



ANNUAL REPORT 1967-68

DEPARTMENT OF FORESTRY
AND RURAL DEVELOPMENT

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*Department of Forestry
and Rural Development
of Canada*

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INTRODUCTION

This year saw a change in the Office of the Deputy Minister of Forestry and Rural Development. Dr. L.Z. Rousseau, who served in this post for five years, retired September 1. He was succeeded by Mr. L.E. Couillard, formerly vice-chairman of the Economic Council of Canada.

In order to facilitate overall implementation of government policy on bilingualism, a Departmental Adviser on Bilingualism was appointed. Besides being available to officers of the Department for consultation on policy matters in this area, such items as language courses and the establishment of priorities for translations also come within the purview of the adviser.

A change in departmental responsibilities occurred this year when the administration of the program of feed grain assistance was transferred. This work is now undertaken by a Crown corporation, the Canadian Livestock Feed Board, located in Montreal.

Within the Forestry Branch substantial progress was made in carrying forward the expansion program that was approved by Treasury Board in July 1966. A total of 136 professional scientific personnel accepted positions with the Branch, and to provide accommodation and facilities for staff increase an active building program was pursued. Notable additions included an administrative block at Acadia Forest Experiment Station, an interim office and laboratory at Quebec Regional Headquarters, and a three-wing dormitory complex at Petawawa Forest Experiment Station. New laboratories and offices were added to the Ontario Regional Headquarters and the Forest Insect Pathology Laboratory located in Sault Ste. Marie. In Alberta, at Kananaskis Forest Experiment Station, a complex which houses laboratories, offices, and living accommodation was completed. Plans are also well advanced for the new Alberta-Northwest Territories-Yukon Regional Headquarters at Edmonton, and construction is expected to start in the coming fiscal year.

With the termination of the Federal-Provincial Forestry Agreement on March 31, 1967, there is no longer anything to report in this area of work. However, special agreements with four of the

provinces were in effect during this year. These agreements covered spruce budworm spraying in New Brunswick, balsam woolly aphid surveys in British Columbia, Swaine jack pine sawfly spraying in Quebec, and a forest inventory and land capability survey in Newfoundland.

The Forest Management Research and Services Institute became the Forest Management Institute during the year. This was a change in name only; the aims and objectives of the Institute remained the same.

Four of the five Advisory Committees established in the Forestry Branch Regions held one or more meetings in the course of the fiscal year. The fifth committee held one meeting in February 1967 and planned another for April 1968. These organizations are making a valuable contribution in defining and evaluating regional forestry problems and outlining priorities in research needs.

Each of the seven Research Program Committees, associated with different aspects of the work of the two Forest Products Laboratories, held meetings in 1967-68. These meetings provided opportunity for representatives of the wood-using industries to bring forward and discuss specific problems that they felt were in need of research attention.

This year also saw the establishment of the National Advisory Committee on Forest Products Research. Composed of wood industry representatives and senior members of the Forestry Branch and the Department, this body is responsible for the consideration of broad policy matters relating to the direction and emphasis of the forest products research program. In addition to its inaugural meeting on May 11, the committee also convened on September 7.

The work of the Forestry Branch was materially assisted by a number of workshops, conferences, and program reviews held throughout the year. The Forest Insect Sampling Workshop in Ottawa, the Tree Improvement Workshop in Winnipeg, and the Conference on Root Rots held in Victoria provide examples of the topics covered. Such meetings, sometimes attended by outside scientists as well as those of the Department, permit informal discussions and promote co-operation and a high degree of understanding of progress and problems that are difficult, if not impossible, to achieve through correspondence or an exchange of published results.

The solution of major forestry problems requires co-ordinated research by specialists from more than one discipline. This has led to

the setting up of task forces frequently involving scientists from several different Forestry Branch establishments as well as representatives from outside organizations. During 1967 in British Columbia, for example, forest economists, and liaison and research development staff from the British Columbia Region worked on container planting investigations along with personnel from the University of British Columbia Forestry Faculty, the British Columbia Forest Service, several forest industry firms, and the British Columbia Research Council. The expanding task force activities in 1967 also included work on forest fertilization in British Columbia and an appraisal of insecticide residues from forest spraying operations in New Brunswick.

The Rural Development Branch of the Department administers the Agricultural and Rural Development Act (ARDA), the Fund for Rural Economic Development Act (FRED), and the Maritime Marshland Rehabilitation Act (MMRA).

The first Federal-Provincial Rural Development Agreement (1962-65) emphasized the importance of agriculture in programs designed to raise rural standards of living and to increase employment opportunities. It soon became apparent, however, that development on a broader base was necessary, and a more comprehensive approach to the problem was adopted. Subsequently, the change was reflected in retitling of the legislation itself; the Agricultural Rehabilitation and Development Act became the Agricultural and Rural Development Act.

In the drafting of the second Agreement, to cover the 1965-1970 period, provision was made for the creation of a special Fund for Rural Economic Development by the federal government, to help finance comprehensive development programs in disadvantaged areas jointly designated by the federal and provincial governments. This special Fund, initially established at \$50 million in 1966, was increased the following year to \$300 million.

The 1965-70 Rural Development Agreement further provided for a maximum federal expenditure of \$25 million yearly on projects initiated in the categories of Research, Land Use and Farm Adjustment, Rehabilitation, Rural Development Staff and Training Services, Rural Development Areas, Special Rural Development Areas, Public Information Services, and Soil and Water Conservation. There was stronger emphasis on the use of the total resource base in disadvantaged rural areas in an effort to bring about increased income and employment opportunities

and raise living standards; and extension of rural development programs to Indian lands and Indian people in provinces so desiring.

Additionally, the current Agreement provides a basis for co-operation among the various provincial and federal departments working in rural areas. Interdepartmental ARDA committees at both the federal and provincial level assure this necessary element.

ARDA also embraces the Canada Land Inventory, the object of which is to produce data on land capability, primarily for land use and rural development planning. In this federal-provincial program, the Government of Canada, through the Rural Development Branch of the Department of Forestry and Rural Development, sponsors and co-ordinates the planning, collection, analysis, and the publication of results. Each province is responsible for the inventory within its borders, and is supported by federal financial and technical assistance.

Agreements signed in 1966 provide for the transfer of operation and maintenance responsibilities for works constructed under the Maritime Marshland Rehabilitation Act from the federal government to the governments of Prince Edward Island, Nova Scotia, and New Brunswick. This transfer of responsibility is expected to be completed by 1970. In return the federal government will provide engineering services for soil and water conservation programs implemented under the Agricultural and Rural Development Act in the Maritime Provinces. The Soil and Water Division of the federal regional rural development establishment at Amherst and Windsor, N.S., carries out these responsibilities.

For purposes of administering the Rural Development Agreements, Canada is divided into four regions - Atlantic, Quebec, Ontario, Western - each headed by a Director.

INTERNATIONAL ORGANIZATIONS AND PROGRAMS

Departmental participation in the work of international agencies and programs related to forestry continues to increase. This applies to the Food and Agriculture Organization (FAO) and its statutory bodies, to programs administered by the External Aid Office, to various Commonwealth organizations, and to establishments, mainly scientific in character, such as the International Union of Forestry Research Organizations (IUFRO) and the International Biological Program (IBP). The appointment of an International Liaison Officer in the office of the Special Adviser to the Deputy Minister reflects the significance attached to this increasing involvement in international forestry matters. The main function of this officer is to co-ordinate the Department's international activities and its relationships with the agencies concerned.

The 14th IUFRO Congress, held at Munich University in September 1967, was an important event for international forestry. Canada, one of more than 50 participating countries, was represented by about 40 delegates, 17 of whom were from the Department.

The 4th Session of the North American Forestry Commission of FAO (the members of which are Canada, Mexico, and the United States of America) was held in Mexico City in October 1967. The Canadian delegation was headed by the Deputy Minister of Forestry and Rural Development. Forestry matters of mutual concern were studied and discussed by the Commission and its working groups; topics included forest fire control, forest insects and diseases, forest tree improvement, and wildlife and recreation. Based on reports prepared by the Working Group on Forest Insects and Diseases, the Department published a handbook covering important forest insects and diseases of mutual concern to Canada, the United States, and Mexico.

In October 1967, the Department was represented by the Special Adviser to the Deputy Minister at the 14th Session of the Conference of FAO in Rome. This officer also took part in a meeting of the Technical Committee on Forestry and Forest Products which preceded the conference. Other Canadian participation in the work of FAO includes the chairmanship of the Advisory Committees on Pulp and Paper, and Forestry Education.

A departmental representative headed the six-member Canadian delegation that attended the 9th Commonwealth Forestry Conference at New Delhi, India, in January 1968. This conference, which is held approximately every five years, provides a forum in which Commonwealth foresters discuss their programs and activities. Special attention is also given to the technical problems of the host country.

Personnel of the Rural Development Branch took part in several international meetings including the Organization for Economic Co-operation and Development (OECD) Working Party No. 6 on Regional Development in Washington, D.C., and the 3rd Far East Conference of the Royal Science Association in Tokyo. The Forestry Branch was represented at the World Symposium on Man-Made Forests in Canberra, Australia; at a meeting of the Timber Committee of the Economic Commission for Europe held in Geneva, Switzerland; and also at a meeting of the Wood Preservation Committee of OECD convened in St. Gall, Switzerland.

A tour of Canada by eight Russian forestry specialists during the summer was one of several visits by foresters, or representatives of forest industries, from abroad.

The Department acts as a consultant to the External Aid Office in programs of forestry assistance to developing countries. An example of this type of work is the Kenya Forest Inventory Survey. Begun in 1963, and covering 6,000 square miles of forest, this operation will be completed in 1968. Inventory maps (1:25,000) and timber estimates have been produced, and similar material was also prepared for 87 square miles of plantations. Other work included an inventory of 220 square miles of mangrove forest close to the coast, and the near completion of a survey of forest reserve fringe areas to determine their potential for tree planting or agriculture. In Nigeria, the 500-square-mile Calabar Reserves Survey was completed and on the British West Indies Island of Dominica the forest resources survey, carried out by the Department in 1962, was put to practical use. A Canadian lumber company, basing its operating plans on the survey, expects to start production by the end of 1968 and anticipates a minimum output of 12 million fbm by 1971.

FORESTRY BRANCH ACTIVITIES

THE LAND AND THE SOIL

Soil survey maps, comparable to those available to agriculture, are lacking for most of Canada's forests. To fill this need, several pilot studies are in progress utilizing aerial photographs to develop basic soil classification schemes that can be applied over large areas. Up to this time, forest land has been classified in terms of those physical and ecological characteristics that would permit a subsequent evaluation of its use-capability for forestry, recreation, wildlife, and watershed values. For several years, work of this nature has been conducted to assist the Canada Land Inventory Program of the Rural Development Branch, and current studies are now extending into the boreal forest. A number of special problems, such as the classification of bogland in Newfoundland and abandoned farmland in Quebec, are also being investigated.

Basic soil research has complemented the foregoing work. The cycling processes of potentially toxic elements such as aluminum, iron, and manganese, together with some minor nutrients, were studied. The program in soil biology expanded during the year to include work on soil fauna responsible for litter breakdown and an investigation of the role of small forest mammals on soil formation. New research also began on nitrogen transformations in forest soils and on microbial response to insecticides and habitat conditions. The part played by urea in bringing about biochemical and microbiological changes in black spruce humus received further attention.

In northern Europe, forest fertilization has proved to be profitable, and this has stimulated both basic and applied research in Canada. In the latter field, studies have dealt with tree response and distribution techniques for various fertilizers on major soil types. Emphasis has been placed on applications at the seedling stage, and again, about 10 years prior to harvesting.

SILVICULTURE AND TREE BIOLOGY

In 1967-68, active research programs in silviculture and tree biology operated in all seven Forestry Branch Regions as well as at the Petawawa Forest Experiment Station and the Forest Management Institute in Ottawa. Much of the silviculture work is of a long-term, continuing nature aimed at developing improved methods for regenerating forests and for increasing yields; however, a number of new projects were also begun during the year. The tree biology program seeks to provide an increased understanding of tree species together with information that is basic for developing silvicultural methods.

Continuing investigations in forest nursery, greenhouse, and growth chamber yielded more data concerning the response of different tree species to light, temperature, and moisture. Past work has resulted in the accumulation of a substantial fund of knowledge relative to eastern Canadian trees, and greater attention is now being given to those of the West as well as to problems associated with particular combinations of species and site.

The program in tree physiology developed substantially during the year. One major topic investigated was that of resistance phenomena. Trees were examined at various stages in their cycles to determine the biological mechanisms by which they react to stresses occasioned by insect or fungus attack, drought, or temperature extremes. New projects were started in carbohydrate, growth-regulator, and tissue culture research, and work relating the chemical characteristics of jack pine seed to provenance and climatic factors was completed. Continuing activities involved basic studies of nitrogen metabolism and growth-regulatory substances in spruce, research on the physiology and tissue chemistry of the Dutch elm disease, investigation of the physiological relationships between tree roots and mycorrhiza-forming fungi, and work on white spruce check phenomena.

In tree improvement research, recent emphasis has been on provenance or interrelated genetic and ecological studies of black, white, and red spruce, jack and lodgepole pine, Douglas-fir, poplar, and yellow birch. Much attention is also being devoted to developing propagation techniques, such as the rooting of cuttings for use in the production of superior genetic material. Most regional establishments

are in the process of providing improved physical facilities for this type of research.

At Petawawa and in Quebec, important work continued on the nutrient uptake of forest stands, forest nursery nutrition, and the fertilization of plantations growing on abandoned farm land and burned-over areas. New research on forest fertilization was also started in the Newfoundland, Maritimes, and British Columbia Regions. Knowledge derived from these activities not only helps forest managers to achieve increased growth in natural and artificial stands but also assists them in improving seed production from seed orchards and other selected areas.

Increased attention is now being given to problems associated with the growing of poplars in the two prairie forest regions. Studies in Alberta are concerned with total per-acre production of these trees and, in Manitoba-Saskatchewan, methods of growing trembling aspen under short-rotation management are being developed. This work also includes investigations of yield prediction, the physiology of suckering, and the structure of clones (groups of trees that have grown up from the suckers of a single parent).

Studies of the effects of highly mechanized logging systems on the forest were continued, and work was extended to include the development of methods of artificially restocking logged-over land. Initial surveys of the influence of mechanical logging on residual trees, advanced growth, and seedbeds are now completed, and the results are being published co-operatively with the Pulp and Paper Research Institute of Canada. Also in the modern logging field, the mathematical model approach was used to evaluate practical and economic aspects of operating mechanical tree harvesters under different forest conditions.

For a number of years, container planting of small seedlings has received attention as a tool in reforestation. In co-operation with the British Columbia Forest Service, the University of British Columbia, and forest industry, departmental scientists of the British Columbia Region recently sought ways to mechanize container planting with emphasis on modifying the rigid container, or bullet planting, technique. This program also includes experimental testing and economic appraisal of the methods devised. In Alberta and Ontario detailed assessments of other operational container planting projects are in

progress. Investigations of direct seeding were expanded and the Quebec Region, with the co-operation of the Quebec and Ontario governments and industry, conducted a jack pine aerial seeding study covering a one-half square mile area of logged and burned forest.

The development of efficient methods of using large-scale aerial photography in forest surveys continued this year, and the radar altimeter, produced by the National Research Council for use in this type of work, received further testing.

Other important aspects of research concerned the improvement of techniques for estimating individual tree volume, height-age relationship, and predicting growth and yield of several forest types. Preliminary studies were also begun on a new inventory sampling procedure, allowable cut calculations, and computer simulation methods useful in forest management.

FOREST MANAGEMENT

The Department is directly concerned with forest management on forest experiment stations and national defence areas. It also accepts responsibility for managing other federal forests by agreement with the departments concerned. The work undertaken includes preparation of management plans, cutting prescriptions, surveys, research, and timber disposal. Within the Department, the various phases of the work are divided between the Forest Management Institute and the Forestry Branch Regions.

At the Acadia Forest Experiment Station, a 10-year plan is in operation to remove overmature timber and rationalize the distribution of age classes. This is yielding 6,000 cunits of wood per year from an area of 28 square miles.

Management at the Petawawa Forest Experiment Station is mainly concerned with silvicultural prescriptions for the headquarters silvicultural area and the preparation of forest land for research studies. Cutting at the Correctional Camp, together with timber salvaged from military and right-of-way clearing operations, has produced 450,000 fbm of sawlogs, 1,500 cunits of pulpwood, and a stumpage revenue of \$10,100. About 100,000 fbm of logs were also cut for the research sawmill. Other work included the application of herbicides along road allowances, a 4-mile extension of the road system, and Ribes

eradication over an area of 300 acres as a control measure for white pine blister rust.

A new forest management plan was prepared for the Kananaskis Forest Experiment Station to improve age-class distribution for research purposes. Prospects for wood production have improved with increased local demand and the first timber sale for the Station was let this year to cover 350,000 fbm from a 28-acre fire research site.

During the past two years stumpage returns from the Base Borden and Meaford Range areas have amounted to \$24,362. Over the same period, stand improvement, on permit, was completed for 322 acres at the Base, and in addition, 8 miles of 24-foot-wide fire breaks were cleared.

At Base Gagetown annual wood production is 20,000 cunits, but it is expected that this will decrease in future because of clearing required for military purposes. The fire and logging access road system provided by the Department now includes 108 miles of new grade together with 254 miles of old farm roads which have been improved to accommodate truck traffic.

Also in the Maritimes, 170,000 fbm of sawlogs from the forests on the Bedford Rifle Range, Nova Scotia, were sold along with 230 cords of pulpwood from the stands of the McGivney Ordnance Depot in New Brunswick.

Figures on wood production from the various federal lands will be found in Tables 5 and 6 of the Forestry Tables.

FOREST FIRE RESEARCH

Forest fires destroy or damage the growth on some 2.5 million acres during the average fire season in Canada. Estimates indicate that a little less than 2 million acres were burned over during 1967, but fire-fighting costs were reported to be much higher than normal. The fire research program conducted by the Department is designed to reduce both control costs and damage and to help solve specific problems confronting fire protection authorities.

In British Columbia, forest fires were particularly destructive in 1967, but the conditions that prevailed provided an excellent opportunity to complete a program of field studies involving prescribed fire in logging slash. More than 50 such fires, each covering about

2 to 3 acres, were studied to determine rate-of-spread and fire impact factors. This project, in an average British Columbia fire season, would have been restricted to 10 to 15 fires.

The application of research to problems of forest operations was successfully demonstrated this year with the design of a fire detection system for an area of some 7,000 square miles in Manitoba. A computer was used in this work to select those combinations of fixed lookouts and patrol aircraft that provided the most effective coverage in relation to the funds available.

Much effort is being devoted to the subjects of forest fire danger rating and danger forecasting since it is on the basis of these aids that most forest protection agencies organize their day-to-day operations. Methods were developed and programs written for computerizing all necessary rating calculations and having both input and output data transmitted by teleprinter. This is an important advance towards a Canada-wide danger forecasting service. At present, this type of departmental assistance is available only to Quebec and the Maritime Provinces.

Electronic computers are enabling the Department to improve its operation in other fields as well. An example of this is the production of the quarterly publication "Forest Fire Control Abstracts", a popular report summarizing fire control literature of interest to Canadian forest protection staffs. By using a computerized manuscript assembly process, these abstracts are now produced in less than one tenth of the time formerly required.

FOREST INSECT AND DISEASE SURVEY

This Survey is a national project operated continuously by the Department in collaboration with the provincial forestry departments, industry, and other agencies. Its primary objective is to detect and appraise insect and disease outbreaks anywhere in Canada's forests. Knowledge derived from these operations assists in the planning and evaluation of research and control programs. The work of the Survey is greatly assisted by modern, machine data-processing methods which permit rapid reporting of insect and disease conditions to all interested agencies. Annual reports are published for Canada as a whole, as well as on a more detailed regional and problem basis.

Noteworthy features of insect and disease conditions prevailing in Canada during 1967-68 are contained in the following summary.

The area affected by spruce budworm in New Brunswick was substantially reduced in 1967, and balsam fir defoliation was less severe than in any year since the early 1950's. Spruce budworm populations increased sharply in three relatively small and widely-separated regions of Ontario. These areas will be carefully watched since they are close to other susceptible forest stands. In northern Saskatchewan, Alberta, and the Northwest Territories, spruce budworm attack in pure spruce stands continues at outbreak levels.

The balsam woolly aphid was again a serious problem in fir stands in Newfoundland and coastal British Columbia. Several new spot infestations were recorded in Newfoundland, and it appears that the aphid will eventually affect all fir stands in that province. Trees damaged by the aphid in western Newfoundland have been further weakened by an outbreak of the hemlock looper which, if it continues, could kill thousands of acres of mature and overmature fir trees in the next year or two. There was little change in the status of the aphid in British Columbia except for a severe infestation on some planted ornamental fir in the interior of the province. Infested trees in this area were burned, and there is no evidence of spread to surrounding forest stands. The Department continues to work closely with the British Columbia Forest Service to define the geographic limits of the aphid and to devise means of preventing its spread.

Outbreaks of jack pine budworm developed over a large area in central Canada during the year. Jack pine stands covering approximately 10,000 square miles along the Manitoba-Ontario border were severely defoliated. Some pine plantations in Manitoba were also affected and chemical controls were used to prevent serious losses.

Scleroderris canker continued to be a serious threat to pine plantations in eastern Canada. New infection centres were recorded in southern Ontario and extensive mortality occurred among young planted pines in the eastern and central regions of the province. For the first time, this disease also caused losses in some southern Quebec red pine and jack pine plantations.

No significant changes in the distribution of Dutch elm disease were noted in the Maritimes or Quebec, but in Ontario it progressed as far west as Sault Ste. Marie. This spread was accompanied

by a substantial increase in the incidence of diseased trees in some of the older centres of infection in the province.

FOREST ENTOMOLOGY

During 1967-68, the Department's program provided financial support for insect control operations through the renewal of special agreements in New Brunswick and British Columbia and the negotiation of a new agreement with Quebec. In New Brunswick, a contribution of \$674,022 was made towards spruce budworm spraying and in British Columbia funds up to \$55,000 were made available for continued support of surveys of balsam woolly aphid infestations. The original agreement for this work, which was in effect in 1966-67, provided \$150,000, but by the end of that year only \$117,622 of the amount allocated had been used. A total of up to \$45,000 was assigned by new special agreement for aerial spraying of pine stands infested with the Swaine jack pine sawfly in Quebec. The provinces and industry made additional contributions to this work.

The New Brunswick spruce budworm spraying program covered 1,039,080 acres this year. This is a decrease of approximately 50 per cent over the figure for 1966-67. As in past years, DDT was the principal insecticide employed, with Phosphamidon being applied in proximity to the main salmon streams because of its lower toxicity to fish. On approximately one fifth of the total area sprayed, Sumithion and Novathion were used and satisfactory control was achieved. For the second consecutive year overall results of spraying were excellent and, consequently, the area of infestation going into the spring of 1968 will be about one third of what it was at the beginning of 1967. Additional new insecticides for spruce budworm were tested in the course of the year, and studies were carried out to improve spray formulations and application techniques. Research on endemic budworm infestations in northern New Brunswick and Ontario continues to provide information on the causes of violent changes in the population of this insect.

The Swaine jack pine sawfly spraying project in Quebec covered seven areas totalling 90,000 acres and utilized Phosphamidon, Sumithion, and Novathion. In all spraying operations, every endeavour is made to achieve control with as small amount of insecticide as

possible. To this end, the three insecticides used were applied at concentrations of 1/8 and 1/4 lb. in 0.2 gallon of water per acre. Results indicated that the lower concentration is adequate for control. The complete operation was highly satisfactory, with mortality attributable to the insecticides ranging from 96.3 to 100 per cent.

Through continuing co-operation with the Commonwealth Institute of Biological Control and the Canada Department of Agriculture, several parasites and a predator were imported from overseas to combat the most injurious of Canada's accidentally-introduced insect pests. The parasites were released against the European pine sawfly and the European pine shoot moth; the single predator against the balsam woolly aphid. Parasites of the larch sawfly, released previously in Manitoba, served as a source for redistribution to the Maritimes during the year. In both regions the parasites are proving to be especially successful near the release points, but natural dispersal has been rather slow.

In the course of the year, several entomological research programs became part of a research team approach to solve broader forestry problems. It remained essential, however, to continue to develop background information on the mode of action of insect disease organisms, population dynamics, and systems ecology, all of which are basic to a better understanding of insect control.

FOREST PATHOLOGY

It is estimated that Canadian forest diseases cause annual losses of about 1 billion cubic feet of wood. To cope with this situation, the Department maintains a continuing research program directed towards solving forest disease problems and developing control procedures. This work covers a broad range of destructive diseases including those prevalent in nurseries, plantations, and natural stands. The portion of pathology research relating to root and butt rots is highlighted in this year's report.

Root and butt fungi cause widespread damage as evidenced by the incidence of windthrow, decay, and death among infected trees. These factors in turn, alter the structure of stands and influence future timber yields. Both plantations and natural forests are affected, but because of thinning procedures, monoculture, and the possibility of poor site selection the hazards are greater in the planted areas.

Considerable work has been done on Fomes root rot which is known to be damaging recently-thinned plantations in five counties in the southern part of Ontario. Normally, following initial infection of stumps, this fungus proceeds to the roots and transfers by root contact to neighbouring healthy trees. It has now been established that spores can also infect and colonize damaged roots where these are exposed. Other studies revealed that spread depends as well upon host age, tree spacing, and site conditions.

Although coniferous trees, especially pines, are much more subject to Fomes root rot than hardwoods, it has, nevertheless, been isolated from an elm stump and a young ash tree. Research is continuing to determine the relative susceptibility of native hardwoods.

Control of this rot in Ontario plantations is effected by applying 10 per cent sodium nitrite solution to new stumps. This is routine procedure in provincially-operated plantations and is recommended to all private forest and woodlot owners.

In British Columbia the disease causes heart rot in living conifers, but is not known to result in mortality as it does in Ontario. In parallel with the intensification of management practices (including thinning) in British Columbia coastal forests, experimentation on fungus population, host susceptibility, and spread is in progress to establish the disease potential.

The majority of commercial trees in British Columbia appear to be subject to Fomes stump infection, and in the case of Douglas-fir and western hemlock this is quickly followed by progression into the roots. Seasonal incidence on these two trees, and on balsam fir, is being investigated. Where the fungus persists in stumps and decay from previous crops, preliminary results indicate that it can frequently spread to young western hemlock trees but less often to young Douglas-fir.

Experiments in the control of Fomes root rot are underway in British Columbia. These involve stump treatment of western hemlock and Douglas-fir with such chemicals as sodium nitrite, urea, borax, and copper oxychloride.

A second important fungus disease, also found in the British Columbia Region, is Poria root rot. It will attack most commercial species in the province, but heavy damage is confined, for the most part, to Douglas-fir stands ranging from 30 to 120 years of age.

Considerable work has been done using antibiotics and chemicals in an attempt to control the spread of this disease. Applications, both to trees and soil, have so far proved unsuccessful. However, research is now in progress on the economic feasibility of stump removal and the usefulness of this approach as a control measure.

Other studies on *Poria* root rot include root inoculation of a wide range of native and exotic trees to establish the likelihood of their becoming infected. Where infection occurs, the rate of spread is compared with that prevailing in Douglas-fir.

During the year, investigations were made of spruce root rot in the Manitoba-Saskatchewan Region. It was found that low soil fertility, inadequate moisture, and excessively compact soils apparently predispose trees to this disease, but initial fertilization and irrigation experiments failed to reduce its intensity. Studies of root and butt rots of balsam fir in Quebec revealed that these fungi are unable to survive in soil unless in constant contact with wood debris. Significantly, almost any species of wood may be infected by these rots. In New Brunswick, investigations showed no correlation between the incidence of balsam fir butt rot and spruce budworm defoliation.

FOREST PRODUCTS RESEARCH

During the year, in an effort to meet the rapidly increasing need for knowledge of wood properties and wood conversion techniques, the staff of the Ottawa Forest Products Laboratory was increased from 147 to 171 while that of the Vancouver Laboratory rose from 106 to 136. Research covered 14 main areas of activity.

In the field of wood anatomy, a co-operative project was undertaken with the British Columbia Regional Laboratory and the Pacific Logging Company. This was concerned with the measurement of changes in volume growth and specific gravity in Douglas-fir following the application of fertilizer. A taxonomic investigation of the genus *Abies*, based on the distribution of calcium oxalate crystals in the wood, was also completed.

The performance of western red cedar in many of its end uses is profoundly affected by the extractives that it contains, and the structure and properties of these substances were the subject of further research. Studies of the extractives of eastern Canadian hardwoods,

particularly birch, maple, and elm, were also made in the hope of gaining a better understanding of discoloration defects that present problems to the furniture industry. Further research in the field of wood chemistry included observations on the photochemical degradation of wood, designed to provide information necessary for the development of more durable coatings. The effects of heat treatment on the dimensional stability of western red cedar and spruce were also studied.

A number of projects concerned with the strength and stiffness of wood received attention. It was found, for example, that machine-shaved, plantation-grown red pine poles were not significantly different in strength from those grown in natural stands. Stress relaxation in wood at constant strain takes place in numerous situations where wood is used as a structural material. One study in this area involved Douglas-fir loaded in compression at various angles to the grain. Fractional stress relaxation was found to increase with increasing grain angle. Another investigation revealed a close relationship between the vibrational properties of wood and its creep under bending stress. This may lead to the provision of non-destructive methods for determining the long-term strength of wood. A vibrational grader was also developed which accurately and rapidly measures the edgewise modulus of elasticity of commercial lumber. Tests made with this equipment showed that it is more efficient than visual or mechanical grading in classifying timber according to strength.

In structural design research, theoretical studies of stresses in pitched, tapered laminated beams were supplemented by actual measurements. A specially fabricated beam was loaded and the results measured by photo-strain and electrical resistance strain gauge techniques. Other work was begun on the effects of knots and angle grain on the strength of plywood panels. The buckling of the compressive face of stressed-skin panels was also examined with a view to developing more efficient reinforcing designs. The search for improved working stresses for use in engineered design in wood was continued with emphasis on strength data derived from full-sized timbers.

Research into harvesting methods took place during the year. Tree felling by conventional means was compared with that carried out by one type of tractor-powered shears. It was found that direct savings of up to 50 per cent resulted from the use of the shears. With the co-operation of Balloon Transport Limited and the Department of

Industry, a study was launched into balloon logging. In work on the skidding of timber, it was established that load orientation and weight, together with height of suspension at the leading end, had the greatest effect on power requirements. It was also found that up to $4\frac{1}{2}$ times more power was needed to start a load moving than to keep it in motion.

In sawmilling, ways were sought to improve efficiency in debarking frozen (-30°F) white spruce logs through research on the cutting tool of a simulated, ring-type debarking machine. In converting high-quality, hard maple logs to furniture components, preliminary data showed that live sawing followed by grade ripping produced a 20 per cent increase in lumber value when compared with taper sawing logs on four faces. Production characteristics of headrigs designed for sawing small logs into lumber, while simultaneously producing chips from the residue, were measured and compared with those of conventional machinery. The new equipment was found to reduce processing costs by about 50 per cent and to decrease sawdust production from approximately 20 per cent to 5 per cent.

The normal fixed nose bar on a laboratory lathe was replaced with a floating pressure bar in an experiment to improve the accuracy of industrial veneer cutting. Assistance was also provided to veneer manufacturers through peeling projects conducted at seven commercial factories. This work was designed to achieve production of uniformly thin veneer. Further research led to development of an equation to predict veneer-peel quality. This relies on a knowledge of the physical and mechanical properties of wood together with information on the geometry and settings of the veneer knife and pressure bar.

A new method for reducing both lumber seasoning degrade and drying time was explored. The treatment consisted of "prestressing" boards by passing them through a pair of pinch rolls; the pressure on the green boards being sufficient to cause a momentary reduction in thickness in the order of 5 per cent to 15 per cent. Initial trials have been very promising and further work is in progress to determine both the optimum treatment and the underlying anatomical and mechanical factors involved. In addition to this work, kiln schedule development was undertaken for western white spruce and the effect of circulation on drying time for this lumber was also investigated.

In research on gluing, techniques for quantitatively measuring the degree of cure in phenol-formaldehyde adhesive bonds were developed, and tests to assess the effect of species on the rate at which glue lines break down were completed. Examinations were also made of the behaviour of glued wood products produced with little or no clamping pressure and having glue lines up to 0.050 inch in thickness. This information is important to current work on nail-gluing of lumber and plywood composites.

With the eventual goal of protecting wood against organisms and fire, research was begun on the relationships between pit anatomy and permeability of Douglas-fir. Gas chromatography is also being employed to measure the carbon dioxide produced by respiring fungi. This in turn provides means for a more rapid evaluation of the efficacy of wood preservatives. A completed project showed that biological storage losses in decked logs can largely be eliminated by intermittent water spraying. A biological method of controlling decay in birch logs during summer storage was also investigated and this could have application in instances where it is impractical to store logs under water or to apply water sprays. A co-operative industrial project was started to discover the amount of pentachlorophenol-base preventive required to protect freshly-cut lumber for periods of up to two years.

Research is in progress which, it is hoped, will lead to a control for the subterranean termite which has become established, and is spreading, in southern Ontario. A combined attractant-insecticide is being employed against this insect on several test plots and results to date have been promising.

The fire resistance of wood and wood products received further attention this year. Processes involved in thermal degradation were explored and surface flammability determinations were made for hardwood plywood treated with fire-retardant impregnants and coatings.

To eliminate cracks and checks that appear in untreated plywood, work has progressed on the use of dimethylolethyleneurea as a veneer stabilizing agent. Solutions of some phosphorous compounds have also been used both to stabilize veneer and reduce flame spread.

This year saw the installation and staffing of pulping and carbohydrate research laboratories at the Vancouver Forest Products Laboratory. The equipment for these was calibrated and procedures were standardized. The long-range pulping needs of the Department

were reviewed, and research embracing outside chip storage, micro-pulping, and whole-tree utilization was begun.

Efforts to provide improved wood-based packaging were continued. New designs for 40- and 90-pound cheese boxes were drawn up and evaluated, and the feasibility of using secondary wood species in pallet construction was also studied. Other work in this field included production of new sheet materials for cleated panel boxes and the devising of special methods of packaging military stores.

One of the limitations on the use of quality control in small manufacturing plants is the high cost of testing machines for recording strength properties of wood products. An example of work directed towards overcoming this type of difficulty was the establishment of test techniques for measuring the three most important properties of particleboard, using a low-cost torque wrench.

FOREST ECONOMICS RESEARCH

The economics research activities of the Department are centred in the Forest Economics Research Institute located at Ottawa and in economics sections within each of the Forestry Branch Regions.

The broad functions of the Institute include studies of forest resources, forest industries, product marketing, and the provision of economic criteria and information to assist in formulating policy and programs. An important part of this work involves the development of new methods of economic analysis, and the adaptation of older ones, to cope effectively with emerging problems. The regional economists conduct studies and act as consultants and advisors in their own areas. They also supply regional data in support of the national program of the Institute.

To carry out its responsibilities the Institute is organized into the following six units: Statistical and Data Processing, Policy and Legislation, Marketing and Demand, Industry and Sector, Production and Management, and Resources and Resource Analysis.

Within the Policy and Legislation unit the main activity during the year was concerned with finding more efficient ways of allocating funds to research programs in the Forestry Branch. Pilot studies related to this work are proceeding in Vancouver and Winnipeg. A consolidation of Canadian forestry statutes and regulations was also

produced and copies are available for limited distribution. The unit is currently engaged on a digest of Canadian forest fire legislation.

The Production and Management unit completed a preliminary study on the economics of afforestation on marginal and submarginal agricultural land. For Prince Edward Island a forestry sector analysis was concluded. This outlined alternative and optimum courses of action for expanding forestry as part of an overall development plan. A computer program was developed which provides a more efficient method of making forest management decisions when two or more courses of action are open. Other work of the unit included the preparation of a brief for the Associate Committee on Forest Fire Protection concerning a method of studying the economics of forest fire protection. Preliminary research on the economics of forest fertilization was also begun.

A report on the production and consumption of construction-grade plywood was prepared by the Market and Demand unit for presentation at a symposium convened by the FAO/ECE Timber Committee in Geneva, Switzerland. A survey now being planned by the unit will result in a quantitative measure of lumber and wood-based panels being used in single detached dwellings. The impact of the Kennedy Round Agreement on the Canadian forest products industry is also under investigation.

The Industry and Sector unit was involved in developing economic research programs in the Alberta-N.W.T.-Yukon and Manitoba-Saskatchewan Regions during the year. Discussions were also held with regional directors concerning a system for program analysis and a simplified mathematical model for this purpose is currently receiving attention. The unit also conducted a short investigation on means of indicating principal trends and patterns within the forest economy. This is the first of a series of studies designed to show the role of forestry in the overall economy. Other work included preparation of comments on the possible effects on forestry of the recommendations of the Royal Commission on Taxation. A study of central Canadian sawmills is now approaching completion.

Departmental economists conducted two seminars at the University of Toronto in the course of the year. One of these dealt with multiple land use; the other with the economics of forest management for timber production.

FORESTRY TABLES

TABLE 1 - NATIONAL FOREST INVENTORY - 1964

FOREST LAND	<i>Thousands of acres</i>
Softwoods	342,708
Mixedwoods	142,000
Hardwoods	73,304
Unclassified	<u>56,291</u>
Total Productive Forest Land	614,303
Non-productive Forest Land	<u>480,601</u>
Total Forest Land	<u>1,094,904</u>
Total Land Area of Canada	2,278,552
<hr/>	
VOLUME OF MERCHANTABLE TIMBER	<i>Millions of cubic feet</i>
Softwoods	609,063
Hardwoods	<u>139,919</u>
Total	748,982
<hr/>	
TENURE OF PRODUCTIVE FOREST LANDS	<i>Thousands of acres</i>
Provincial Crown	500,202
Federal Crown	56,749
Privately-owned	<u>57,352</u>
Total	614,303

Source: Forest Economics Research Institute, Department of Forestry and Rural Development.

TABLE 2 - ANNUAL FOREST DEPLETION

	MILLIONS OF CUBIC FEET		PERCENTAGE	
	1954-63 AVERAGE	1964	1954-63 AVERAGE	1964
PRODUCTION OF TIMBER PRODUCTS				
Logs and bolts	1,677	2,187	44.2	55.8
Pulpwood	1,280	1,185	33.7	30.3
Fuelwood	264	199	6.9	5.1
Other products	<u>56</u>	<u>56</u>	<u>1.5</u>	<u>1.4</u>
Total	3,277	3,627	86.3	92.6
WASTAGE				
By forest fires	<u>520</u>	<u>288</u>	<u>13.7</u>	<u>7.4</u>
GRAND TOTAL¹	3,797	3,915	100.0	100.0

¹ Does not include wastage caused by agencies other than fire, such as insects, disease and natural mortality, for which no reliable estimates are available.

Sources: Dominion Bureau of Statistics.
Department of Forestry and Rural Development.

TABLE 3 - PRINCIPAL STATISTICS OF THE FOREST INDUSTRIES - 1965

INDUSTRY	EMPLOYEES	SALARIES AND WAGES	VALUE ADDED ¹	GROSS VALUE OF PRODUCTION
	<i>Number</i>	<i>Millions of dollars</i>		
LOGGING ²	53,992	274	547	1,225
PULP AND PAPER	69,897	424	1,042	2,104
SAWMILLS	52,375	232	400	922
WOOD-USING	77,626	321	533	1,074
PAPER-USING	35,109	168	323	778
TOTAL	288,999	1,419	2,845	-

¹ Gross or sale value less cost of materials, fuel, purchased electricity and process supplies consumed.

² New establishment concept. Data not comparable with previous years.

Source: Dominion Bureau of Statistics.

TABLE 4 - PRODUCTION AND TRADE OF MAJOR FOREST PRODUCTS - 1966

PRODUCT	PRODUCTION ¹	EXPORTS	IMPORTS
ROUNDWOOD <i>millions of cubic feet</i>	3,627 ²	222 ³	71
LUMBER <i>millions of board feet</i>	9,987	6,362	268
PLYWOOD <i>millions of square feet</i> <i>¾-inch basis</i>	3,056	559	154
WOOD PULP <i>thousands of tons</i>	16,004	4,096	58
NEWSPRINT <i>thousands of tons</i>	8,419	7,764	-
PAPERBOARD <i>thousands of tons</i>	1,674	258	88
WRAPPING PAPER <i>thousands of tons</i>	424	46	5
FINE PAPERS <i>thousands of tons</i>	587	171	25

¹ Preliminary estimate.

² 1964 data.

³ Includes pulpwood chips.

Sources: Dominion Bureau of Statistics.
Canadian Pulp and Paper Association.

TABLE 5 - ANNUAL TIMBER PRODUCTION BY FEDERAL AGENCY - CUNITS

YEAR	YUKON AND NORTHWEST TERRITORIES	NATIONAL PARKS	DEPARTMENT OF NATIONAL DEFENCE	FOREST EXPERIMENT STATIONS	INDIAN RESERVES	ALL SPECIES TOTAL
1960-61	23,824	46,659	7,294	7,544	268,849	354,170
1961-62	18,144	45,482	13,536	2,366	214,460	293,988
1962-63	41,057	39,604	13,123	14,215	332,077	440,076
1963-64	39,652	38,374	15,363	11,471	614,888	719,748
1964-65	32,636	37,065	20,010	9,265	336,818	435,794
1965-66	32,685	46,278	21,802	6,593	357,078	464,436
1966-67	36,568	54,638	20,692	10,022	314,600	436,520

TABLE 6 - ANNUAL TIMBER PRODUCTION OF
FEDERAL AGENCIES BY PRODUCT - IN CUNITS

YEAR	LOGS	PULP- WOOD	FUEL- WOOD	POLES, PILING	MINING TIMBER	BOLTS	OTHER ROUND- WOOD	ALL SPECIES TOTAL
1960-61	137,307	84,330	103,227	12,066	5,310	742	11,188	354,170
1961-62	128,707	55,759	88,756	3,817	567	1,135	15,247	293,988
1962-63	168,816	62,162	151,491	23,489	10,429	707	22,982	440,076
1963-64	242,466	73,362	367,518	13,866	5,744	1,965	14,827	719,748
1964-65	220,397	73,267	111,985	6,289	7,463	497	15,896	435,794
1965-66	213,791	82,015	140,353	4,432	8,674	1,210	13,961	464,436
1966-67	219,564	69,643	130,103	4,351	5,700	872	6,287	436,520

RURAL DEVELOPMENT BRANCH ACTIVITIES

AGRICULTURAL AND RURAL DEVELOPMENT

ATLANTIC REGION

The Director, with his program-development and administrative staffs, moved in January from his original headquarters in Amherst, N.S., to new offices in Moncton, N.B. As a result, liaison with the various federal and provincial departments and agencies has been facilitated.

ARDA activities in the Atlantic Provinces, and consequently regional office activities, were influenced by FRED (Fund for Rural Economic Development) programs both underway and in the formulative stages. In addition to the importance and far-reaching effects of these comprehensive development programs, valuable contributions to rural development continued to be made through participation in joint ARDA undertakings.

In Newfoundland, projects approved covered a diversity of fields. They included resource-oriented programs, such as community pasture development, and a grant to aid in the establishment of the "Development for Progress Committee" at Eastport, Bonavista Bay.

The total of nine projects approved represented an overall federal contribution of \$548,500.

In addition, the cost of preparing a comprehensive development plan for Western Newfoundland, estimated at \$200,000, is to be borne by the federal government.

The federal contribution to Prince Edward Island's eleven ARDA-sponsored projects totalled \$708,800.

Assistance to the extent of \$166,000 was extended to the province's Water Conservation and Land Improvement Program. The federal government is also paying half the cost of developing a provincial park at Brudenell, and shared the expenses of sending a rural development worker to the University of Colorado for extension training.

Cost sharing arrangements with respect to Nova Scotia's major programs in resource development and conservation were renewed.

The programs include Tile Drainage, Rural Pond Construction, Forest Stand Improvement, Community Pasture Development, and Campground and Picnic Area Development.

Human-resource improvement, financially supported through ARDA, included the Rural Manpower Development Program inaugurated during the year.

In total, 26 projects, involving a federal contribution of \$1,059,900, were approved.

New Brunswick received \$799,000 in federal assistance for 15 projects. Federal support was given to the province's programs of reforestation and stand improvement on Crown lands, to a project establishing a 2,100-acre community pasture on the Tantramar Marsh, and to investigating the socio-economic situation in Charlotte, Madawaska and northern Victoria counties.

QUEBEC REGION

A decisive turning point was reached during the year, with the opening and staffing of a regional office in Montreal, the establishment of a Joint Federal-Provincial ARDA Advisory Committee and final steps toward negotiation of a FRED (Fund for Rural Economic Development) Agreement for Eastern Quebec.

The regional office was opened on June 1, and a sub-regional office was established at Rimouski on September 1. Total staff, including the Regional Director, numbered four.

On February 22, a Joint Advisory Committee was established for the purpose of:

- a) advising the federal and provincial ministers as to the best methods to be adopted to carry out the purpose of the ARDA Act;
- b) defining mutually acceptable criteria for the consideration of programs;
- c) considering provincial programs proposed for the ensuing year.

The Committee operates, in the socio-economic planning process, through seven working groups concerned respectively with Agriculture, Forestry, Water and Soil Conservation, Fisheries, Recreation, Information, and Local Participation. These groups, composed essentially

of a federal and a provincial ARDA co-ordinator and federal and provincial specialists in each sector of activity, met periodically. Through this administrative machinery, closer federal-provincial understanding is being developed.

A federal administrator was appointed within the regional office to eventually take charge of the implementation of the proposed comprehensive rural development plan for Eastern Quebec embracing the Gaspé Peninsula, the Lower St. Lawrence and the Magdalen Islands. The FRED Agreement under negotiation involves a federal-provincial commitment of \$258,000,000 over a 5-year period.

Implementation of some of the Eastern Quebec programs has already been initiated under the ARDA Agreement. Amongst others a centralization program and modernization of fisheries have already reached the implementation stage. Investment of \$7,600,000 in a fishery complex at Rivière-au-Renard, near Gaspé, is financing construction of a processing plant, a freezer-warehouse, and two ultra-modern trawlers. The Government of Canada has contributed \$3,200,000 to this development, as follows:

1) an ARDA contribution -----	\$ 991,250
2) an ARDA grant to new industries -----	340,500
3) provision of a public wharf -----	700,000
4) subsidy on construction of trawlers -----	1,161,000

The main thrust of the FRED Agreement is to change the region's institutional structure to meet the requirements of a modernized and dynamic economy and, in particular:

- 1) to bring about structural changes in the resource sectors by phasing out obsolete units and creating modern and economically dynamic ones;
- 2) to assess the identified industrial, service and other development opportunities, and to identify new opportunities and develop programs for their exploitation;
- 3) to provide new elements in the infrastructure and to improve existing elements that will be required:
 - a) in the process of modernizing operations in the resource sectors;
 - b) in providing adequately, over the long term, transportation facilities, urban, social and private infrastructure facilities, and industrial services;

- c) in the tourism sector;
- 4) to improve and rationalize the economic input for the benefit of people by:
 - a) raising the standards of education and training to enable the labour force to meet the skill requirements of the FRED area and to provide skills to those members of the labour force who will leave the area;
 - b) assisting the mobility of population within the region and to other regions;
 - c) assisting those who, because of age or for other reasons, cannot benefit from education, training, and mobility programs, and who will remain unemployable;
 - d) providing counselling and information services required to carry out all these activities.

The over-riding requirement for implementing this strategy is the establishment of an administrative mechanism to ensure:

- 1) co-ordination between departments and agencies at both levels of government;
- 2) development and management of detailed programs and projects;
- 3) evaluation of the progress of the program, and
- 4) adaptation of strategy, programs and projects in the light of unforeseen changes.

Through the Joint Advisory Committee and by grants, ARDA contributed technically and financially to a variety of programs during the year.

An ambitious program of recreational development led to the opening of the Ste-Agathe Park, which cost slightly more than \$1,000,000, with a federal contribution of \$270,770; the Metis Road Park; a tourism inventory of the Province; and the decision to establish a national park in the Gaspé Peninsula.

A major tourist development program for the Gaspé Peninsula is planned, including 13 projects for the improvement of salmon rivers.

The intention is to create recreation areas close to Montreal and thereby contribute to the economy of the adjacent rural areas.

In the agricultural sector, research undertaken in the fields of farm consolidation, mechanization, underground drainage and blue-berry production, together with consultations between federal and provincial officials, foreshadow a systematic modernization of farms,

expansion of the blueberry production in Lake St. John area, and a shift in types of production. The farm consolidation and improvement program continued during the year. This program will be systematically implemented in the pilot area, as well as in other parts of the Province. The farm enlargement policy during the year resulted in commitments of approximately \$2,100,000, while farm improvement through the introduction of mechanization reached an expenditure of \$4,200,000 (with a federal contribution of \$1,248,050).

A research and consolidation program in the blueberry industry - at a total cost of \$194,615 - has provided nearly 3,000 blueberry pickers with extension courses in modern techniques, while bringing together about 40 experts at a symposium in Quebec City.

Under the heading of soil and water conservation, drainage projects were undertaken in various counties, and a start was made on construction of the Sartigan dam at St-Georges de Beauce. With other works initiated on the Chaudière River and its vicinity, the hazard of ice-jams is reduced with protection afforded to an agricultural area of 65,000 acres. The works completed to date have entailed expenditures of \$3,013,838, with federal participation to the extent of \$1,383,718. A research program involving the St. Louis River and Laguerre River in the counties of Beauharnois and Huntingdon is underway. The objective is to drain a 23,000-acre agricultural area, permitting its most effective use. Finally, lack of drinking water in the counties of St. Hyacinthe and Rouville and pollution of the Richelieu and Yamaska watersheds are receiving close attention. There are approximately 16,000 farms in this region, with a total cultivated area of 2,000,000 acres.

Forestry has not been neglected. A \$1,618,287 program is underway, concerned mainly with developing nurseries, reforestation on both Crown lands and private woodlots, and silvicultural methods to improve yield.

Socio-economic studies undertaken in various regions - Abitibi-Temiscamingue, Parent Area, South Shore, Brôme-Stanstead, Etchemin, Saguenay-Lake St. John, and Rouge Valley - have led the specialists to advocate a regional approach with local participation.

In the information field there were press releases and publications, as well as audio-visual participation in fairs and exhibitions, particularly Le Salon National de l'Agriculture, and symposiums.

Thus, in 1967-68, as joint federal-provincial ARDA activities increased, a concept of regional development and a comprehensive and coherent program began to emerge.

ONTARIO REGION

The Ontario program continued to concentrate heavily on agricultural adjustment and the improvement of farming efficiency. The process of farm enlargement, introduced in 1966, continues to accelerate and is closely coupled to the Canada Manpower programs providing training and mobility assistance for those who are moving out of agriculture.

To improve agricultural efficiency large investments are being made in programs of soil drainage, field enlargement, the provision of farm water supplies, and the removal of stones from good-quality soils.

During the year, the provincial staff of rural development officers and rural development counsellors increased from 7 to 15. Formerly the work of the field staff was devoted almost exclusively to the agricultural adjustment program - more and more it is becoming involved with the over-all problems of rural development as they affect farmers and other rural residents.

The acquisition of land for alternate use, primarily forestry, is increasing with many of the projects approved two or three years ago now in full operation.

A major project initiated during the year involves the redevelopment and enlargement of three large parks in the eastern part of the province. The demand for recreation facilities in Ontario has necessitated enlargement of camping accommodation on a large scale. ARDA participation in such projects is limited to low-income areas where park developments can contribute to the generation of new income and employment opportunities.

Towards the end of the year, negotiations were started between the Province and the Government of Canada involving the preparation of a comprehensive economic development plan for Northwestern Ontario. It is expected that resource assessment studies, area economic evaluations, and sociological studies will soon be undertaken in the northwest region. A joint federal-provincial steering committee will direct this research and evaluate the findings.

ARDA projects approved for the Ontario region in the fiscal year totalled 27, with an overall federal contribution of \$4,884,307.

Arrangements have been made to move the Ontario Regional Office from Ottawa to Toronto in 1968. This new location will permit closer liaison with the provincial ARDA offices and the regional offices of other federal departments and agencies.

WESTERN REGION

The regional headquarters was relocated to Winnipeg, facilitating a much closer working relationship among the various federal departments having an interest in the rural development program.

The signing of the Manitoba Interlake Comprehensive Rural Development Agreement was one of the most significant activities during the year. Three million dollars of ARDA funds were allotted to the Agreement as part of the total cost of some 85 million dollars.

Soil and Water conservation constituted the major portion of the regular Manitoba ARDA program. Continuing emphasis was placed on leadership training and research on the identification of rural conditions and development potentials. Parks and recreation development projects were carried out in several areas.

The federal expenditure approved for Manitoba, not including the Interlake, was \$3,594,300 for 23 projects.

Alternative land use and community pasture development constituted a major portion of the Saskatchewan program. Leadership training, education and physical resource development for people of Indian ancestry were continued and are now a significant part of the overall program. Projects for parks and recreation, irrigation, advisory and development services continued. Testing of the mobile counselling unit project, in co-operation with the Canada Department of Manpower, was continued.

A federal contribution of \$3,192,487 was approved for 35 Saskatchewan projects.

The most outstanding development in Alberta was the signing of an Agreement for a rural development program in Census Division 14. This is a program under various sections of the Rural Development Agreement providing for a co-ordinated approach to research leadership training, education, and physical resource adjustment and

development. Research in Census Division 12 and Census Division 15 formed a large portion of the provincial research program. Community pasture development continued to be an important segment of the Alberta program. A new soil and water program for flood protection and drainage, which will provide much needed assistance to farms and rural communities, was approved. The educational program on rural economics and sociology proved to be popular in its second year with about 2,000 participants, of whom about half were on second year courses and half on first year courses. A land clearing project for agricultural land development on Saddle Lake Indian Reservation was undertaken.

A federal contribution of \$6,862,083 was approved for the 18 Alberta projects.

A rural development area under Part V of the Agreement was established in northern British Columbia and the first project for the area was one to assist Indian people to develop a tourist complex. British Columbia appointed a rural development officer to assist the people with project development. The emphasis continued to be on the rehabilitation and extension of irrigation and water supply systems. Four new projects and twelve extensions and supplements were approved during the year.

In all, 27 British Columbia projects were approved with a federal contribution of \$1,916,400.

Although Indian programs in the region are all provincial and are included in the provincial summaries, it is of significance to report them as a group. Ten projects were approved, with a federal contribution of \$1,060,675, providing for research, education, leadership training, and physical resource development for pasture, cultivated crops and recreation. The distribution was: one in Manitoba, six in Saskatchewan, one in Alberta and two in British Columbia.

THE CANADA LAND INVENTORY

The object of the Canada Land Inventory (CLI) is to produce data on land capability, primarily for land use and rural development planning. It is a federal-provincial program. The Government of Canada, through the Rural Development Branch of the Department of Forestry and Rural Development, sponsors and co-ordinates the planning, collection, analysis and publication of results. Each province

undertakes the inventory within its borders, with financial and technical assistance from the federal government.

The inventory data are being reproduced in two series of maps. One series, which is for general distribution, will consist of about 1,200 colored maps at a scale of 1:250,000 (available from the Queen's Printer). The other series, for more specialized use, will include up to 20,000 scribed, computer-input maps at a scale of 1:50,000. Each series will include the lands throughout the settled areas of Canada - a total of about one million square miles.

Lands are classified according to their capabilities for agriculture, forestry, recreation, wildlife and sports fish, with estimates of the extent and location of each class, and of the supply and demand factors on which decisions concerning land resources may be based. Feasibility studies of alternate land use are also being undertaken.

In the agricultural sector there are seven soil capability classes, ranging from good arable land with no significant limitations for crops, down to soils that have no capability for arable cultivation or permanent pasture.

Land capability for forestry also falls into seven classes, the highest indicating that there is little limitation on the growth of commercial tree species, the lowest indicating such severe limitations that the production of commercial forests is ruled out.

In the recreation sector, land is rated in a seven-class system according to its natural capability to generate and sustain recreational uses. Sub-class symbols indicate the type of recreational features offered by each land unit. Land capability for wildlife is split into separate classifications for waterfowl and ungulates (hoofed animals). The two classifications are similar to those in the other sectors, in that sub-classes indicate the limitations on waterfowl and ungulate production. A simple classification of sports fish into four classes indicates the watershed capabilities to support and sustain fish populations. These maps will be produced at the 1:250,000 scale.

In addition to the capability maps, others showing administrative and census boundaries are being fed into the computer to assist in analysing data. With the present land use classifications, this information will help in both planning and assessing the need for, and the effects of, ARDA programs. The most important aspect is the breakdown into lands that are being intensively cultivated, those that

are left in pasture and less intensive use, and those that are sub-marginal for agricultural purposes. The system is designed to permit revisions as conditions change.

To test the validity of the CLI data and to encourage their use as a basis for planning by provincial authorities, the Canada Land Inventory is providing financial and technical assistance to the provinces to carry out pilot projects in land use planning.

Maps and other geographic-specific information, such as population characteristics, regional economic data and yields, are put into a computerized system. The system is capable of storing, making multiple comparisons and reproducing the results in tabular or map form.

The number of land capability and computer maps completed or in preparation for the various sectors is as follows:

Maps	Sector						Total
	Agri-culture	Present Land Use	For-estry	Wildlife (Ungu-lates)	Wildlife (Water-fowl)	Recre-ation	
<u>Capability Maps</u>							
Manuscripts on hand	7		6	6	15	9	43
Map Sheets in progress	48		7	11	40	6	112
Map sheets printed	27		1	1	1	1	31
TOTAL	<u>82</u>		<u>14</u>	<u>18</u>	<u>56</u>	<u>16</u>	<u>186</u>
<u>Computer Maps</u>							
Manuscripts on hand	4	74	9	12	112	45	256
Map sheets in progress	91	163	0	0	39	57	350
Map sheets completed	461	1230	152	266	702	285	3096
TOTAL	<u>556</u>	<u>1467</u>	<u>161</u>	<u>278</u>	<u>853</u>	<u>387</u>	<u>3702</u>

The geo-information system is designed to serve both the federal and provincial governments. All the information applying to a specific province will be made available to that province.

ARDA TABLES

TABLE 1
TOTAL FEDERAL EXPENDITURES TO MARCH 31, 1968
FOR THE FIRST GENERAL AGREEMENT (1962-65)

Province	Federal Research and Canada Land Inventory	Provincial Projects	Total
	\$	\$	\$
Newfoundland	299,698	612,091	911,789
Prince Edward Island	66,512	235,458	301,970
Nova Scotia	212,815	456,369	669,184
New Brunswick	182,221	471,773	653,994
Quebec	198,513	10,391,650	10,590,163
Ontario	55,483	1,018,138	1,073,621
Manitoba	338,941	2,694,850	3,033,791
Saskatchewan	313,301	6,009,605	6,322,906
Alberta	95,540	1,573,364	1,668,904
British Columbia	111,207	1,521,891	1,633,098
Total	1,874,231	24,985,189	26,859,420
Federal Projects	889,635	-	889,635
Total	2,763,866	24,985,189	27,749,055

TABLE 2
FEDERAL EXPENDITURES UNDER THE SECOND (1965-70) FEDERAL-PROVINCIAL
RURAL DEVELOPMENT AGREEMENT FOR THE 1967-68 FISCAL YEAR

Province	Second Agreement							Federal Research	Canada Land Inventory	Total
	<i>Part I</i>	<i>Part II</i>	<i>Part III</i>	<i>Part IV</i>	<i>Part V</i>	<i>Part VII</i>	<i>Part VIII</i>			
	Research	Land Use and Farm Adjustment	Rehabilitation	Rural Development Staff and Training Service	Rural Development Areas	Public Information Services	Soil & Water Conservation			
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Nfld.	58,544	-	-	-	310,547	-	15,061	93,661	-	477,813
P.E.I.	2,540	36,318	-	4,889	97,462	-	179,099	273,123	36,481	629,912
N.S.	95,476	850,742	-	52,200	364,427	-	118,816	80,936	153,850	1,716,447
N.B.	65,898	47,976	-	88,131	544,122	4,735	443,366	-	104,346	1,298,574
Que.	771,062	-	-	119,260	1,475,113	8,111	1,389,114	298,388	1,147,557	5,208,605
Ont.	67,931	1,424,599	269	50,213	297,338	10,160	3,012,914	-	765,955	5,629,379
Man.	126,167	4,876	-	93,306	244,228	1,206	310,467	17,274	528,533	1,326,057
Sask.	313,079	355,070	3,161	101,610	600,692	3,875	509,311	291,162	253,056	2,431,016
Alta.	514,090	335,204	-	89,771	139,367	658	426,525	33,620	186,058	1,725,293
B.C.	22,204	3,750	-	9,879	-	-	1,164,917	976	556,666	1,758,392
Total	2,036,991	3,058,535	3,430	609,259	4,073,296	28,745	7,569,590	1,089,140	3,732,502	22,201,488
Federal Projects	-	-	-	-	-	-	-	256,131	2,446,701	2,702,832
Total	2,036,991	3,058,535	3,430	609,259	4,073,296	28,745	7,569,590	1,345,271	6,179,203	24,904,320

TABLE 3

FEDERAL EXPENDITURES ON ALL ARDA PROJECTS FIRST AND SECOND AGREEMENTS
FOR THE 1967-68 FISCAL YEAR

Province	First Agreement Total	Second Agreement				Total
		Annual Allotment	Expenditures	Percentage of Allotment	Federal Research and Canada Land Inventory	
	\$	\$	\$		\$	\$
Newfoundland	58,427	1,378,638	384,152	27.86	93,661	536,240
Prince Edward Island	12,817	715,638	320,308	44.76	309,604	642,729
Nova Scotia	50,821	1,790,675	1,481,661	82.74	234,786	1,767,268
New Brunswick	4,795	1,672,950	1,194,228	71.38	104,346	1,303,369
Quebec	951,204	5,665,612	3,762,660	66.41	1,445,945	6,159,809
Ontario	419,313	5,058,287	4,863,424	96.15	765,955	6,048,692
Manitoba	119,154	1,828,712	780,250	42.67	545,807	1,445,211
Saskatchewan	173,450	2,866,988	1,886,798	65.81	544,218	2,604,466
Alberta	123,974	2,292,388	1,505,615	65.68	219,678	1,849,267
British Columbia	118,541	1,730,112	1,200,750	69.40	557,642	1,876,933
Total	2,032,496	25,000,000	17,379,846	69.52	4,821,642	24,233,984
Federal Projects	500	-	-	-	2,702,832	2,703,332
Total	2,032,996	25,000,000	17,379,846	69.52	7,524,474	26,937,316

TABLE 4
ARDA PROJECTS APPROVED UNDER THE SECOND (1965-70) FEDERAL-PROVINCIAL
RURAL DEVELOPMENT AGREEMENT DURING 1967-68 FISCAL YEAR

Province	Second Agreement							Multiple	Federal Research	Canada Land Inventory	Total
	<i>Part I</i>	<i>Part II</i>	<i>Part III</i>	<i>Part IV</i>	<i>Part V</i>	<i>Part VII</i>	<i>Part VIII</i>				
	Research	Land Use and Farm Adjustment	Rehabilitation	Rural Development Staff and Training Service	Rural Development Areas	Public Information Services	Soil & Water Conservation				
Nfld.	-	-	-	2	6	1	-	-	1	1	11
P.E.I.	-	-	-	3	4	-	3	-	1	-	11
N.S.	5	4	-	4	6	-	3	-	1	3	26
N.B.	4	-	-	2	8	-	-	-	-	1	15
Que.	15	-	-	8	19	1	3	-	9	1	56
Ont.	6	2	-	3	3	-	3	1	-	9	27
Man.	7	1	-	8	4	1	2	-	-	-	23
Sask.	1	5	2	2	11	-	8	2	1	3	35
Alta.	5	1	-	-	3	1	2	1	-	5	18
B.C.	1	1	-	4	1	-	9	-	2	9	27
Total	44	14	2	36	65	4	33	4	15	32	249
Federal Projects	-	-	-	-	-	-	-	-	28	24	52
Total	44	14	2	36	65	4	33	4	43	56	301

TABLE 5
FEDERAL CONTRIBUTIONS FOR PROJECTS APPROVED
DURING THE FISCAL YEAR 1967-68

Province	Second Agreement							Multiple	Federal Research and Canada Land Inventory	Total
	<i>Part I</i>	<i>Part II</i>	<i>Part III</i>	<i>Part IV</i>	<i>Part V</i>	<i>Part VII</i>	<i>Part VIII</i>			
	Research	Land Use and Farm Adjustment	Rehabilitation	Rural Development Staff and Training Service	Rural Development Areas	Public Information Services	Soil & Water Conservation			
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Nfld.	-	-	-	146,000	383,675	18,750	-	-	225,190	773,615
P.E.I.	-	-	-	8,800	337,478	-	172,508	-	190,000	708,786
N.S.	132,320	66,585	-	88,762	493,218	-	174,900	-	104,118	1,059,903
N.B.	47,977	-	-	63,233	595,709	-	-	-	92,000	798,919
Que.	1,327,635	-	-	67,664	1,339,683	8,110	1,293,954	-	1,174,066	5,211,112
Ont.	58,350	33,750	-	28,650	1,832,056	-	1,495,000	5,000	1,431,501	4,884,307
Man.	124,477	37,500	-	128,933	998,934	2,500	2,302,000	-	-	3,594,344
Sask.	44,147	753,800	140,960	120,820	1,074,490	-	666,573	180,285	211,412	3,192,487
Alta.	1,087,369	33,780	-	-	784,846	49,963	1,578,795	3,070,311	257,019	6,862,083
B.C.	20,000	4,000	-	34,500	160,000	-	589,199	-	1,108,700	1,916,399
Federal Projects	-	-	-	-	-	-	-	-	3,267,970	3,267,970
Total	2,842,275	929,415	140,960	687,362	8,000,089	79,323	8,272,929	3,255,596	8,061,976	32,269,925

FUND FOR RURAL ECONOMIC DEVELOPMENT

The Fund for Rural Economic Development, established in July 1966, made available \$50 million for the implementation of comprehensive rural development plans in areas agreed upon by the federal and provincial governments. The amount was increased to \$300 million by amendment legislation passed by the Parliament of Canada in May 1967.

A third FRED agreement was entered into during the year. On May 16, negotiations which had been conducted in the previous fiscal year culminated in the signing of an agreement between the Government of Canada and the Province of Manitoba for developing the Interlake Area.

The agreement provides for a total expenditure of \$85,085,000 over 10 years, with the Government of Canada sharing to the extent of \$49,562,000. The commitment includes \$27,606,000 from the Fund for Rural Economic Development, and approximately \$20,000,000 under the occupational training and technical-vocational school provisions administered by the Department of Manpower and Immigration.

Two previous FRED agreements, both with the Government of New Brunswick, provide for development of the Northeastern area of the province and the Mactaquac region. FRED commitments are respectively \$31,461,000 and \$9,433,000. Total cost of all programs under the Northeastern New Brunswick Agreement is estimated at \$89,250,000, the federal contribution being \$62,136,000. Comparable figures in the Mactaquac agreement are \$20,950,000 and \$15,358,000.

In all cases, a joint federal-provincial advisory board will review the progress of the development plans, recommend budgets and programs on a yearly basis, and evaluate the results.

Other FRED developments include negotiations underway for agreements with the provinces of Newfoundland, Prince Edward Island, Nova Scotia and Quebec.

ATLANTIC REGION COMPREHENSIVE RURAL DEVELOPMENT PLANS

March 31, 1968 marked the end of the first full year of implementation of the Northeast and Mactaquac Comprehensive Rural Development Plans (the Agreements having been signed by the Government of Canada and the Government of New Brunswick on September 20, 1966).

For the purpose of representing federal interests in the areas, Program directors were appointed - at Bathurst for the North-east region, and at Fredericton for the Mactaquac region. These officers have established close liaison with their counterparts in the Community Improvement Corporation, the provincial Crown agency charged with the responsibility of implementing the two plans.

Meanwhile, preparation of similar plans for Prince Edward Island, the nine Northeastern counties of Nova Scotia, and Western Newfoundland is well advanced. The research and planning in these three provinces are expected to culminate shortly in the signing of Comprehensive Rural Development Agreements under the Fund for Rural Economic Development.

The regional office maintains close contact with the provincial agencies charged with implementing the current FRED plans, as well as with the provincial authorities responsible for formulating proposed plans. With respect to the latter, federal program co-ordinators have been appointed at Charlottetown, Halifax, and Corner Brook.

Following is a summary of FRED activities in New Brunswick.

Northeast Region

During the year under review, emphasis was placed on three sectors of the overall development plan.

1. *Physical Works*

- (a) School Construction Program: Fifty-four new classrooms (42 elementary and 12 secondary) were built, at a cost of approximately \$2 million.
- (b) Roads to Resources: The highway construction/upgrading program got underway with a start on the Bathurst-St. Quentin road. Two million dollars will be invested in this project.
- (c) Caraquet Marine Haulout: This facility, which is to cost an estimated \$700,000, is about 50% completed.

2. *Technical and Vocational Training*

The main limiting factor in the development of the area is the low education level of the labor force. A concerted effort is being made through a basic adult education program to upgrade and train workers. Approximately 1,000 persons went back to school and upwards of 500 have received occupational training in various vocational courses.

3. *Local Involvement*

Volunteer groups, such as the Northern Regional Development Council (NRDC) and the Conseil Régional d'Aménagement du Nord (CRAN), have been active in the past without substantial support in terms of finance and the provision of permanent staff. As the result of a per capita grant, both groups are now in a better position to promote local involvement in implementation of the development plan. Further, the Community Improvement Corporation has laid the groundwork for counselling and public information programs aimed at promoting a greater awareness and understanding of the regional development scheme. Both programs are directed specifically to those residents who are most in need of sharing in the regional economy.

Mactaquac Area

Highlights of FRED accomplishments in the Mactaquac Area were as follows.

1. *Nackawic*

Through the joint efforts of Central Mortgage and Housing Corporation and the New Brunswick Housing Corporation the first phase of creating the Town of Nackawic has been completed, providing for 150 fully serviced lots, with underground wiring, central water and sewage, curbs and roads. In the town site there are now an elementary school and a high school, two apartment buildings, and 12 houses, as well as a community centre in the recreation area.

2. *Industrial Site*

A lumber company has relocated to the industrial park, simultaneously enlarging its operation. The clearing of land and the construction of a large storage shed for the St. Anne-Nackawic Paper Company have been completed. The installation of water supply and sewage system for the \$68 million mill has also been completed.

3. *Recreation*

With the flooding of the Mactaquac headpond and 50% completion of the hydro development project, attention is being given, in co-operation with the New Brunswick Department of Natural Resources, to the recreational development aspect. An 18-hole golf course has been designed and the grounds

prepared for seeding. The underground preparation and concrete walls for the marina have been completed, and the campsite and park area prepared for 100 campsites in 1968.

4. *Land Assembly*

Lands not required by the New Brunswick Electric Power Commission and the Province have been assembled under the control of the Community Improvement Corporation.

5. *Historic Village*

Architectural and engineering drawings of the buildings that are to comprise the Historic Village are progressing, as is the collection of historical objects and artifacts considered suitable for furnishing the buildings.

WESTERN REGION
INTERLAKE AREA (MANITOBA)
COMPREHENSIVE RURAL DEVELOPMENT PLAN

On May 16, 1967, negotiations which had been conducted in the 1966-67 fiscal year culminated in the signing of an agreement between the Government of Canada and the Province of Manitoba for developing the Interlake Area.

The Agreement provides for a total expenditure of \$85 million over 10 years, to which Canada will contribute approximately \$49.5 million and Manitoba \$35.5 million. Of the federal contributions, approximately \$27.5 million will be drawn from the Fund for Rural Economic Development (FRED) and about \$20 million will be contributed under the occupational training and technical-vocational school provisions administered by the Department of Manpower and Immigration.

In the effort to ameliorate widespread low income, to encourage adjustment within the basic resource industries, and to realize the significant development potential of the Interlake Area, the two governments have agreed to participate in programs in the following broad areas.

- (a) Investment in education to provide a higher level of education for the residents.
- (b) Increase in training facilities, training allowances and mobility grants to prepare the employable population for more rewarding opportunities in places of expanding employment.

- (c) Provision of information through counselling to make residents of the area more aware of alternative opportunities available to them.
- (d) Development of the economic potential in the renewable resource sectors and encouragement of secondary industry.
- (e) Development of capital infrastructure such as roads, parks and housing to encourage additional employment opportunities and raise the standard of living.

The first year of implementation, while necessarily characterized by a cautious approach as to content of programs, saw considerable progress in the manpower provisions of the Plan and the successful launching of many physical projects, such as land clearing, road construction, drainage and recreational facilities.

Adult Education

A total of 358 individuals were enrolled in 21 vocational preparatory courses throughout the Interlake during the year. Accelerated basic education was provided, aimed at boosting the qualifications of adults whose previous schooling was below the level necessary to undertake trades training. The majority of the training spaces were purchased and the associated allowances paid to the trainees under the provisions of the Occupational Training for Adults Program of the Department of Manpower and Immigration. Similarly, places and allowances were provided for 127 students who commenced pre-employment vocational training in 25 different courses at the Manitoba Institute of Technology in Winnipeg and the Manitoba Vocational Centre at Brandon.

Nine additional special courses were held during the period in which 83 Interlake residents participated. The vocational agricultural course, a pilot endeavour aimed at improving the technical management and practical knowledge of Interlake farmers, set the pattern for a much larger effort in future years. Forty-nine individuals, under instruction from experienced farmers possessing a diploma in agriculture, followed a four-month course designed by the Faculty of Agriculture of the University of Manitoba. Enrollments for 1968-69 are expected to be approximately 175. The facilities are to be set up within easy commuting distance of the homes of the trainees.

The Manpower Corps, the training aspects of which are financed 90% from the Fund for Rural Economic Development, provide an environment for personal development, day-to-day work experience under

supervision, and incentives for further learning as a result of tangible personal achievement, to individuals who are unskilled and are victims of a wide-scale unemployment situation beyond their control. Each task is tied to some public works activity or an untendered community project. Materials are provided by sponsors, usually provincial departments. Seven such corps projects were mounted in 1967-68. Five were organized for unemployed Indian and Metis fishermen, who constructed community education halls at Berens River, Fairford, Lake St. Martin Reserve, Jackhead and St. Laurent. One was associated with park development at Winnipeg Beach. Another followed a heavy-duty equipment operator's course on Peguis Reserve.

Selecting trainees, counselling individuals for appropriate training, informing residents of the services available from federal and provincial departments, relating worker and employer, and many other associated activities are carried out by the staff of the Canada Manpower Centre at Selkirk and counsellors employed by Manitoba who are located within the area. The intensive effort and very close cooperation required to ensure success of the FRED concept in the Interlake area grew rapidly during the year. Understanding of the objectives of the Plan were developed through 10 Area Development Boards composed of local residents, where specialists were able to offer advice and information, and where views particular to a locality were expressed. The members of the Boards complemented the counsellors in their tasks, made significant contributions in guiding management towards adjustment decisions, and promoted development programs.

Resources Improvement

Land clearing is encouraged in the Interlake area by a \$4.00 per acre incentive, shared 75:25% between the two governments. Farmers applied for payment on 47,000 acres during the year. This was a major start on the 500,000 acres of arable land estimated to require clearing over the 10 years of the Plan. Work continued on five of the seven major drainage projects aimed at improving good arable land. Canada contributes 60% of the cost. Engineering feasibility studies proceeded on a gated control dam at the outlet of Lake St. Martin.

The two governments also share in the purchase of land not suited to farming - for example, for conversion to wildlife management or to bring under the Crown, land which is subject to periodic flooding. Present owners must volunteer to sell. In 1967-68, two areas

were designated where this program is to go into effect, and some acquisition was begun.

All road work under the Agreement is to be completed in the early years, involving a total investment of \$8.85 million, shared 60% Federal, 40% Provincial. Twenty-two miles of Highway #6 were reconstructed to various stages of completion; 12.5 miles of improvements on Highway #68 were undertaken, as well as substantial work on those provincial roads expected to service a redesigned school system.

Most of the recreational development will be along the west shore of Lake Winnipeg. There will be strong links with the Manpower Corps program. The year's program included basic improvements at Winnipeg Beach - removal of old buildings, repair of the seawall, filling and landscaping preparatory to construction of facilities. Development will continue to follow a master plan.

The financial incentives offered by the Area Development Agency Program for industry, together with \$400,000 of assistance equally shared between Canada and Manitoba, encouraged Selkirk to make considerable progress towards implementing a plan for a serviced industrial park in the town. Some work was done in extending sewer and water lines, but the main effort during the year was in design and negotiation preparatory to development. Industrial establishments in Selkirk can be expected to create job opportunities in the FRED region within reasonable distance of most Interlake communities.

Administration

Like FRED plans elsewhere, management direction is given by a Joint Federal-Provincial (FRED) Advisory Board comprising four senior heads of departments from each of the Governments of Canada and Manitoba. The Board met three times during the year, providing direction for the Provincial FRED Co-ordinator and the Federal FRED Co-ordinator. Practical day-to-day management is provided through a staff, reporting to the former, which has the special role of focusing the tasks of provincial line agencies upon the Interlake. The Federal Co-ordinator works very closely with provincial agencies in smoothing the way for the implementation of the Plan, and has special responsibilities where a program must draw on inputs from federal departments - e.g. Department of Manpower and Immigration, Indian Affairs Branch of the Department of Indian Affairs and Northern Development.

During the year, understanding and accord within the management group developed very successfully. The unusual concept of co-ordination and control through a central group, forcing departments of both governments to think in terms of a milieu peculiar to a geographic area rather than in directions defined by occupations or disciplines, began to receive acceptance by both the federal and provincial agencies involved. The mechanics which will allow a maximum of flexibility within the funds allocated under the Agreement were evolved. Thought began to be given to the gaps in the comprehensive Plan and the new measures and services which might be incorporated in the future.

FRED TABLES

TABLE 1
PROGRAMS APPROVED UNDER THE NORTHEAST NEW BRUNSWICK
FEDERAL-PROVINCIAL RURAL DEVELOPMENT AGREEMENT
TO MARCH 31, 1968

Programs	Expenditures	Commitments
Counselling	\$ 68,646.38	\$ 161,780.00
Land Use Adjustment		403,650.00
Fisheries Development	119,304.77	450,000.00
Transportation	660,703.97	1,200,000.00
Administration	234,749.65	340,000.00
Implementation Grant	1,400,000.00	1,400,000.00
T O T A L	\$2,483,404.77	\$3,955,430.00

TABLE 2
PROGRAMS APPROVED UNDER THE MACTAQUAC AREA (N.B.)
FEDERAL-PROVINCIAL RURAL DEVELOPMENT AGREEMENT
TO MARCH 31, 1968

Programs	Expenditures	Commitments
Land Bank	\$ 244,824.75	\$ 244,824.00
Recreation	1,472,965.25	1,715,076.00
Administration	83,012.63	112,234.00
T O T A L	\$1,800,802.63	\$2,072,134.00

TABLE 3
PROGRAMS APPROVED UNDER THE INTERLAKE AREA OF MANITOBA
FEDERAL-PROVINCIAL RURAL DEVELOPMENT AGREEMENT
TO MARCH 31, 1968

Programs	Expenditures	Commitments
Administration	\$ 37,223.00	\$ 40,000.00
Manpower Training	67,233.00	94,500.00
Manpower Corps	106,635.00	157,500.00
Program Evaluation		4,000.00
Land Development	24,938.00	56,250.00
Water Control	547,238.00	600,000.00
Roads	800,000.00*	960,000.00
Management Education	76,983.00	93,000.00
Recreation	143,784.00	240,000.00
Land Acquisition	11,164.00	90,000.00
Community Affairs	10,964.00	12,750.00
Industrial Park		10,000.00
T O T A L	\$1,826,162.00	\$2,358,000.00

* Expenditures \$724,823.
Unused Advance 75,177.

TABLE 4
FUND FOR RURAL AND ECONOMIC DEVELOPMENT
EXPENDITURES AND COMMITMENTS
TO MARCH 31, 1968

Agreements	Expenditures	Commitments
Northeast New Brunswick	\$2,483,404.77	\$3,955,430.00
Mactaquac (New Brunswick)	1,800,802.63	2,072,134.00
Interlake (Manitoba)	1,826,162.00	2,358,000.00
T O T A L	\$6,110,369.40	\$8,385,564.00

MARITIME MARSHLAND REHABILITATION

In 1948 the Maritime Marshland Rehabilitation Act was passed, giving the federal government the responsibility of providing main protective works for approximately 100,000 acres of rich, agricultural marshland. At the same time, the provincial governments of Nova Scotia, New Brunswick and Prince Edward Island undertook to assure proper utilization of the rehabilitated marsh areas.

The Act was administered by the Canada Department of Agriculture until early 1964 when this responsibility was transferred to the Department of Forestry of Canada (renamed the Department of Forestry and Rural Development in October 1966). The Maritime Marshland Rehabilitation Administration is the departmental agency established for the program.

During 1966, agreements were signed between Canada and each of the three Maritime Provinces providing for the transfer from the federal government to the provincial governments of operation and maintenance responsibilities for works constructed under the MMRA program. This transfer will be completed by March 31, 1970.

As part of the agreement, Canada will provide, on a continuing basis, engineering services to the provinces for soil and water conservation programs implemented under the Agricultural and Rural Development Act.

MMRA was designated as an operating arm of ARDA in 1963, and, under the new agreement, became the engineering agency responsible for providing the services outlined in the agreement (see ARDA report).

ADMINISTRATION AND ORGANIZATION

The headquarters of the Maritime Marshland Rehabilitation Administration was established in Amherst, Nova Scotia, in the summer of 1949.

The Maritime Marshland Rehabilitation Advisory Committee was established early in the program and functioned as required under Section 8 of the Act. The Act states "No work shall be undertaken in any Province ... unless (a) the work has been recommended by an Advisory Committee ...".

In January, 1968, the Administration Division of the Atlantic Regional Office was moved to Moncton, New Brunswick. The Soil and Water Division remained in Amherst, Nova Scotia.

The Soil and Water Division comprises the following services:

- (a) Conservation
- (b) Water Resources
- (c) Workshop and Stores
- (d) Surveys, Drafting and Photo Mosaics
- (e) Design and Construction.

Construction services operate from Amherst and Windsor, Nova Scotia, and temporary additional offices are established in the field as required.

REVIEW OF PROGRESS TO DATE

Projects and Acreages Protected

All projects approved by the Minister and not incorporated into larger projects are designated as active. The number of active projects on March 31, 1968, and the acreages protected are as follows:

Province	No. of Active Projects	Acreage Protected
Nova Scotia	86	44,572
New Brunswick	39	39,936
Prince Edward Island	1	275
TOTAL	126	84,783

Details on the active projects in each province and the acreages protected are listed in Table 1.

Construction of Works

The protection of marshlands from the tides is normally accomplished by the construction of dykes. Structures, known locally as aboiteaux, are incorporated at major stream crossings where fresh water runoff is to be discharged. River bank control and foreshore protective works are installed where required.

The protecting works include:

- 252 miles of dyke, 85 miles having rock or timber facing;
- 448 aboiteaux;
- 4 major tidal dams;
- 21 miles of river bank control installations.

The construction trend, directed by economic feasibility studies, has been toward protecting areas in groups, using a single large aboiteau, or dam, instead of miles of dyke and large numbers of small aboiteaux. This has already been done in the case of Shepody, Tantramar and Annapolis dams. This trend will in time render obsolete some of the protective works constructed during the current program.

THE CONSTRUCTION PROGRAM FOR 1967-68

Standard Projects

Works previously constructed were improved and extended on projects in Nova Scotia and New Brunswick.

It has been found advantageous to quarry, haul and place required protective rock for most projects during the winter months. This program was successfully continued last winter on the following projects:

NOVA SCOTIA

Herbert River	Rhynds Creek
John Lusby	Grand Pré
Minudie	Truro Dykeland Park
Seaman	Newport Town
Wellington	St. Croix
Kennetcook	Round Marsh
Bishop Beckwith	Amherst Point
Athol	Converse
Lower Truro	River Hebert
Greenhill	Scotch Village
Wentworth	

NEW BRUNSWICK

Westcock	Gautreau Village
Taylor Village	Memramcook
Dorchester	Memramcook West
Lower Coverdale	Aulac
Dixon Island	Hillsboro
Beaumont	Shepody River

Details of expenditures to date on all projects are recorded in Table 1.

Special Projects

The existence of several multipurpose structures, serving as aboiteaux and highway or railway culverts, prompted the careful investigation of possible combined undertakings early in the rehabilitation program. Such investigations have been continued. Among the larger projects considered was the Avon River Causeway, Hants County, Nova Scotia, in conjunction with the Nova Scotia Department of Highways and the Dominion Atlantic Railway.

Construction on the Petitcodiac River Dam, Westmorland Co., N.B., progressed on schedule. On February 10, the two arms of the causeway crossing the River were joined, shutting out the tides from the reservoir. Widening of the causeway was started in preparation for highway traffic. This dam, immediately adjacent to the City of Moncton, will provide protection for upstream marshlands.

