prepare proposed amendments to the inventory process as might be required for the unique regional situation. Identified as item 2.1 in the Operational Plan for the Forestry Canada Prescribed Fire Working Group (1988-1991).
3. Reassess study goals in light of current client agency needs and requirements. Evaluation to be done through a series of discussions and on site meetings at operation prescribed burns.
4. Provide advise and services with respect to prescribed fire.

14. Publications 1988-89:

McAlpine, R.S. 1988. The acceleration of point source fires to equilibrium spread. Univ. Mont., Missoula, Mont. M.Sc. Thesis. 130 pp.

15. Environmental Implications:

The NoFC Environmental Screening Committee has evaluated the proposed study activities. On the basis of information provided by the study leader, the committee concludes that these activities are not potentially detrimental to the environment.

16. Duration:

Started: 1985

Estimated Completion: 1995

17. Resources 1989-90:

PYs: Prof: vice McAlpine	0.5
Tech:	0.0
Total:	0.5
Term/Student:	0.0

O &amp; M: \$1,000

Capital: Nil

18. Signatures:


---

 Investigator

*J. M. Powell*  


---

 Program Director, Environment

*C. L. Hill*  


---

 Regional Director General

## FORESTRY CANADA

## STUDY WORK PLAN

1989-90

---

Responsibility Centre: NORTHERN FORESTRY CENTRE

Date: February 14, 1989

1. Project: Fire Management Research
2. Title: NoFC Forest Fire Research Coordination
3. New: X                      Cont.:                      4. No.: NOR-5-07
5. Study Leaders: vice Barney
6. Key Words: Fire Research, Fire Programs, Research Management, Fire Research coordination
7. Location of Work: Northwest Region
8. Problem:

The widespread nature of the fire research program at NoFC requires considerable effort in coordination and management. The problems, the size of the area which includes, Alberta, Saskatchewan, Manitoba and the NWT in itself presents severe coordination challenges, especially with the provincial/federal agreement program activities. The diverse nature of the fire problems, research program and wide variety of user needs all make for an extremely complex management task. The need to use existing funding, secure outside funding, extensive support and agency cooperation adds to the complex dimensions already encountered. There is a need for coordination to maximize productivity and wise use of all resources within the fire research project.

9. Study Objectives:

1. To coordinate NoFC fire research activities as an essential element of the overall forest fire management programs in the prairie provinces and NWT.
2. To enhance the regional, national and international perspectives of the Forestry Canada fire research program through participation on committees, task forces, review boards and other service activities aimed at improving the protection of Canada's forestry.
3. To promote the fire research program within the prairie provinces and NWT as well as nationally.

4. To develop support and cooperation for fire research programs through a wide array of activities, processes and action.

10. Goals for 1988-89:

1. Continue to provide advisory services to National Parks with emphasis on the management guidelines. (R.B.)
2. Supervise and coordinate the regional fire research program including that by the Fire Specialists in the District Offices. (R.B.)
3. Continue to provide technology, participation on committees, task forces etc. aimed at improving the protection and use of Canada's forests through efficient fire management. (R.B.)
4. Complete regional fire research strategy, including integration of studies under the Forestry Development Agreements and Memorandums of Understanding. (R.B.)
5. Conduct regional fire research technical subcommittee meeting. (R.B.)
6. Maintain cooperative relationships and studies with University of Alberta and other Canadian universities as appropriate. (R.B.)
7. Make presentations at academic institutions throughout the year as appropriate. (R.B. and others)
8. Provide technical services and training to client agencies. (R.B. and others).
9. Provide guidance and assistance to forest economist for studies in fire management economics. (R.B. and others)
10. Complete current International Assignment Agreement which expires July 1, 1988.
11. Make plans and develop process to replace the current project leader in a manner that meets long term goals and objectives of the Northern Forestry Centre and the fire research project.
12. Complete manuscripts currently in preparation prior to July 1, 1988.
  - a. Forest/Urban fire in the Prairie Provinces
  - b. The Fish Creek Provincial Park Challenge
  - c. Research - management relationships

11. Accomplishments in 1988-89:

1. Limited advisory services were provided to National Parks personnel.
2. The regional fire research program was supervised and coordinated by Dr. R. Barney before the completion of his 3-year International Exchange Assignment in June, and since by the Program Director in an acting role.

