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ADMINISTRATION OF CROWN FORESTS IN CANADA

Significance of the Forests

Canada is often referred to as a forest nation. Of its 1,714,000 square miles of forest acreage, more than 960,000 are productive forest land. Canadian forest industries employ more people and pay out more in salaries and wages than any other group of industries dependent on a single natural resource. Forest products consistently account for some 30 per cent of the value of all Canada's exports.

Constitutional Division of Authority

Under the provisions of the British North America Act, the administration and management of the forests were closely defined as provincial responsibilities. This situation has continued up to the present, with the Federal Government's responsibilities in forest administration being limited to the Yukon and Northwest Territories and such other federal lands as national parks, Indian reserves, certain military areas, and forest experiment stations.

There is also a strong tradition in Canada favouring public, or Crown, ownership of forests. Thus, of the total productive forest area, 82 per cent is provincial Crown land, nine per cent is held by the Federal Crown, and another nine per cent is privately owned. However, whether or not the bulk of the forest land is disposed of to private owners is a decision for each province to make. In fact, the ownership patterns vary greatly between the older parts of Canada and the newer. For example, in Prince Edward Island almost all of the productive forest land is privately owned; in Nova Scotia and New Brunswick, 77 and 53 per cent respectively are privately held. In Alberta and British Columbia, private forest land amounts to three per cent and five per cent respectively. In Ontario and Quebec, where some 63 per cent of Canada's population is concentrated, private forest ownership runs at ten per cent and nine per cent respectively.

Throughout Canada, in varying degrees, there is a movement by the provinces toward the establishment of sustained-yield forest-management systems. The mechanics of these systems are designed to meet the needs of specific provinces, and in this sense they differ widely. The common goal, however, is to manage the forests in such a way as to ensure their continuous productivity in perpetuity -- in short, to manage for the common good.

FEDERAL RESPONSIBILITIES

In spite of the fact that the responsibility for the management of the forests of Canada lies overwhelmingly with the provinces, it has been recognized since early in the century that certain forestry functions could best be performed by a central, nationally-oriented authority. Specifically, such matters as basic forest research, forest-products research, forest entomology and pathology research and survey are best dealt with at a national level, to ensure that the results of study are made available to the whole forest community.

Department of Forestry of Canada

The forest policy of the Federal Government is to a large extent set forth in the Department of Forestry Act of 1960. This Act incorporates all the powers of the Canada Forestry Act of 1949, which it replaced, and gives the Department of Forestry the responsibility for conducting all federal forestry research previously carried out by the Departments of Northern Affairs and National Resources and Agriculture. In addition, the new Act provides for federal participation in forestry publicity and public-education programmes.

Broadly stated, the objectives of the Department of Forestry are the improved management and protection of the forest resource, the fuller use of forest products, and the improvement, through research, of the competitive position of Canada's forest industries.

Specifically, this Act says, "the duties, powers and functions of the Minister extend to and include all matters over which the Parliament of Canada has jurisdiction relating to the forest resources of Canada". "The Minister," it goes on,

"(a) shall provide for the conduct of research relating to the protection, management and utilization of the forest resources of Canada and the better utilization of forest products, and may establish and maintain laboratories and other necessary facilities for such purposes;

(b) may undertake, promote or recommend measures for the encouragement of public co-operation in the protection and wise use of the forest resources of Canada;

(c) with the approval of the Governor-in-Council, may enter into agreements with the government of any province or with any person for forest protection and management or forest utilization, for the conduct of research related thereto, or for forestry publicity or education;

(d) may provide for the making of forestry surveys and provide advice relating to the protection and management of forests on land administered by any department or agency of the Government of Canada or belonging to Her Majesty in right of Canada; and

(e) at the request of any department or agency of the Government of Canada, may assume responsibility for the protection and management, including the disposal of timber and other forest products, of any forest on lands administered by such department or agency.

"In carrying out his duties and functions under this Act, the Minister may consult with and inaugurate conferences of provincial or municipal authorities, universities, representatives of industry or other interested persons."

In this connection, the first national conference of Canada's forest ministers was held in Ottawa on October 21 and 22, 1963, with all ten provincial ministers present and the federal Minister of Forestry as chairman.

