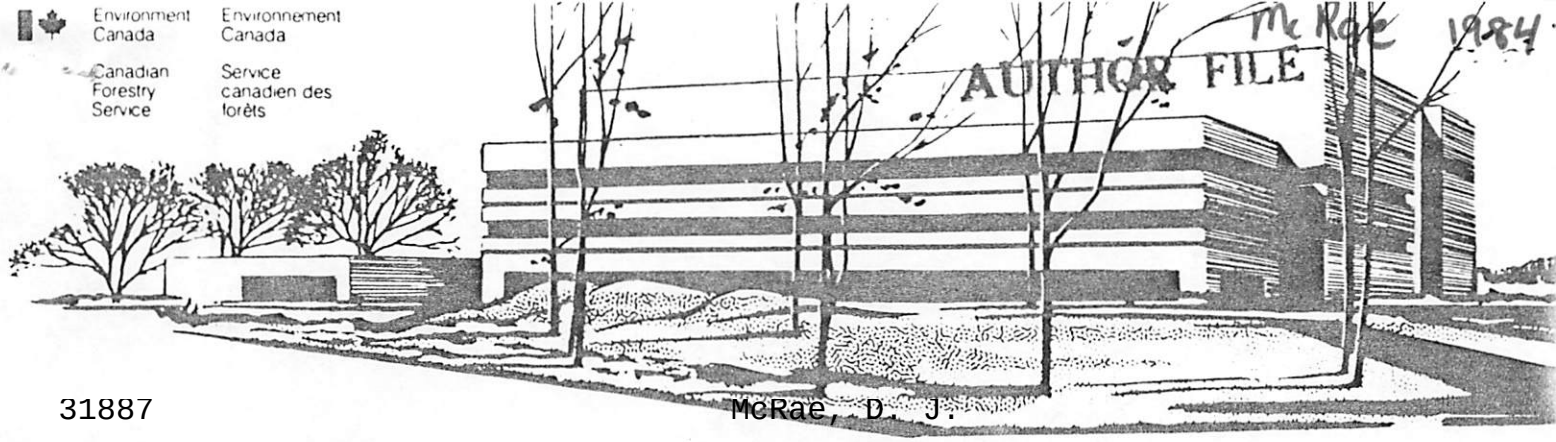
Environment Canada / Environnement Canada
Canadian Forestry Service / Service canadien des forêts



FORESTRY NEWSLETTER

GREAT LAKES FOREST RESEARCH CENTRE, SAULT STE. MARIE, ONT.