3. Involvement on various committees continued but on a reduced scale since the departure of Dr. Barney.
4. A document "Forest Fire Research - Planning Recommendations" was completed at the end of June by Dr. Barney. This has been used along with input from project staff for ongoing discussions about the future direction of the project. A document "Strategic Plan for Forest Fire Research, Northern Forestry Centre" was also updated and provided to Management and the Forestry Canada National Fire Advisor
5. No regional fire research technical subcommittee meeting was held this year. In its place it was agreed to encourage agency attendance at the Interior West Fire Council meeting at Kananaskis, October 24-27 (all agencies attended and some took a very active role), also a workshop was organized on the topic "Foam as a fire Suppressant". This three day workshop was well attended and most productive with an action plan developed (these aspects are covered elsewhere under NOR-05-02 and 05-06), and involved input from relevant staff at PNFI.
6. Cooperative activities were continued with the University of Alberta, although the Fire Project with the departure of Drs. Barney and S. Pickford no longer have an adjunct professor relationship. Good progress was made with the final year of the Canada-Alberta FRDA study on Fireline Productivity. A bulldozer manual "Production Rates and Guidelines for Constructing Fireguard in Boreal Forest Cover types" was completed and two of three earlier reports were published and the other was accepted by the journal. A paper entitled "Determining Production Rates of Initial Attack Crews" was also presented at the Interior West Fire Council meeting and will be in the proceedings.
7. The project leader was not involved with any presentations but other project staff participated in presentations at the University of Alberta and the Forest Technology School, Hinton.
8. Technical services and training was provided to client agencies by project staff (see separate studies). Major input was provided by the District Office Fire Specialists through STEP assignments. T. Van Nest, AFS spent 5 months at NoFC on a reverse STEP assignment to assist with aspects of NOR-5-04 and other areas of fire management.
9. Limited advice was provided by Dr. Barney before his departure to the forest economist. Assistance was provided by W. DeGroot for background material for Elan fire damage appraisal case study which was completed and submitted to the Saskatchewan Dept. of Parks, Recreation and Culture with eight recommendations.
10. The International Assignment Agreement was completed by Dr. Barney on June 30, 1988.
11. The vacant Project Leader position has been on hold pending Management decision to fill the position. The Program Director has acted in the position since June.



12. The paper on "Fire in the Boreal Forest—Enemy or Management Agent" was completed and presented to the IUFRO Working Party S1.05-12 Northern Forest Silviculture and Management 1988 Symposium in Harbin, Heilongjiang Province, Peoples Republic of China. A seminar on "Computer applications in Fire Management" was also presented. Work on the other papers was not completed for a variety of reasons, including unavailability of coauthors to provide input for papers b and c.

12. Present Status of Study:

Under this new study we have been able to expand support in several areas. Work associated with federal-provincial agreements has increased this past year. New and stronger ties are in place with the University of Alberta and greater cooperative efforts are under way. A short-term international agreement was developed with the USDA Forest Service, Intermountain Research Station, Forestry Fire Sciences Laboratory. Good progress is being made on all objectives.

13. Goals for 1989-90:

1. Fill the Project Leader position and realign the project as required, including assisting with filling of other vacant positions.
2. Supervise and coordinate the regional fire research program, including providing technical guidance for the Fire Specialists in the District Office.
3. Continue to provide technology transfer through, participation on committees, task forces, etc. aimed at improving the protection and use of Canada's forests through efficient fire management.
4. Conduct regional fire research technical subcommittee meeting and hold other special workshops as required including follow up to last year's "Foam as a Fire Retardant" workshop. (P.L. and others)
5. Maintain cooperative relationships and studies with University of Alberta and other centres including presentations at academic institutions as appropriate. (P.L. and others)
6. Provide technical and advisory services and training to client agencies with emphasis on fire management guidelines (P.L. and others)
7. Provide guidance and assistance to forest economist for studies in fire management economics (see NOR-3-03). (P.L. and others)
8. Plan and initiate research activities in area of fire management science expertise.