In order to carry out its responsibilities, the Department of Forestry of Canada is organized into four branches -- three research and one administration -- plus an economics division, and operates from its headquarters in Ottawa through 23 regional establishments, research laboratories and experiment stations spread across the country from St. John's, Newfoundland, to Victoria, British Columbia. Somewhat broadly presented, the following are the areas of activity of the Federal Department:

Forest Management

The Department of Forestry is responsible for the protection and management of forests on certain military training areas on behalf of the Department of National Defence. It acts as consultant to the Department of Northern Affairs and National Resources, the federal department responsible for the administration, protection and management of the forests of the Yukon and Northwest Territories and national parks, and to the Department of Citizenship and Immigration with respect to Indian reserves. The Forestry Department also conducts forest surveys on lands in all the above categories.

Public Information

The Information and Technical Services Division of the Department is responsible for the development and maintenance of a comprehensive public information programme on forestry matters, with special emphasis on the research activities of the Department.

Besides initiating programmes of its own, the Department seeks to assist the provincial forest agencies, the forest industries and resource associations in their information activities.

Federal-Provincial Forestry Agreements

Although main emphasis is placed on the research role of the Department of Forestry, approximately half its Parliamentary appropriations is paid over the to the provinces under the Federal-Provincial Forestry Agreements. For most classes of shared-cost projects, a dollar-for-dollar division of costs between the Federal Government and the provinces is in effect.

The first agreements under the Canada Forestry Act of 1949 became operative in the fiscal year 1951-52, and provided federal financial contributions for the preparation of provincial forest inventories and for reforestation of unoccupied Crown lands.

Over the past 12 years, under the inventory programme, seven of the provinces have completed provincial forest inventories totalling nearly 1,000,000 square miles. They are now engaged in maintaining them and carrying out surveys of a more detailed nature. The inventory information thus made available has resulted in the opening of forest industries in hitherto undeveloped areas, and has resulted in the curtailment of cutting in some areas which were being over-exploited.

A total of 178,000,000 trees have been planted, 22,000 acres have been seeded, and 15 new forest nurseries have been established under the federally-supported reforestation programmes.

In 1957, agreements were entered into with all provinces providing federal contributions toward provincial capital expenditures on forest-fire protection. In addition, the costs of hiring aircraft or boats for fire protection are sharable. Large quantities of protective equipment have been bought and there has been marked improvement in facilities for detecting and reporting forest fires. The greatly intensified use of aircraft in recent years, especially for water bombing, has been largely financed under the federal-provincial agreements.

Financial assistance for the construction of forest-access roads, which are of prime importance in a wide range of forest-management applications, was first offered to the provinces in 1958. Since that year, more than $12 million have been contributed by the Federal Government towards the construction of forest roads, trails and airstrips.

In 1961, an agreement consolidating the various areas of shared-cost forestry undertakings, including stand-improvement projects, was offered to and accepted by all the provinces.

Since 1951, the Federal Government has contributed $32.2 million to the provinces under these general forestry agreements, and an additional $5.5 million under special agreements, notably for aerial spraying of spruce budworm in New Brunswick. The period covered by the agreements is one in which the most rapid advances towards intensive management of Canada's forest resources have been made.

Forest Research

Forest research in this sense does not include forest entomology and pathology research but refers primarily to studies carried out in silviculture, forest management, ecology, and related subjects. There are several Canadian agencies engaged in this work besides the Federal Department. For instance, professors at each of the four Forestry Schools carry out certain investigations in connection with their teaching. Some of the provincial forest authorities have research divisions. Also, provincial research foundations, as well as the National Research Council, provide financial assistance for special projects. The Woodlands Department of the Pulp and Paper Research Institute of Canada, located near Montreal, studies particular problems of harvesting and managing pulpwood forests facing member companies. Several of the larger pulp-and-paper companies assign one or two officers to small research projects, usually on a part-time basis.

The largest single organization responsible for this type of research is the Department of Forestry. Through its Forest Research Branch, it carries on comprehensive studies in the fields of forest management and forest-fire control from seven regional establishments and five research stations across the country.

Forest-management research by the Department has two main objects: to gain an understanding of trees and forests according to their inherited characteristics in relation to their environments, and to develop and improve methods and techniques for measuring, manipulating and controlling forest and forest environment to serve man's need efficiently. Forest-management research embraces four broad areas - silviculture, mensuration and surveys, tree biology and forest land. These types of research share the common aim of making possible the maximum quality and quantity of production from forests and forest land.

Research in silviculture and silvics deals with the response of forests and trees to cultural treatments designed to secure satisfactory regeneration and maximum productivity. Current research emphasizes regeneration silviculture, including artificial seeding, planting, natural regeneration, and harvest cutting methods. Treatments under investigation include: planting methods and equipment, species adaptability to site, planting site and seedbed preparation using mechanical equipment and fire, and various harvest cutting practices. The cultural effects of such treatments in quality and quantity of seed, germination and survival of seedlings and vigour and survival of planted stock are being measured. These are related to environmental factors, including soil moisture and lethal temperatures. Research is carried out on cultural practices to improve productivity, including thinning and pruning in natural and planted stands, the use of chemicals to release desirable species, and the use of fire to control species composition. The results of these experiments are combined into recommendations for the practice of silviculture in each important forest ecosystem.

Research in forest mensuration and survey methods is designed to develop and test the best methods of conducting forest inventories, preparing tables of growth and yield, and determining the volume of individual trees and stands. Improved methods of measuring tree and stand volumes on both conventional and new types of air photos are investigated. Sampling designs suitable for the determination of forest inventories are developed from a combination of airphoto interpretation and ground sampling. Improved methods of constructing yield tables and volume tables are developed, using regression functions calculated on digital computers. Methods of developing models of stand growth through regression analysis of individual tree-growth patterns are tested. An extensive series of permanent and single examination sample plots is maintained in the main forest-cover types to provide the data for growth analysis. The results of this research are employed by the wood-using industries to improve the inventory and regulation of their forest crops.

Study of the biology of important forest trees is a major field of research, aimed at obtaining a better understanding of the genetic, physiologic and ecologic controls of growth and development. Tree improvement work is centred on the pines and spruces; a search is being made to find outstanding trees and to breed from them superior strains adapted to the Canadian environment. Physiological research is primarily focussed on the flowering and cone production of spruce and Douglas fir, and there are encouraging signs that methods for inducing seed formation in "seed orchards" of young "plus" trees will soon be perfected. Environmental studies in both field and laboratory are exploring the relations between tree growth and the factors of light, temperature, moisture and nutrients, both in the crown layer of the air and the root layer of the soil. The identification and classification of seedlings and trees, as well as of minor forest plants, is a continuing aid to the other research activities.

The geographic study of forests and forest sites has to do with problems of forest-land inventory, classification of soils and forest-vegetation types, climatology and hydrology. The land base on which forests grow is receiving greater attention as provincial planting programmes grow and information is needed on the soil, its suitabilities and productive capacity, and its response to fertilizers. Closely tied to studies of the land are investigations of the natural forest cover, which indicate present and potential uses. Climatological studies, particularly on open lands, are assisting in the identification of areas where frost, high temperatures and atmospheric drought constitute a hazard to reforestation. A programme of watershed research has been started

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:

Insect Pathology Research Institute, Sault Ste. Marie
Chemical Control Section, Ottawa
Cytology and Genetics Section, Sault Ste. Marie
Bioclimatology Section, Victoria

The Statistical Research Service in Ottawa provides guidance and advice on the use of mathematical and statistical methods and procedures, and collaborates on research projects, especially those involving the use of electronic computers, with all research elements in the Department.

The forest insect and disease surveys, which are organized and conducted at the regional establishments, provide up-to-date information on infestations, pest-population trends, and occurrence of damage. The surveys are essential to assessing insect and disease hazard to infested timberlands and in formulating recommendations for control operations. They also serve as an important guide in development of the research programmes. Results of surveys are distributed regionally at periods during the field season, and are published annually for Canada as a whole.