Spring 1984

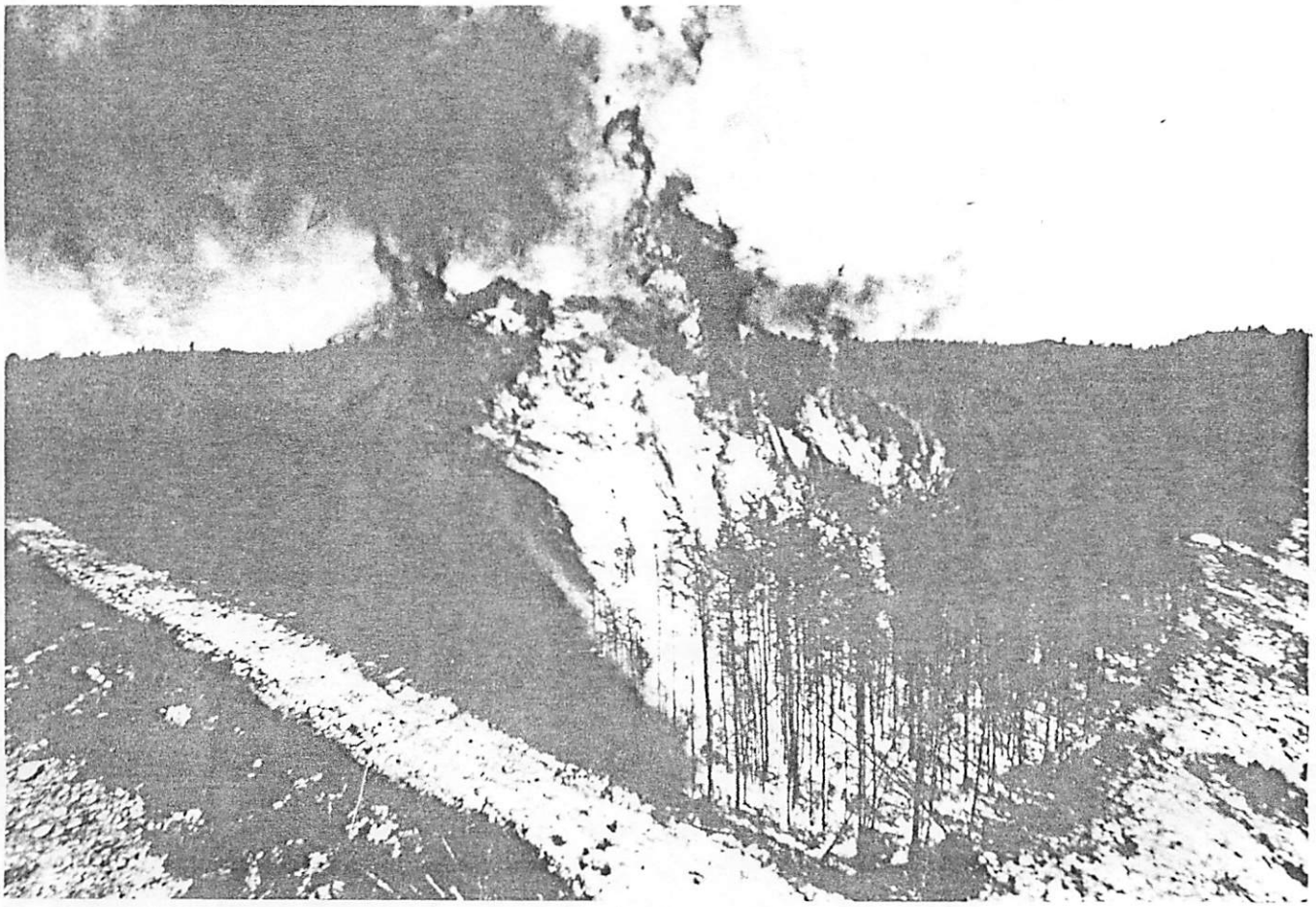
Please note the name change from Forestry Research Newsletter to Forestry Newsletter. The new title is intended to reflect the increasingly varied nature of the work done at the Great Lakes Forest Research Centre.

FOREST FIRE RESEARCH AT THE GREAT LAKES FOREST RESEARCH CENTRE

The Summer 1979 issue of the Forestry Research Newsletter was devoted entirely to research activities within the Great Lakes Forest Research Centre's (GLFRC) Forest Fire Research Unit. The following is a general update of progress over the past five years.

Forest Fire Behavior in Jack Pine

The program of conducting thoroughly documented experimental fires in major Ontario fuel types has continued in recent years, with emphasis on mature



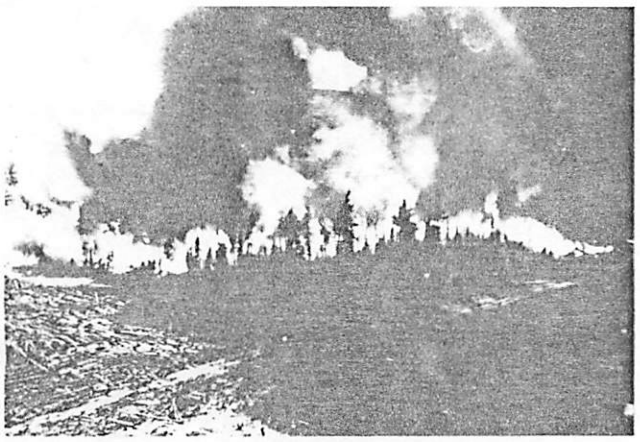
Experimental crown fire in immature jack pine, Blind River District.

and immature jack pine. Burning plots were established in selected stands, bulldozed firelines were constructed around each plot, and aerial, surface and ground fuels were sampled in detail. Fires were conducted under a broad range of weather conditions, measured at an on-site weather station. Fire behavior parameters such as rate of spread, intensity, fuel consumption and crowning potential were documented on each burn and related to prevailing weather, as reflected in the component codes and indices of the Canadian Forest Fire Weather Index (FWI) System. Ignition, control and suppression of all fires were the responsibility of Ontario Ministry of Natural Resources (OMNR) fire management personnel.

Experimental burning in mature jack pine was completed in 1983. Twelve successful burns, each 0.4 ha in size, ranging from creeping ground fires to partial crown fires, were conducted between 1973 and 1983 in an 1899 origin stand in Wawa District. A series of eighteen 0.4-ha experimental fires was conducted, between 1974 and 1981, in a very dense immature jack pine stand (1948 origin) in Blind River District. Intense, fast-spreading crown fires were common in this fuel type. Data analysis is complete for all experimental fires in both jack pine fuel types, and publication of results is under way.