14. Publications 1988-89:

Anon. 1988. Fire suppression production rates - A new cooperative approach. Forest Fire News No. 25:21-22.

- Barney, R.J. 1988. Fire in the Boreal Forest—Enemy or Management Agent. Paper to IUFRO Working Party SI-05-12 North. For. Silviculture and Management, Aug. 31-Sept. 11, 1988, Harbin, Heilongjiang Prov., P.R.C.
- Murphy, P.J.; Quintilio, D.; Woodard, P.M. 1989. Validation of an index system for estimating fireline production with hand tools. For. Chron. 65:(in press).
- Ponto, R.L. 1988. Production rates and guidelines for constructing fireguard in boreal forest covertypes, Canalta Envirotech Ltd. Contract Rpt. 101 pp.
- Quintilio, D.; Murphy, P.J.; Woodard, P.M. 1988. Production guidelines for initial attack hotspotting. USDA For. Serv., Fire Manage. Notes 49(3):24-27.
- Quintilio, D.; Van Nest, T.A.; Murphy, P.J.; Woodard, P.M. 1988. Determining production rates of initial attack crews. Abs. Page 37 in Final Program: the Art and Science of Fire Management. Interior West Fire Council. 1st Annu. Meeting and Workshop, Kananaskis, Alta., Oct. 24-27, 1988.

15. Environmental Implications:

The NoFC Environmental Screening Committee has evaluated the proposed study activities. On the basis of information provided by the study leader, the committee concludes that these activities are not potentially detrimental to the environment.

16. Duration:

Start: 1987. Estimated Completion: Continuing.

17. Resources 1989-90:

PYs:	Prof:	vice Barney	1.0
	Tech:		0.0
	Total:		1.0

Term/Student:

O & M: \$3,000

Capital: Nil

18. Signatures:

\_\_\_\_\_  
Investigator

J.M. Powell  
Program Director, Environment

A. D. [Signature]  
Regional Director General

## FORESTRY CANADA

## STUDY WORK PLAN

1989-90

---

Responsibility Centre: NORTHERN FORESTRY CENTRE

Date: February 7, 1989

1. Project: Development Agreements
2. Title: Fire Management (Manitoba)
3. New:                    Cont.: X
4. No.:                    NOR-36-01-3
5. Study Leader: K.G. Hirsch
6. Key Words:    Fire management, information exchange, training, development, fire weather, cost effectiveness, fire behavior, fuels, fire environment
7. Location of Work:    Manitoba
8. Study Objectives:
  1. To participate in the development of and facilitate the application of fire research technology that is relevant to Manitoba and will help to improve and advance fire management in the province.
  2. To promote and encourage the identification and expression of fire research requirements by the fire management agencies in Manitoba so as to assist the effective communication and presentation of these ideas to the NoFC fire research project and other appropriate research groups.
  3. To collect pertinent information on a variety of fire management subject areas, permitting the development and application of models to assist fire managers in their decision-making process.
9. Goals for 1988-89:
  1. Maintain liaison between fire research and operations in Manitoba by:
    - a) participating in provincial and regional meetings which deal with the various aspects of Manitoba's fire management program,
    - b) interacting with fire management personnel at all levels of the organization,

- c) continue to participate as a member of the Manitoba Fire Research Committee,
  - d) continue to provide advisory services on fire weather and serve as a member of the Central Region Fire Weather Committee.
2. Continue to monitor and provide input and direction to research projects and other fire management activities conducted under the Agreement.
  3. Complete a file report on the accuracy of the thermohygrometer.
  4. Finish the analysis of the fire occurrence database (1968-86) and complete a file report showing any significant trends in Manitoba. A formal presentation of this report will be made to the province.
  5. Publish an article and an Information Report on the fire weather and fire behavior associated with the 1987 Wallace Lake Fire.
  6. Collect fuel loading, fire weather and fire behavior data on a prescribed fire conducted by the province at Lake St. George.
  7. Assist in the field work associated with the Lowland Black Spruce Experimental Burning Project at Big Fish Lake (NOR-05-05).
  8. Continue to provide technology transfer services by:
    - a) participating in and conducting workshops on various topics (e.g., fire weather, fire behavior) upon request from the province,
    - b) producing and distributing two Technology Transfer Notes on topics related to fire management in Manitoba.
    - c) continuing to provide advice and services on fire management topics, especially to the provincial fire management organization.
10. Accomplishments in 1988-89:
1. Various activities have taken place which maintained the liaison between fire research and operations. This included:
    - One and/or two day meetings with Fire Control Officers in the Northwestern, Western and Eastern Regions.
    - Attended a provincial field demonstration of new suppression equipment.
    - Seconded to provincial Fire Programs Office from December 1, 1988 to March 31, 1989. Designated projects included:

- (a) revising the current fire report form and creating a new fire report database with special statistical analysis and plotting capabilities,
  - (b) evaluating fire weather/behavior software and proposing the most effective uses for it,
  - (c) assisting in the creation of a fire management planning team and any ensuing planning activities.
    - Continued to serve as a federal member of the Central Region Fire Weather Committee and also represented the province at the annual meeting December 7, 1988 in Saskatoon.
2. Worked cooperatively with Regional Services staff to coordinate the fire management projects under the agreement including a preliminary study on a detection video camera, out-of-country fire suppression and fire management training, team evaluation of various aspects of the provincial fire management program.
  3. The data from the thermo-hygrometer study was forwarded to the Petawawa National Forestry Institute for analysis. It will be used as part of a larger study on the accuracy of various humidity sensors.
  4. The fire occurrence database has been turned over to the province for use in a fire occurrence display system built for IBM/PCs. Because of the desire to create a new database no analytical studies were desired at this time.
  5. A comprehensive slide presentation on the Wallace Lake Fire was completed. Presentations were given at:
    - Region Fire Weather Committee Scientific and Technical Seminar,
    - Annual Manitoba-Ontario border cooperation meeting,
    - Abitibi-Price annual spring fire meeting,
    - Cranberry-Portage District fire operations meeting.
- Due to the secondment to the province an Information Report was not completed however an overview of the fire weather and fire behavior was published in Fire Management Notes (see publications).
6. Fuel loading data was collected on the Lake St. George prescribed burn site but the burn itself did not occur due poor weather conditions.

Fire weather and fire behavior information was collected during four prescribed burns in the Duck Mountains in October. A brief report was provided to the province.

7. Assisted in the field work associated with the Lowland Black Spruce Experimental Burning Project at Big Fish Lake (NOR-05-05). Due to poor burning conditions only 1 experimental fire was conducted.
8.
  - Conducted 5 introductory workshops on fire weather and fire behavior at: (a) CL-215 pilot training course, and (b) Western, Interlake, Northeastern and Southeastern region's Level III fire suppression training courses.
  - Produced and distributed two technology transfer notes (see publications). One of these notes was also published in Fire Management Notes.
  - Provided consultation to Riding Mountain National Park regarding their wildland/urban interface problem.
  - Provided assistance to the fire suppression team at the Brereton Lake Fire and also collected fire behavior information. This information was analyzed along with data collected by field staff on the Gull Lake and Kenora #14 Fires and a case study will be produced in 1989.
  - Fire weather data from 1980 to 1987 was compiled and forwarded to R/EMS Ltd. for use in a fire weather software package purchased by the province.
  - Reviewed three unsolicited manuscripts.
  - Participated in the public information programs during forest week and at the Flin Flon Trout Festival (June 29 - July 2).

11. Present Status:

1. Various technology transfer activities have been undertaken to improve and advance fire management in Manitoba. This includes:
  - planning and conducting workshops and training courses on recent developments in fire weather, fire behavior, and fire management planning,
  - demonstrations of new fire fighting equipment and computer programs,
  - publication of newsletters (2/year) and posters on topics of current interest to fire management staff, and
  - distribution of publications on various fire management topics plus personal consultation.
2. To assist the identification of research needs, meetings are held annually with regional and provincial fire management staff. A formal committee composed of field and management staff has also been established to deal with fire research matters in the province.

3. A number of applied research projects have been conducted in order to assist fire managers in their decision-making process. This includes:
- an analysis of the provincial fire weather stations and instrumentation used,
  - the development of a fire occurrence database for the period of 1968-86,
  - the compilation of all available fire weather data,
  - an analysis of the efficiency of the present fire weather station network,
  - a report on the use of Bird-dog aircraft in Manitoba,
  - an analysis of some examples of extreme fire behavior in Manitoba, and
  - the creation of a provincial fire management planning team.

The objectives of this study are on-going and will be continued if the present Canada-Manitoba Forest Renewal Agreement is renewed.

12. Goals for 1989-90:

1. Continue to provide technology transfer services to the province by:
  - a) participating in provincial and regional meetings which deal with the various aspects of Manitoba's fire management program,
  - b) interacting with fire management personnel at all levels of the organization,
  - c) participating in and conducting workshops on various topics (e.g., fire weather, fire behavior) upon request from the province,
  - d) providing advice and services on fire management topics including fire management planning, prescribed fire and fire behavior prediction.
2. Continue working on the secondment projects designated by the province. This includes:
  - a) developing of a fire report database and statistical analysis system,
  - b) evaluating and developing a plan for implementing the R/EMS fire weather and fire behavior software,
  - c) assisting in the development of a provincial fire management planning team and possibly in a pilot planning project.

d) coordinate a project designed to evaluate the use of a high quality video camera for fire detection.

3. Present and publish a poster paper entitled an Analysis of the Fire Weather and Fire Behavior Associated with Three 1988 Spring Wildfires in Central Canada. This will be presented at the 10th conference on Forest and Fire Meteorology in Ottawa to be held April 17-21, 1989.
4. Co-author a poster paper to be presented at an international wildfire conference to be held in Boston, Ma. July 23-26, 1989. This paper, titled the Use of Posters for Interpreting Fire Behavior/Danger Research will also be published in Fire Management Notes.
5. Continue to serve as a member of the Central Region Fire Weather Committee and coordinate the 6th Scientific and Technical Seminar to be held April 4, 1989. Proceedings form this seminar will be published as a file report.

13. Publications 1988-89:

Hirsch, K.G. 1988a. An overview of the 1987 Wallace Lake Fire, Manitoba. Fire Management Notes 49(2).

Hirsch, K.G. 1988b. Documenting wildfire behavior: an example from the 1988 Brereton Lake Fire, Manitoba. Govt. Can., For. Can., Man. Dist. Office, Winnipeg, Man., Tech. Trans. Note M-003. 4 p.

Hirsch, K.G. 1988c. Ignition patterns used in prescribed burning. Gov't Can., For. Can., Man. Dist. Office, Winnipeg, Man., Tech. Trans. Note M-004. 4 p.

Hirsch, K.G. 1988d. Documenting wildfire behavior: an example from the 1988 Brereton Lake Fire, Manitoba. Fire Management Notes 50(?) [in press].

14. Environmental Implications:

The NoFC Environmental Screening Committee has evaluated the proposed study activities. On the basis of information provided by the study leader, the committee concludes that these study activities are not potentially detrimental to the environment.

15. Duration:

Started: 1984

Estimated Completion: 1990

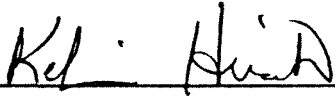
16. Resources 1989-90:

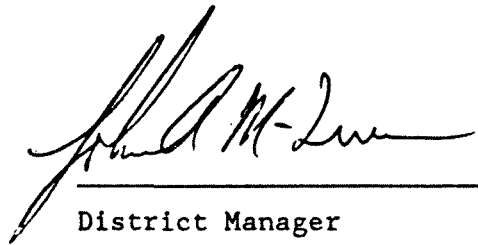
PY's: Prof.:	Hirsch	1.0
	Tech:	0.0
	Total:	1.0

O & M: \$4000

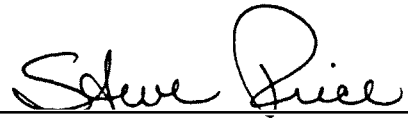


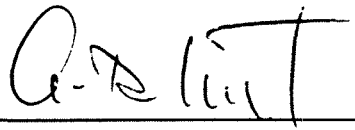
16. Signatures:

  
Investigator

  
District Manager

for   
Technical Advisor

  
Program Director, Development

  
Regional Director General

## FORESTRY CANADA

## STUDY WORK PLAN

1989-90

---

Responsibility Centre: NORTHERN FORESTRY CENTRE

Date: February 9, 1989

1. Project: Development Agreements
2. Title: Fire Management (Saskatchewan)
3. New:            Cont.: X
4. No.: NOR-36-03-4
5. Study Leader: W.J. De Groot
6. Key Words: Fire management, technology transfer, development, training, intelligence systems, information data base
7. Location of Work: Saskatchewan
8. Study Objectives:
  1. To provide fire management information to Saskatchewan through research and technology transfer that will assist in the development and advancement of fire management in the province.
  2. To promote the continued fire research effort in Saskatchewan by participating in problem/need identification and analysis with provincial personnel and NoFC fire research staff to aid in the development of a comprehensive fire management program for the province.
9. Goals for 1989-90:
  1. While working under secondment for the Saskatchewan Department of Parks, Recreation and Culture:
    - i) Provide technology transfer information by working closer with Regional Fire Operations and on-site fire activities.
    - ii) Develop an initial Baseline Presuppression Planning System for Saskatchewan through a review of literature and other similar operational systems, and through participation and consultation with Saskatchewan fire operations.
    - iii) Develop personal fire management expertise through exposure and participation in provincial fire management operations.

2. Provide information transfer through communication with Fire Research staff, the 'Saskatchewan Forest Fire Notes' technical newsletter, participation on committees, training workshops, seminars, field work and personal contact.
  3. Develop fire management expertise through courses and field experience.
  4. Continue to supervise a contract to evaluate the efficiency of the Saskatchewan Detection System.
  5. Continue to provide support for provincial personnel to attend training courses and seminars on various aspects of fire management.
  6. Continue to act as project officer on cost-shared projects and capital purchases.
  7. Complete a paper dealing with fire behavior on the Elan Fire.
10. Accomplishments 1988-89:
1. Secondment to the Forest Fire Management Branch of Saskatchewan Department of Parks, Recreation and Culture was extended an extra six months to cover the period April 1, 1988 - March 31, 1989. The following areas were the focus of the secondment:
    - i) Technology Transfer
      - attended regional spring fire meetings in Prince Albert, Meadow Lake, La Ronge, and Hudson Bay in April;
      - attended the Saskatchewan-Manitoba Border Fire Meeting in April;
      - prepared and presented an Introductory Fire Behavior Officer's Course to provincial fire response teams in Melville;
      - instructed the Fire Weather Index System at the Tower Observer's Course in May;
      - participated on the Cypress Hills Management Planning Committee. The core area of the park and fire fighting facilities were toured and reviewed in May; recommendations were submitted in a subsequent report; fire guards were determined in June;
      - served as Fire Behavior Officer on the Weasel Fire (4,800 ha.);
      - assisted with a Crew Boss Training Course in Buffalo Narrows in May;
      - prepared and presented a preliminary fire investigation report on the Cowboy Fire (1,200 ha.) in Saskatoon Region;
      - provided a post-fire analysis of burning conditions and fire behavior of the Burns Fire (16 ha.) which occurred just north of Prince Albert;
      - served as Fire Behavior Officer on the Coffee Fire (33,000 ha.); providing hourly predictions and acting as liaison with the weather section at the Provincial Fire Centre;

- assisted in the preparation of a public information slide program for Cypress Hills Provincial Park on the role of fire in the park;
- assisted with a preliminary investigation of the Elk Fire (10 ha.) in Yorkton/Melville region;
- attended the Prince Albert Regional Fall Fire Meeting in October;
- prepared and presented a fire behavior analysis at the Coffee Fire debriefing in Prince Albert;
- instructed on the Canadian Forest Fire Danger Rating System at two sector boss courses in January;
- completed a training package on the FWI System for the Province.

ii) Initial Attack Preparedness System

- prepared and presented initial attack preparedness system proposals to regional directors and fire management staff in December and January;
- provided an information session and discussion on the proposed preparedness system at each of the regional offices in January;
- following discussions with field staff and testing with historical data, a final proposal for an Initial Attack Preparedness System was completed and presented to the Province.

iii) Field and Operations Experience

- participated in fire operations at the Weasel Fire, and in the Buffalo Narrows Fire Cache in May;
- participated on the Coffee Fire in June, assisting with fire behavior and burn-out operations;
- returned to the Coffee Fire in July to act as sector boss, and to assist with infra-red scanning activities;
- spent considerable time working with provincial fire operations staff, particularly the duty officer.

