

on the front ranges of the Rocky Mountains to study the factors of the forest land that regulate stream flow, and to determine how the quantity and quality of water for the Prairie Provinces can be maintained.

Fire is not only the most dramatic enemy of the forests but also the most sudden and most devastating. In severe fires, and more particularly in areas repeatedly burned, not only may the timber be destroyed, but the soil may be consumed, rendering the areas useless for plant growth, game habitat, watershed protection and recreational use for hundreds, perhaps thousands, of years. During the decade ending in 1961, the average of the forest area burned annually in Canada was almost 2,750,000 acres.

The Department of Forestry co-operates with provincial and industrial forest-protection organizations in solving many of the problems relating to the protection of forest against fire. Probably the most important contribution made by the Department in this field to date has been the development of a system of forest-fire danger rating that is used in all provinces and territories of the country. Canada is unique among the larger nations in having such a unified system.

Research has been undertaken in nearly all phases of forest-fire control, with the exception of the development of heavy equipment for fire suppression. In recent years, increasing consideration has been given to problems concerned with fire-control standards, fire-control planning, prescribed burning for hazard reduction and silvicultural purposes, forest-fire behaviour, logistics of fire suppression, chemicals in fire control and adequate methods of preparing and using forest-fire loss statistics. Although a few of the provincial forest-protection services maintain fire-research staffs, their numbers are comparatively small. In recent years, they have made outstanding advances in the use of aircraft, both fixed-wing and rotary-wing types, for fire-control purposes. Development of radio communication systems in another important and successful activity of the provinces.

Forest Entomology and Pathology Research

The three great natural enemies of the forests are harmful insects, tree diseases, and forest fires. In Canada it is conservatively estimated that losses from insects and diseases amount to some 700,000,000 cubic feet a year. Insect and disease attacks are national rather than provincial in nature since they are no respecters of man-made boundaries. This field of forest protection has, therefore, been left with the federal authority.

The Department of Forestry, through its Forest Entomology and Pathology Branch, carries out comprehensive programmes of forest insect and disease research and surveys throughout Canada, and provides consultative and advisory services to federal, provincial, municipal and industrial organizations, and to private citizens, in connection with direct control operations and other practical measures to prevent or reduce losses owing to forest insects and diseases. The headquarters at Ottawa provides broad direction, co-ordination and policy guidance for the programmes and services, which are executed chiefly at regional establishments at Corner Brook (Newfoundland), Fredericton (New Brunswick), Quebec (P.Q.), Maple and Sault Ste. Marie (Ontario), Winnipeg (Manitoba), Saskatoon (Saskatchewan), Calgary (Alberta), and Victoria (British Columbia). In addition, certain basic research requirements of the Department are provided by specialized research sections located as follows: