

Climate-related research activities at the Northern Forestry Centre were mainly in these categories: climate of boreal forest and wetlands, forest hydrology, and fire-related climatic research.

Climate of the boreal forest

The boreal forest is a major tract of forest land with considerable importance for Canada. The influence of climate on the growth of trees in general, and of microclimate on regeneration and establishment of seedlings in harvested areas in particular, provided the rationale for continued analysis of climatic data during the year. The data used were supplied by the Canadian Climate Centre and the data collected by the Canadian Forestry Service near Hinton, Alberta. Based on climatic records of 101 stations in the boreal forest, the mean annual temperature and precipitation for the boreal forest subregions were computed as: forest-grassland transition 1.5 C, 444.8 mm; predominantly forest -0.6 C, 439.2 mm; and forest-tundra transition -7.1 C, 303.0 mm, respectively. Highly significant ($P < 0.01$) differences were detected in the mean monthly temperature among the subregions for each month, and similar differences were found in precipitation for most months. Long-term data showed slightly increasing temperature and precipitation trends within the predominantly forest subregion. The results are being presented as a journal paper accepted for publication by 'Climatic Change'.

Temperature data collected on two clearcuts located in the leasehold of St. Regis (Alberta) Ltd. near Hinton were analyzed for comparing microclimate of the cutblocks at increasing distances from the stand edge. The analyses showed interesting patterns in ground surface and soil temperatures; these are being reported separately in a paper for this workshop.

Wetlands

Wetlands are widespread in the prairie provinces and other parts of Canada. Peatlands create their own environment as an ecosystem of which climate is an important component. The study of peatland dynamics has been in progress at the Northern Forestry Centre for the Boreal Wetland Regions of Alberta, Saskatchewan, and Manitoba. An ecoclimatic map of Canada was finalized and the manuscript of a report prepared. Steve Zoltai prepared three chapters for the book "Wetlands of Canada", and contributed to a chapter on wetlands of the arctic regions of Canada; these manuscripts are presently in the review stage. A paper by him has been accepted for inclusion in "International Perspectives of Periglacial Research" being published by John Wiley & Sons Ltd. Steve Zoltai also acted as a member of the editorial group for "Wetlands of Canada".

The main objective of the wetland drainage project under the joint Wetland Drainage and Improvement Program of Canadian Forestry Service and Alberta Forest Service is to develop optimal silvicultural regimes for increasing the growth of commercial tree species on drained wetlands. Three experimental areas (Goose River, McLennan, and Wolf Creek) were established during 1985 for the study; about half of each area is scheduled for drainage, the remainder will serve as control. A weather station consisting of a recording precipitation gauge and a recording hygrothermograph were installed on each area, and nearly 400 samples collected for physical and chemical analysis. Over 100 hydraulic conductivity measurements were made, mostly at 0.6 m depth. Final plans for the drainage ditch networks have been completed and the field layout of these networks is currently in progress.

Forest hydrology and microclimate

The microclimate of 1, 3 and 5 tree-height diameter forest clearings was monitored during the past winter. Fourteen sites were instrumented with wind, net radiation (all wave), relative humidity, and air and snow temperature sensors. Snow evaporation, as determined by weighing small pans, was generally less than 0.5 mm/day. Preliminary results indicated that evaporation from snow was small, as long as wind speed near the ground was low. Most of the incoming energy caused melt - even during January.

Weather and snow data for Marmot Experimental Watershed (Mount Allen) were in less demand than last year. The data from four permanent stations operated by the Canadian Forestry Service are now available in IBM-PC format suitable for direct entry into Lotus 1-2-3. These are also available on tape or via modem from the Northern Forestry Centre's Vax system.

Several versions of the WRENSS procedure to predict annual water yield from harvested or natural forested areas are now available. One such version is on line on the University of Alberta computer (\$RUN VSAS:WRENSS); two other versions are available for the IBM-PC in either compiled FORTRAN or as a LOTUS 1-2-3 spread sheet. The procedure uses a set of climatically similar zones, forest cover type and local precipitation to provide estimates of annual water yields that are generally within 10% of the actual. The IBM versions are available from Pierre Bernier (Tel: 435-7358), as is the information on the most recent computerized version at the University of Alberta.

Forest fires and climatology

Technical and scientific seminars on fire-weather related topics were held in Winnipeg and Edmonton, and the proceedings for these were made available.

Field work continued on the joint Canadian Forestry Service/Alberta Forest Service experimental burning project in northwestern Alberta. Preburn inventory of fuels was completed. Six successful experimental fires were conducted and documented under low to moderate fire danger conditions. Head fire spread rates up to 30 m/min were observed.

A set of dew-point temperature tables were prepared for fire-weather stations with ventilated thermometers. These are analogous in format to the present relative humidity tables in the Canadian Forest Fire Weather Index (FWI) Systems Tables (i.e., dry- and wet-bulb temperatures in 0.5 C increments). A comprehensive inter-active computer program, designed to calculate the FWI System components and archive 1200 h LST fire weather observations, has been developed.

Two members of the Northern Forestry Centre participated in the review of Canadian committee on the glossary of forest fire management terms.

Publications

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Teja Singh

**CURRENT
CLIMATOLOGICAL
ACTIVITY
IN ALBERTA**

PROCEEDINGS OF THE
TENTH ANNUAL GENERAL MEETING
OF THE
ALBERTA CLIMATOLOGICAL
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