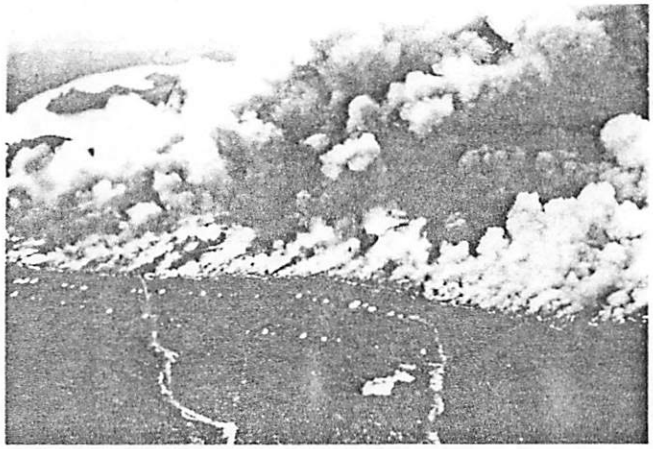
Fire Studies in Budworm-killed Balsam Fir

In response to growing concern over potential fire control problems associated with widespread balsam fir mortality resulting from the most recent spruce budworm outbreak in Ontario, GLFRC fire researchers undertook a fire behavior investigation in this fuel type in 1976. Between 1978 and 1982 six 2.0-ha plots, located in a heavily infested stand in Blind River District, were burned under a variety of weather conditions. Stand deterioration following balsam fir mortality, and subsequent surface fuel accumulation, were monitored. Spring fires (prior to leaf flush) were quite explosive, with continuous crowning, extensive downwind spotting, and spread rates in excess of 50 m/min. Summer fires carried out within a few years of stand mortality did not spread at all, because of the retarding effect of large quantities of lush surface vegetation, flourishing with the increased sunlight available as a result of overstory deterioration. However, 5-7 years after mortality, dead surface fuel has accumulated to a point at which it can overcome the retarding influence of green understory vegetation, and summer fires are able to spread continuously in consequence, though at a much slower rate than similar fires under spring conditions. Data analysis for this fuel/fire behavior investigation in dead balsam fir is complete and publication of results is under way.



Experimental burn in dead balsam fir, Blind River District.

Increasing interest in converting areas of high balsam fir mortality to productive forest has led to the consideration of prescribed fire as a possible means of achieving this goal. The technique of tramping such areas (by bulldozer) after a salvage operation, and then conducting a controlled burn in the residue, is becoming more common, and the GLFRC Fire Research Unit has been attending a number of these burns in order to gather information to facilitate the development of fire behavior and fuel consumption guidelines for this particular fuel type. The large quantities of dead, dry balsam fir fuel mean significantly higher fuel consumption levels than would be expected in a typical slash burn. Fire intensity is much higher and downwind spotting is a problem. Guidelines for predicting fire behavior in this increasingly important fuel type will be developed in the near future, as additional prescribed burns are documented.



Operational prescribed burning in tramped balsam fir using aerial ignition by helicopter, Timmins District.

Wildfires and Fire Weather

During the past decade GLFRC fire researchers have supplemented detailed experimental fire data with empirical information gathered on large Ontario wildfires, particularly in northwestern Ontario. General wildfire behavior parameters have been related to synoptic-scale weather. This blend of specific small-scale experimental fire data with more general information gathered on large-scale wildfires has provided the best and most practicable approach to quantifying and modeling forest fire behavior. All Ontario wildfire and experimental burn data are currently part of a large Canadian Forestry Service data bank being used by researchers across Canada to develop a quantitative Canadian Forest Fire Behavior Prediction (FBP) System which will permit, under varying weather conditions, the prediction of important fire behavior parameters (rate of spread, fuel consumption, intensity, crowning) for major Canadian fuel types. A preliminary version of this FBP System is being developed.

A data bank of Ontario fire weather and wildfires has been maintained within the GLFRC Fire Research Unit since 1969. This annually updated data bank contains daily weather information from approximately 100 OMNR stations and information on more than 32,000 wildfires for the period from 1965 to 1983. These data are being used regularly to assess the performance of the Canadian Forest Fire Danger Rating System (CFFDRS) in Ontario, and to delineate fire climate and fire occurrence zones in the province. An extensive investigation of the predictability of fires caused by man in various regions of Ontario is under way in cooperation with the University of Toronto.