2. Provided Information Transfer by:


- consultation with NoFC Fire Research staff on all fire management activities in Saskatchewan;
- serving as co-ordinator for the 5th Central Region Fire Weather Committee (CRFWC) Scientific and Technical Seminar in April;
- presenting a paper entitled: "Fire Behavior on the 1987 Elan Fire, Saskatchewan" at the CRFWC Seminar;
- presenting an analysis of fire behavior on the Elan Fire at the Advanced Fire Behavior Course in Hinton, Alberta;
- participating as interim NoFC member on the National Prescribed Fire Working Group which met in April;
- participating in a field tour and meeting with Prince Albert National Park staff to discuss fire management concerns in the Park;
- continuing discussions with and providing consultation to the Canadian Wildlife Service in regards to prescribed burning and fire behavior;

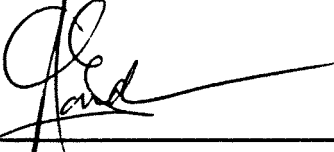
- attending and assisting with the First Interior West Fire Council's Annual Meeting and Workshop in Kananaskis, Alberta;
  - attending the Northwest Fire Council's Annual Meeting and Seminar in November;
  - participating in the Regional Fire Research Technical Committee's Meeting on foam suppressants in Edmonton;
  - presenting an agency report at the 14th Annual Meeting of the Central Region Fire Weather Committee in Saskatoon;
  - assisting the Saskatchewan Institute of Applied Science and Technology with requests for information on fire behavior and the Canadian Forest Fire Danger Rating System;
  - continuing distribution of the 'Forest Fire Notes' series to Saskatchewan field offices.
3. Completed the Following Courses:
- Aerial Detection Course, April;
  - Tower Observers Course, April;
  - Aerial Incendiary Device Course, January;
  - Fire Weather Course, March.
4. Continued supervising a contract to evaluate the efficiency of the Saskatchewan Detection System.
5. Provided travel funds for one provincial employee to attend the Advanced Fire Behavior Course in Hinton, Alberta; for one provincial employee to attend an Instructor Training Course; for two NoFC staff to travel to Saskatchewan on two trips to present information sessions on IFMIS (Intelligent Fire Management Information System) being developed for Saskatchewan.
6. Served as Project Officer on the following:
- Meteorologist contract;
  - Detection Study contract;
  - Damage Appraisal Study (through NoFC Economics Project);
  - contract with Saskatchewan Research Council (for Detection Study data).
7. A paper on "Fire Behavior on the 1987 Elan Fire, Sask." was presented at the 5th Central Region Fire Weather Committee Scientific and Technical Seminar, and will be printed in the Seminar Proceedings.
11. Present Status of Study:
1. Information transfer has reached the level of activity designated in the original agreement Operational Plan. The technology transfer process and activities under the FRDA are firmly established and are ongoing at a rate commensurate with all predetermined goals.
  2. The continued long-term fire research effort in Saskatchewan by NoFC is being encouraged and promoted through various studies being done in the province with support from the agreement.



Capital: Nil

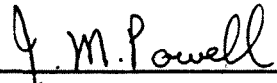
17. Signatures:

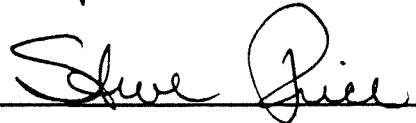
  
\_\_\_\_\_  
Investigator

  
\_\_\_\_\_  
Supervisor

  
\_\_\_\_\_  
District Manager

for   
\_\_\_\_\_  
Technical Advisor

  
\_\_\_\_\_  
Program Director, Environment

  
\_\_\_\_\_  
Program Director, Development

  
\_\_\_\_\_  
Regional Director General