MMRA TABLES

TABLE 1

CURRENT PROJECTS AND EXPENDITURES TO MARCH 31, 1968

NOVA SCOTIA

Name of Marsh	Project No.	County	Acreage Protected	Expenditures	
				1949-66	1967-68
Advocate	20	Cumberland	489	140,920.30	88.32
Allan River	30	Annapolis	122	51,401.28	1,436.44
Amherst Point	42	Cumberland	2,252	205,105.30	25,943.53
Annapolis River Dam	103	Annapolis	4,300	1,649,908.01	4,727.31
Armstrong Marsh	75	Hants	53	20,302.67	-
Argyle	108	Yarmouth	45	15,784.71	47.98
Athol	78	Cumberland	131	29,768.79	2,177.65
Avonport	92	Kings	255	116,612.45	143.44
Barronsfield	45	Cumberland	237	93,702.65	6,083.74
Belcher Street	91	Kings	346	137,773.49	2,071.86
Belmont	105	Hants	72	29,511.68	109.67
Bishop Beckwith	65	Kings	604	208,040.35	13,336.82
Brown Salt Pond	59	Yarmouth	294	25,322.76	54.40
Burlington	88	Hants	106	47,386.18	-
Burntcoat	111	Hants	37	15,709.11	-
Castle Frederick	16	Hants	145	59,242.13	58.75
Central Onslow	86	Colchester	291	57,117.47	56.45
Centre Burlington	48	Hants	158	38,044.14	-
Chambers	79	Hants	61	16,829.85	39.60
Cheggoggin	70	Yarmouth	425	33,346.59	-
Chignecto	87	Cumberland	544	47,127.08	-
Converse	44	Cumberland	838	167,484.42	32,902.72
Dentiballis	13	Annapolis	348	119,656.00	59,554.62
Dugau	5	Annapolis	172	50,287.43	30.95
Elderkin	14	Hants	203	92,298.10	547.59
Falmouth Great Dyke	3	Hants	975	193,632.99	-
Falmouth Village	17	Hants	97	49,373.78	-
Farnham Dyke	76	Kings	192	37,663.76	-
Flemming	66	Colchester	277	47,932.39	128.22
Fort Belcher	40	Colchester	181	68,025.33	2,896.05
Fort Ellis	106	Colchester	203	49,942.04	106.00

NOVA SCOTIA (continued)

Name of Marsh	Project No.	County	Acreage Protected	Expenditures	
				1949-66	1967-68
Fort Lawrence - Amherst	95	Cumberland	3,400	85,460.67	-
Glenholme	64	Colchester	292	65,845.93	151.60
Goose Bay	71	Yarmouth	269	29,403.02	350.50
Grand Pre	8	Kings	3,013	662,159.58	25,062.03
Great Village	114	Colchester	518	115,970.40	288,054.48
Greenhill	93	Hants	53	38,203.71	7,171.20
Green's Creek	121	Colchester	75	34,865.29	484.16
Habitant	41	Kings	677	25,272.23	27.60
Herbert River	50	Hants	74	39,451.16	9,027.34
Highland Village	97	Colchester	212	84,084.25	-
Horton	72	Kings	309	112,681.18	638.11
Isgonish	15	Colchester	491	185,069.25	277.46
John Lusby	53	Cumberland	821	149,199.01	12,047.33
Kennetcook	61	Hants	169	56,643.47	14,355.07
Kentville	82	Kings	71	21,959.93	1,738.66
Lower Truro	81	Colchester	399	69,278.06	19,988.52
Maccan	63	Cumberland	200	41,505.69	1,203.59
Mantua Poplar Grove	85	Hants	362	95,790.99	188.64
Martock	69	Hants	1,478	182,855.78	278.85
Masstown	23	Colchester	986	249,843.84	2,262.97
Minudie	54	Cumberland	2,711	172,212.26	22,961.96
Nappan-Maccan	115	Cumberland	388	35,646.13	3,183.75
Nappan River Dam	109	Cumberland	1,074	177,115.42	1,601.30
New Minas	57	Kings	304	117,839.43	12,169.01
Newport Town	27	Hants	338	84,204.85	7,003.50
Noel Shore	24	Hants	309	194,236.32	233.10
Old Barns	90	Colchester	181	55,863.16	75.37
Onslow North River	67	Colchester	496	86,198.46	13,718.16
Pereaux	101	Kings	113	22,688.84	-
Princeport	77	Colchester	49	20,971.64	-
Queen Anne	4	Annapolis	477	207,530.96	312.32
Rhynds Creek	112	Hants	187	57,457.66	3,700.71
River Hebert	46	Cumberland	1,052	284,145.23	23,538.96

NOVA SCOTIA (continued)

Name of Marsh	Project No.	County	Acreage Protected	Expenditures	
				1949-66	1967-68
Round	39	Colchester	86	42,566.62	8,331.37
Ryerson	18	Annapolis	86	61,252.84	-
Saulnierville	6	Digby	73	9,610.93	-
Scotch Village	49	Hants	89	30,903.48	5,262.02
Seaman	55	Cumberland	441	46,848.15	6,098.05
Selmah	47	Hants	188	28,340.37	-
Shubenacadie	116	Hants	111	24,221.90	542.55
Southside	113	Colchester	134	33,801.56	853.25
Starr's Point	80	Kings	303	123,839.32	103.21
St. Croix	38	Hants	248	146,902.84	22,377.33
St. Mary's Bay	52	Digby	692	120,477.76	221.79
Stewiacke	98	Colchester	146	45,089.31	-
Sunny Slope	104	Hants	17	11,352.73	-
Tregothic	68	Hants	576	62,814.96	5,329.73
Truro Dykeland Park	11	Colchester	878	129,682.43	18,891.72
Tufts	117	Colchester	87	22,212.54	27.54
Upper Maccan	119	Cumberland	169	29,536.89	3,282.02
Victoria Diamond Jubilee	12	Colchester	527	115,511.10	1,756.08
Wellington	56	Kings	3,105	118,091.58	29,092.83
Wentworth	100	Hants	150	37,595.57	11,071.03
Windsor Forks	2	Hants	465	85,070.61	5,113.31
Annapolis Royal Town	-	-	-	27,624.41	-
Annapolis River Survey	-	-	-	27,049.60	-
Bartlett's Beach	-	-	-	2,644.17	-
Comeau	-	-	-	38,268.06	-
Fox Bow	-	-	-	20,242.73	-
Granville Centre	-	-	-	27,213.80	-
Little River	125	Yarmouth	-	-	-
McKay	-	-	-	17,165.94	-
Messenger	-	-	-	3,457.06	-
Mill	-	-	-	7,321.94	-
Morse	-	-	-	4,616.95	-
Morse Bishop	-	-	-	3,173.26	-

NOVA SCOTIA (continued)

Name of Marsh	Project No.	County	Acreage Protected	Expenditures	
				1949-66	1967-68
Moschelle	-	-	-	28,719.68	-
Mount Anne	-	-	-	60,302.71	-
Pre Rond	-	-	-	9,014.96	-
Ricketson	-	-	-	2,519.54	-
Rosette	-	-	-	2,977.37	-
Shipley	-	-	-	4,609.00	-
Tupperville	-	-	-	18,608.25	-
Upper Belleisle	-	-	-	32,091.75	-
Upper Nappan	-	-	-	54,929.55	-
Walker	-	-	-	5,210.13	-
Windermere	-	-	-	49,026.18	-
Woodworth	-	-	-	23,487.11	-
Payments to Province of Nova Scotia				<u>11,854.77</u>	<u>15,340.65</u>
Subtotal - Nova Scotia Projects				9,584,759.44	758,042.84

NEW BRUNSWICK

Allison	4	Westmorland	197	29,845.32	-
Aulac	24	Westmorland	2,050	329,764.31	27,551.46
Beaumont	19	Westmorland	207	90,460.67	19,774.57
Belliveau Village	11	Westmorland	191	27,866.73	83.10
Black River	50	Saint John	41	16,437.07	32.03
Boundary Creek	36	Westmorland	51	4,990.47	-
Calkins	30	Albert	227	122,360.25	1,670.49
Chartersville	45	Westmorland	348	64,522.84	23,095.41
College Bridge	27	Westmorland	873	163,968.96	9,411.10
Coyle Landry	8	Westmorland	305	54,349.91	155.25
Creeks	43	Albert	93	12,106.04	-
Dixon Island	16	Westmorland	330	111,355.18	19,262.88
Dock	25	Westmorland	42	20,709.90	-
Dorchester	13	Westmorland	1,758	315,180.79	35,223.85
Dover	26	Westmorland	43	19,563.71	161.22
Fox Creek	18	Westmorland	96	41,195.15	18.43

NEW BRUNSWICK (continued)

Name of Marsh	Project No.	County	Acreage Protected	Expenditures	
				1949-66	1967-68
Gautreau Village	20	Westmorland	209	130,502.42	16,005.13
Hillsboro	47	Albert	967	223,484.41	33,294.69
Jones Creek	54	Westmorland	51	7,845.79	-
Lower Coverdale	14	Albert	149	86,429.72	47,261.01
Memramcook	58	Westmorland	215	59,218.47	13,383.89
Memramcook West	21	Westmorland	1,105	224,946.82	18,177.59
Middle Coverdale	15	Albert	31	20,611.90	-
Missaquash	55	Westmorland	333	11,534.63	-
New Horton	17	Albert	799	119,576.13	674.40
Petitcodiac River Dam	63	Westmorland	-	353,339.72	283,299.99
Pre d'en Haut	12	Westmorland	113	62,370.37	-
Red Bank	57	Westmorland	41	5,139.32	-
Sackville	37	Westmorland	473	86,540.68	3,999.38
Shepody River Dam	51	Albert	5,552	1,641,360.25	43,700.60
St. Martin's	62	Saint John	184	51,894.88	779.20
Tantramar River Dam	56	Westmorland	17,988	791,161.72	5,822.89
Taylor Village	6	Westmorland	444	122,772.39	10,137.15
Turtle Creek	41	Albert	125	27,422.51	128.00
Upper Coverdale	28	Albert	45	20,138.32	-
Westcock	5	Westmorland	800	212,073.00	21,398.05
West Coverdale	33	Albert	260	82,626.21	-
Wilson	46	Westmorland	157	31,514.55	-
Wood Point	40	Westmorland	43	2,617.95	-
Baie Verte	-	-	-	923.03	-
Cole's Island	-	-	-	52,094.47	-
Coverdale	-	-	-	19.31	-
Great	-	-	-	6,828.22	-
Germantown	-	-	-	11,909.61	-
Hopewell Hill	-	-	-	72,406.13	-
Jones	-	-	-	4,803.31	-
Log Lake	-	-	-	52,004.10	-
Shepody River Survey	-	-	-	26,334.47	-
Tantramar River Survey	-	-	-	23,201.48	-

NEW BRUNSWICK (continued)

Name of Marsh	Project No.	County	Acreage Protected	Expenditures	
				1949-66	1967-68
Tantramar West	-	-	-	45,616.39	-
Upper Dyke	-	-	-	11,149.33	-
Payments to Province of New Brunswick					<u>89,639.15</u>
Subtotal - New Brunswick Projects				6,107,089.31	724,140.91
PRINCE EDWARD ISLAND					
Johnston River	1	Queens	275	20,486.61	-
TOTAL EXPENDITURE - CONSTRUCTION AND MAINTENANCE OF PROJECTS AND SPECIAL SURVEYS				15,712,335.36	1,482,183.76
TOTAL EXPENDITURE - ADMINISTRATION, ENGINEERING AND SUPERVISION				<u>7,830,616.11</u>	<u>739,887.25</u>
TOTAL				<u><u>23,542,951.47</u></u>	<u><u>2,222,071.00</u></u>

PUBLIC INFORMATION ACTIVITIES

The extension of information services to all Forestry Branch regions was completed in 1967-68 with the appointment of an information officer to the Newfoundland Region.

The Information and Technical Services Division produced and distributed 196 formal press releases during the year on all phases of forestry and rural development activities. A total of 1,470,000 copies of departmental publications, press releases, speeches, etc., were issued in 1967-68; and increase of 47 per cent over last year.

Among the special information items produced were:

- "Canada's Six Leading Commercial Softwood Trees" - second of a wall chart series for Canada's schools;
- "Bill Northwood" - a comic book based on the day-to-day adventures of a District Forester;
- "A Safe and Living Christmas Tree" - a pamphlet describing the safe use of natural Christmas trees;
- "Forest Enemies" - a booklet describing the major enemies of Canada's forests - insects, diseases, and fire;
- "ARDA Catalogue, 1966-67" - a comprehensive listing of ARDA projects;
- "Interlake Area of Manitoba Federal-Provincial Rural Development Agreement"; and
- "Development Plan for the Pilot Region: Lower St. Lawrence, Gaspé, and Iles-de-la-Madeleine".

Departmental exhibits and displays were shown at 32 events during the year, including the Pacific National Exhibition, Vancouver, and the Canadian National Sportsmen's Show, Toronto. An ARDA mobile trailer, equipped with audio-visual aids, was used extensively at rural fairs in Ontario to acquaint farmers and other rural residents with the ARDA program.

Two forestry motion picture films, "Woodlot Management" and "The Forester", were completed by the National Film Board. Production continued on two others - "Fires in the Forest" and "Land Capability", and on an educational film strip series based on the forest regions of Canada.

ESTABLISHMENT DIRECTORY

March 31, 1968

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Canadian Council on Rural Development

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