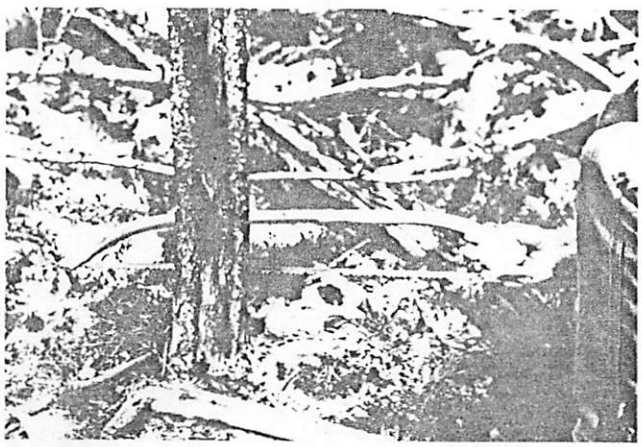
Fire Ecology Investigations

Prefire and postfire assessments of vegetation succession, regeneration, and soil nutrients have continued on all GLFRC experimental fires in mature and immature jack pine, and in spruce budworm-killed balsam fir. Postfire assessments continue for a number of years after each burn. Preliminary data analysis has confirmed that understory species composition remains relatively constant and that changes in soil nutrient levels are quite minor. The success of natural regeneration is quite high after fires in which a high degree of crown fuel is involved.

The establishment of permanent regeneration plots, on selected large Ontario wildfires in which fire behavior was well documented, has continued in recent years. To date, 28 stands in jack pine and black spruce-dominated communities have been sampled, with permanent plots being established on six large boreal forest wildfires which occurred in northwestern Ontario between 1976 and 1980. Assessments are made in the year following the fire and in alternate years thereafter. This procedure is continuing and preliminary data analysis is complete. There are indications of a strong positive relationship between amount of regeneration and fire intensity in both jack pine and black spruce stands.

Fire History

An investigation into the historical role of fire in Pukaskwa National Park, begun in 1977 at the request of Parks Canada, is essentially complete. Extensive field work and a thorough search of historical records have resulted in the production of reports on the fire environment and recommendations for fire management in Pukaskwa Park. On a smaller scale, a study of fire history and the influence of fire on forest vegetation in Parke Township near Sault Ste. Marie has been completed, and documented by S.E.J. Dominy in a Lakehead University B.Sc.F. thesis.

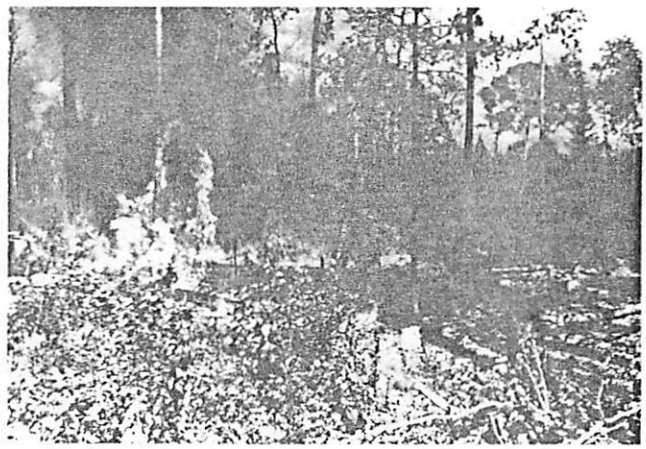


Collecting historical fire scar information, Sachigo Hills, Kapuskasing District.

In 1983, an investigation was begun into the historical frequency and periodicity of naturally occurring forest fires in the remote, unprotected boreal forest of northwestern Ontario. This study is centred in the Sachigo Hills area and will be completed in 1985, providing information on the natural role of fire in this area, a prerequisite for formulating progressive resource management strategies for this part of the province.