The research programme includes intensive studies on the biology of forest insects and disease-causing fungi, and on the numerous biotic and abiotic factors influencing their distribution, abundance and destructiveness. Investigations are carried out on the growth habits, phenology and physiology of trees, so far as these relate to the susceptibility and vulnerability of trees to insect and disease attack. Studies are conducted on the ecology of forest stands in relation to predisposition to epidemic attack, or to successional changes induced by severe insect or disease damage. Experimental control on a pilot-scale basis is undertaken with chemical and cultural control methods, preparatory to application on a commercial scale by the provincial forestry departments, industrial organizations, or owners of private timberland or woodlots. The Department also undertakes biological control projects using insect parasites, predators and pathogenic micro-organisms against native and introduced pest species, and to this end maintains extensive liaison with the Commonwealth Institute of Biological Control and similar agencies in foreign countries from which stocks of promising biological control agents are imported. Research findings are published in full in scientific and technical journals, and research notes in the Bi-Monthly Progress Report of the Forest Entomology and Pathology Branch.

Advisory and consultative services have assumed increasing importance as direct-control operations, or other practical applications to reduce or prevent forest insect and disease damage, have been put into effect with increased frequency by the provinces and the industry, and by municipalities and private owners. Departmental officers assess hazard and provide advice and guidance in the organization and execution of large-scale control projects. Through intensive field studies, they also assess short-term and long-term results of control operations in connection with pest population trends, health and vigour of treated stands, and abatement of hazard.

Forest Products Research

Through its Forest Products Research Branch, the Department undertakes research in the forest-products field at laboratories in Ottawa and Vancouver. This research provides the scientific and technical knowledge required for the development of new and better uses for wood products, improved manufacturing processes and a more complete use of the wood substance available from the forests. Close relations with the provincial services, with industry and with the users of timber is maintained to ensure that this research is of national benefit.

Research undertaken falls under the following broad classifications:-

TIMBER ENGINEERING - determination of the mechanical and physical properties of Canadian woods; calculation of basic working stresses; engineered use of wood products.

PLYWOOD - various factors affecting manufacture, including peeling, drying and gluing; determination of mechanical properties; adhesives for the manufacture of plywood and glued-laminated timbers

WOOD PRESERVATION - improvement of decay-resistant properties of wood with preservatives; studies of the mechanism of movement of liquids into wood; evaluation of preservatives; development of treating schedules.

LUMBER PRODUCTION ENGINEERING - studies on the engineering aspects of sawmill operation; effect of variables and modification of saw design on power requirements, kerf, and efficiency of sawing; research into the theory and techniques of lumber seasoning.

INDUSTRIAL UTILIZATION - studies on the harvesting and manufacture of timber; research into economic use of wood residue; conducting special courses on improved sawmill practice, log-quality evaluation; seasoning of lumber; studies on improved use practices as they relate to the manufacture of forest products.

WOOD CHEMISTRY - determination of the chemical properties of Canadian woods; dimensional stabilization of wood; evaluation of mill residues for production in structural boards and other forms of use.

CONTAINERS - factors involved in the design and use of boxes, crates and other containers; improvements in standards of packing.

PAINTS AND COATINGS - investigations into the various factors affecting the painting of wood and the general performance of paints and natural finishes on wood under a variety of conditions.

FIRE RETARDANTS - improving the fire-retardant properties of wood through treatments and coatings.

WOOD PATHOLOGY - investigations of wood fungi, their effect on the properties of wood, and means of combating wood-destroying fungi.

WOOD ANATOMY - effect of anatomical structure on wood properties and behaviour, miscroscopic identification of wood and wood structure.

MICROBIOLOGY - possibilities of using wood waste through the medium of microbial action.

TIMBER PHYSICS - applications of the principles and techniques of modern physics to forest-products research; development of non-destructive methods of testing wood products; investigation of dielectric properties of wood and glues; the application of dielectric heating to the woodworking industries.

The Department's forest-products research results are available to industry through publications, technical courses, and technical assistance associated with the use of wood.

The Department supplies extensive technical data used in the development of national and international specifications. It is represented on the Associate and Technical Committees of the National Building Code, and the Sectional Specification Committees of the Canadian Standards Association for items such as engineered design

in timber, laminated construction, plywood, shingles, millwork, poles and piling, preservative treatments, protective packaging and containers. International committees on which the Department is represented by Forest Products Research Branch officers include those of the American Wood Preservers' Association, the American Society for Testing Materials, and the Food and Agriculture Organization of the United Nations. Staff members are also active on technical committees of various trade and research associations.