Prescribed Burning in the Clay Belt

An evaluation of the use of prescribed fire in boreal mixedwood cutovers in the Clay Belt region of northern Ontario was undertaken by the GLFRC Fire Research Unit in 1979. A number of large operational prescribed burns had been conducted in this fuel type, with mixed success, and questions were being raised about the relative benefits of burning and mechanical scarification as site preparation tools in this region. In response to this concern, a series of 12 experimental burns (each 4.0 ha in size) was carried out in Kapuskasing District in the summers of 1979 to 1983 inclusive. Each burn was located in fresh boreal mixedwood slash cut during the previous winter. Slash fuels in this type are patchy and discontinuous, and this, in conjunction with frequent patches of standing water resulting from the poor drainage that is characteristic of clay soils, impedes fire spread except under summer drought conditions. For each burn, fire behavior parameters were measured and related to the component codes and indices of the FWI System, as calculated at an on-site weather station. Slash fuel consumption was strongly correlated with preburn slash fuel loading in combination with the Buildup Index (BUI), while forward rate of spread and frontal fire intensity could be predicted accurately by using a combination of wind speed and BUI. Depth of burn was strongly related to the BUI, although little organic matter consumption occurs until midsummer when water pooled above the clay mineral soil has



Experimental burning in boreal mixedwood slash fuels.

evaporated. Late summer burning in this fuel type proved unsuccessful because of substantial herbaceous and shrub growth in August. A report outlining the results of this study and presenting guidelines for future prescribed burns in this fuel type has been prepared for publication.

Between 1968 and 1983 the GLFRC Fire Research Unit has produced 51 publications covering a variety of forest fire-related topics. A list of these publications is available on request from the Centre's Information Office. -- *B. J. Stocks and D. J. McRae*

RECENT STAFF APPOINTMENTS

J. T. Michael Dumas

Dr. J. T. Michael Dumas joined the staff of the Great Lakes Forest Research Centre in June, 1983. Born in Gaspé, Quebec, Dr. Dumas obtained his B.Sc. from the University of Prince Edward Island in 1975, his M.Sc. from the University of Toronto in 1977, and his Ph.D., also from Toronto, in 1981. A forest pathologist, Dr. Dumas is working on control of stem and root decays of the boreal forest.

Dr. Vincent G. Nealis was appointed to the research staff in January, 1984. A native of Fredericton, New Brunswick, Dr. Nealis obtained his B.Sc. (1974) and his M.Sc. (1976) from Carleton University, and his Ph.D. (1983) from the University of British Columbia. He has been assigned to the Centre's project on insect control research emphasizing biological methods.

Vincent G. Nealis

Gary D. Hogan

Dr. Gary D. Hogan began his duties at the Great Lakes Forest Research Centre in March, 1984. Born in Hayes (Middlesex), England, Dr. Hogan obtained his B.Sc. from the University of New Brunswick in 1971, his M.Sc. from Laurentian University in 1975, and his Ph.D. from the University of Guelph in 1978. He will be working with the Centre's project on the impact of long-range transport of atmospheric pollutants on the biogeochemistry of forest ecosystems.

DR. SIPPELL RETIRES

W. Lloyd Sippell

Dr. W. Lloyd Sippell retired on 27 January 1984 after 33 years with the federal forestry service.

Dr. Sippell, who was born in Pembroke, obtained his B.Sc. (1950) and his M.Sc. (1951) from the University of Western Ontario and his Ph.D. (1957) from the University of Michigan. His Ph.D. thesis was entitled "A Study of the forest tent caterpillar, *Malacosoma disstria* Hbn., and its parasite complex in Ontario."

Dr. Sippell spent his entire research career in Sault Ste. Marie, from the time he joined the Department in 1951. He was appointed Head of the Forest Insect Survey in 1953, and Head of the Forest Insect and Disease Survey Unit in 1965. In 1977 he was named Program Manager, Entomology and Pathology, a position he held until 1982 when he returned to research.

During his long and distinguished career Dr. Sippell contributed significantly to forest entomology in Canada. He was recognized as an authority on insect and disease biology, epidemiology and control, and devoted the greater part of his working life to the continuing problem of forest protection.

The author of more than 50 scientific papers and reports, Dr. Sippell was an active member of the Entomological Society of Canada, the Entomological Society of Ontario, and the Northeastern Forest Pest Council. In recognition of his contribution to forest entomology he was appointed a Fellow of the Entomological Society of Canada in 1981.

NATIONAL FOREST WEEK 1984

Since the 1920s, National Forest Week and its predecessors, Forest Fire Prevention Week, Save the Forest Week, and National Forest Conservation Week, have served as a focus for the development of public awareness of, and support for, forest conservation in Canada. National Forest Week is sponsored by the Canadian Forestry Association and its member associations in each province, in cooperation with many other agencies.

This year, the Minister of the Environment, the Honourable Charles Caccia, has indicated strong support for Canadian Forestry Service (CFS) involvement in National Forest Week. Each regional