Field officers of the Industrial Liaison Service assist industry by making plant visits for consultation and for supplying information related to technical problems. This service is a useful aid in disseminating the results of forest-products research. In addition, this close relation with industry assists in determining laboratory research programmes that will take specific regional and industrial problems into account.

Forest Economics

The Department maintains an Economics Division responsible for advising on the economic implications of policies and developments in forestry and the forest industries. The Division reviews the economic position of Canada's forest industries and keeps in touch with international developments in the forestry field. Statistical reports are prepared for the Food and Agriculture Organization of the United Nations, the Economic Commission for Europe, and the Organization for Economic Co-operation and Development on a regular basis, and for other organizations as required. The Division compiles the National Forest Inventory annually from information supplied by provincial and federal government departments. Officers of the Division carry out economic research and economic studies on a number of aspects of forestry and the forest industries.

Eastern Rockies Forest Conservation Board

This joint Board, whose members are appointed by the federal and Alberta governments, is responsible for policies relating to the maintenance of stream flow on certain parts of the eastern slopes of the Rocky Mountains. Federal participation in this project is based on the fact that the Saskatchewan River has its headwaters in the Rocky Mountains and flows through the Provinces of Saskatchewan and Manitoba, as well as Alberta.

Federal funds have been provided to finance construction of roads and other improvements needed in the protection programme, but forestry operations in the area are carried out by the staff of the Alberta Department of Lands and Forests.

Pulp and Paper Research Institute of Canada

The Department also supports research on pulp and paper through the provision of the building and some technical equipment for the laboratories of the Pulp and Paper Research Institute of Canada, located at Pointe Claire, Quebec. Departmental representatives sit on the Institute's Board of Directors. The operating costs of the Institute are borne by the pulp-and-paper industry. McGill University participates in the work of the Institute, through the provision of post-graduate studies.

PROVINCIAL ADMINISTRATION

Because 82 per cent of the productive forests of Canada is under the jurisdiction of the provinces, provincial forest policies are of prime importance.

It is in recognition of the economic contributions of the forest resources that the provinces, in their role as forest administrators, continue to have as their objective the realization of sustained yield from Crown forests. As a means of attaining their objective, provincial forest authorities have continued to emphasize, as a matter of policy, the protection of forests against fire, insects and disease, desirable cutting methods, closer use reforestation, the development of areas supporting mature stands, more detailed inventories, and the execution or promotion of forest research. Policy has also been directed toward the selection and development of areas best suited for recreational uses.

Although systems of Crown timber disposal vary among the different provinces, the policy remains generally either to grant licenses to cut timber on a specified area for a varying number of years or to sell timber by public auction while retaining ownership of the land. All provinces set charges for timber cut on a unit-volume basis, and some levy additional charges on an area basis or on a total standing-timber volume basis. Consistent with the provinces' objective of sustaining yield on Crown forests, licenses are required to adhere to a management plan that regulates cutting and is prepared either by the licencees themselves subject to provincial approval or by the province. Further directives concerned with fire protection, cutting methods to encourage natural regeneration, reforestation in the absence of such regeneration, and standards of use are often embodied in the licence contract.

The responsibility for forest administration in each province is centred in a department of government headed by a minister, who is an elected member of the legislature and a member of the provincial cabinet. The permanent head of the department, the deputy minister, is responsible for the execution of approved policies and departmental administration. The name given the forestry department varies with the province; also, there are considerable differences in organization and in the titles and duties of the principal officers. The similarities, however, are of greater importance than the differences, and the functions performed by each forest administration are virtually the same. The provincial departments responsible for forest administration, and the titles of their chief forest officers, are as follows:

PROVINCE	CHIEF FOREST OFFICERS	DEPARTMENT	ADDRESS
Newfoundland	Deputy Minister of Resources Chief Forester	Mines, Agriculture and Resources	St. John's, Newfoundland
Prince Edward Island	Deputy Minister	Industry, Natural Resources and of Fisheries	Charlottetown, Prince Edward Island
Nova Scotia	Deputy Minister Director of Forestry and Provincial Forester	Lands and Forests	Halifax, Nova Scotia
New Brunswick	Deputy Minister	Lands and Mines	Fredericton, New Brunswick
Quebec	Deputy Minister Director of Forest Service	Lands and Forests	Quebec, Quebec

PROVINCE	CHIEF FOREST OFFICERS	DEPARTMENT	ADDRESS
Ontario	Deputy Minister	Lands and Forests	Toronto, Ontario
Manitoba	Deputy Minister Provincial Forester	Mines and Natural Resources	Winnipeg, Manitoba
Saskatchewan	Deputy Minister Director of Forests	Natural Resources	Regina and Prince Albert, Saskatchewan
Alberta	Deputy Minister	Lands and Forests	Edmonton, Alberta
British Columbia	Deputy Minister of Forests Chief Forester	Lands, Forests and Water Resources	Victoria, British Columbia

In each province, the department responsible for forest administration usually performs other duties in connection with lands, mines or other natural resources. In addition to departmental headquarters, located at the provincial capital, forest services maintain administrative districts each with a district officer in charge. Large districts may be further divided into sub-districts, each in charge of a field officer or forest ranger.

Senior staffs of the forest services are made up largely of men who have received university training in forestry. These services also employ a large number of men having received ranger or technical forestry training at forest-ranger schools at Fredericton (New Brunswick), Duchesnay (Quebec), Dorset and Port Arthur (Ontario), Prince Albert (Saskatchewan), Hinton (Alberta), and New Westminster (British Columbia).

Newfoundland

The forest policy of Newfoundland is directed toward placing all existing unalienated Crown lands under forest management, and developing those areas supporting mature stands which are not being used. Thirty-five forest-management units, comprising more than 2,000,000 acres, have beeh proclaimed forest-management areas.

Everything possible is being done to encourage establishment of new forest industries in the province. Recently, a study was carried out by the government to ascertain the possibilities of establishing a third pulp-and-paper mill.

Significant changes in policy require separate mill licences for sawing Crown and private timber, and provide for legislation to restrict forest travel in Newfoundland and Labrador.

Prince Edward Island

Almost all the forest lands in the province are privately-owned. Two foresters are employed by the provincial government to carry out a programme of forest-nursery development, planting, and extension forestry. Recently the province announced plans to accelerate assistance to private-woodlot management, to create greater opportunities for rural youth to study forestry, and to promote vigorously the organization of 4-H forestry clubs. The government also announced its intention to carry out a survey of vacant farms to determine their number, quality, value and suitability for farming or forestry.

Prince Edward Island is one of three provinces having legislation permitting governmental control over cutting on private land. The legislation provides that all persons intending to cut or clear more than two acres of land must obtain a permit from the minister.

Nova Scotia

Forest policy in Nova Scotia differs from that in most other provinces in that government control is exercised over cutting on private land. Seventy-seven per cent of the productive forest land is privately-owned, and in the past over-cutting on these areas has resulted in over-production of low-quality timber and depletion of the growing stock. The Small Tree Conservation Act now limits cutting of the major coniferous species to a minimum diameter of ten inches at stump height. On receipt of an application to cut timber below this limit, the provincial forest authority inspects the area and may specify the conditions under which it is to be cut.

Following the prescribed forest policy towards better use of the forest resources, the provincial government recently entered into an agreement with Nova Scotia Pulp Limited, which led to the establishment of a new pulp mill in the province.

New Brunswick

The general policy of the provincial government is to make available to industry as much raw material as possible from the Crown forests. The availability of raw material is governed directly by a sustained-yield management programme and by any future developments that will increase the yields through better operating methods and closer use of forest products.

The New Brunswick Forest Development Commission of 1955 published a report which embodied many recommendations for the better administration of Crown lands. As a result of the Commission's report, significant changes in legislation provided for the designation of all vacant Crown lands and unrenewed timber licences as forest reserves, and for a revision of the method of assessing the "mileage" charge on licences from one based on area to one based on standing softwood volume per square mile.

Quebec

The government of Quebec has as a general objective the improvement of its forests under sustained-yield management and continues its policy of requiring from limit holders a general management plan, which must be revised every ten years by the preparation of a special management plan. Cutting regulations provide for complete use. The province's forest service was expanded in 1960 to include a Bureau of Forest Restoration with the responsibility of promoting reforestation and silviculture on Crown lands. This government is also encouraging a greater production of pulpwood by private forest owners. In 1958, the first petition for the formation of a Pulpwood Producers Board for the joint marketing of pulpwood was sanctioned. To date, several such Boards have been approved and the scope of some has been broadened to include forest products other than pulpwood.

Ontario

Ontario has as its stated policy the placing of Crown forests under a modern system of sustained-yield management. The province also disposes of Crown timber by the granting of licences. In addition, and by virtue of an amendment to the Crown Timber Act, any public lands may now be designated as a Crown Management Unit

and agreements may be entered into with any person for the supply of Crown timber to such a person from the Unit for a term of years. The Forestry Act and the Trees Act were amended to enlarge the definition of forestry purposes, and include such secondary functions as proper environment conditions for wildlife, protection against floods and erosion, recreation and the protection and production of water supply. This amendment recognized the secondary uses which could be derived from lands originally set aside under the authority of these Acts for the production of wood and wood products. The Minister's Advisory Committee continues its function of investigating and advising on matters of policy.

Manitoba

In line with its policy of sustaining yield from the forest, the government of Manitoba has been involved in drawing up management plans for the more accessible productive forest land. The province has, in recent years, experimented with taking timber-sale bids by sealed tender and has found this method advantageous in areas where demand exceeds supply. An interdepartmental committee to study and report on the economy of southeastern Manitoba was appointed in 1957, and one of its recommendations was that the forest productivity of the region be increased and sustained permanently. Planning groups have been organized to select and develop areas best suited to recreational use. Fire-protection facilities were improved and reforestation programmes expanded.

Saskatchewan

Standing timber from Crown lands in Saskatchewan is designated for cutting through management licences, timber sales by public competition, permits to individuals, and permits or licences to the Saskatchewan Forest Products Corporation. The province exercises a unique method of control over certain products of Crown forests by granting to this Crown Corporation the sole right of disposition over spruce saw timber, spruce, jackpine and tamarack railway ties, jack-pine poles, spruce boxwood, and spruce piling. At the request of the government, consultants conducted a study of the resources and industrial opportunities, as well as the prospects of pulp-and-paper development in the province. The provincial government in turn studied the forest resource in relation to pulp-and-paper development and carried out economic studies which resulted in the development of new manufacturing industries for the production of fibreboard and poplar plywood and waferboard.

Alberta

The policy of the Province of Alberta is reflected in the Forests Act of 1949, which sets forth measures to implement a sustained-yield policy and a planned forest economy. This Act empowers the government to grant forest-management licences on Crown land. The licence holder is required to adhere to certain use, conservation and fire-protection standards set out in the Act. In 1957 the provincial government established a Royal Commission on the development of northern Alberta. In its report, the Commission dealt with, among other things, the forest resources and their prospects for development. It recommended that more money be spent on fire fighting and protection and that forestry research be augmented augmented. Since then, there has been a sizable increase in fire-protection expenditures in the province.[A]

[A] Specific information on provincial forest-administration policies, as shown above, is based on the "Progress Report 1956-60, prepared for the 8th British Commonwealth Forestry Conference, 1962."

British Columbia

This province, with some 95 per cent of its forests publicly owned, has developed possibly the most sophisticated of all sustained-yield systems in Canada up to the present. Timber is still disposed of by public auction unconnected with the over-all management plan. However, 57,000,000 acres of productive forest land are now under sustained-yield control of one kind or another. The two major vehicles are the Public Sustained-Yield Unit, administered and controlled by the Crown, with the timber being disposed of by auction, and the Tree Farm Licence, a 21-year conditionally renewable lease to private industry, which is required to adhere to a general cutting budget and management plan approved by the Provincial Forest Service. The newest legislative vehicle for sustained-yield is the Pulpwood Harvesting Area, which is designed to be "superimposed" on an existing Public Sustained-Yield Unit for the sole purpose of using the smaller species and waste materials thereon suitable for pulp production. The allowable cut from all sustained-yield tenures in British Columbia is estimated at 870,000,000 cubic feet a year, equivalent to roughly 65 per cent of the total provincial scale.

Forest Protection

Protection, so far as this section is concerned and as it relates to provincial administration, is essentially protection against forest fires.

Although administratively the provinces are, in most cases, responsible for protection against outbreaks of harmful diseases and insects, the federal forest authority has, historically, accepted the responsibility for research, survey, and consultative services. In practice, however, the federal and provincial forest authorities generally work very closely together in the planning and implementation of control programmes, though the provinces remain completely responsible for programme execution in the field. In the case of very severe outbreaks, programme costs are often shared by the two levels of government and, on special occasions, have been shared by industry as well.

The major problems of fire control in Canada's forests stem from a lack of ready access in many regions and the occurrence of hazardous climatic conditions during the fire season, which generally extends from early April until mid-October.

Though many improvements in fire-control organization and methods have been effected for the past 30 to 40 years, fire remains a serious problem in forest management, with some 2,750,000 acres being burned over annually. The fire problem is particularly pressing when considered with the developing sustained-yield programmes in most provinces. An average of almost 6,000 fires is reported each year and about 4,500 of these are known to be caused by human agencies of one kind or another. They are, therefore, preventable. With an ever-growing use of the forests for recreational purposes, the hazards from human carelessness are high.

Forest-fire control in Canada is organized on a provincial basis. In Quebec and Newfoundland, forest-protective associations have been formed to administer fire control on the very extensive lands held under licence by industries.

Fire-control operations in the provinces are usually managed from District Offices, and districts in turn are frequently subdivided into ranger districts, each being in charge of a chief

ranger. The numbers of fire-control personnel vary greatly from district to district, and also within subdivisions, but an attempt is made to have sufficient men available to attack quickly any fires that are reported.

If catastrophically large fires are to be avoided, early detection and quick initial attack on fires that do start are of paramount importance. Some provinces have hundreds of lookouts strategically located throughout their forested areas; when observations from two or more lookouts are obtained on a fire, often referred to as a "smoke", its location can be quickly pin-pointed by triangulation. In some regions, aircraft patrol is the primary means of fire detection, but more frequently aircraft are used to supplement a fixed lookout system. Despite this extensive detection system, a large number of fires in Canada are first reported by tourists, residents, crews of commercial airlines and other members of the general public.

In several provinces, specially-trained fire-suppression crews, often referred to as "standby crews" or "shock troops", are kept in constant readiness throughout the fire season for first attack on fires as they are reported. All fire-control services employ modern fire-fighting equipment suitable to their own conditions. Many specialized types of hand tools and light-weight items of power equipment are supplemented by heavy machinery such as tankers, ploughs and bulldozers. Aircraft, both fixed-wing and helicopters, are used to an ever-increasing extent in forest-fire control. Apart from their detection role, aircraft are used to transport men and equipment to the fire line, to drop water and fire retardants on the fire itself and to provide observation points from which suppression of large fires can be directed.

Through the Department of Forestry Act, the provinces are assisted in fire-control by the provision of cash grants and by a well-developed forest-fire research unit. In times of emergency, personnel and equipment of the Armed Forces may be placed at the disposal of provincial authorities to assist in fire suppression.

Prevention of fires is an important function of all forest-fire control services; education is considered the most effective method. All media of communication, including posters, television, radio and newspapers, are employed, but the personal influence of local rangers and other forest officers at forest-access points and recreation areas is probably the most effective way of educating the forest traveller in fire prevention. Education is supported by legislation; restriction or prohibition of travel in forest areas during periods of serious fire danger is common practice. In most regions, permits are required before a fire may be set during the fire season and such permits may be cancelled if the danger of fire becomes at all serious.

Forestry Information to the Public

Because of the immense value of the forests and the forest industries to the welfare of all Canadians, and because the vast majority of the resource is publicly owned, programmes of public education have been an integral part of the Canadian forest community for many years.

The provincial and federal governments, independent forestry associations and industry sustain programmes to encourage a better understanding of the value of the forest resource by the public. Much of the emphasis has been on public responsibility in the prevention of forest fires. There has been a slight change in recent years, however, designed to familiarize the public with the

need for sustained-yield management programmes, multiple use of the forests for recreational and other non-vocational purposes, and the role of research in achieving optimum management of the resource and to better the competitive position of the forest industries. Generally speaking, however, the major emphasis is still on the fire-prevention aspect.

A wide variety of communication media are used -- press, television, radio, the provincial departments of education and youth organizations.

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