

jackpine budworm, and the spruce budworm. In 1986, Ontario undertook its largest protection spray operation against forest insect pests. About 3% of a 16 million hectare infestation area was targeted for protection action, which involved both aerial spraying and salvage cutting. In 1987, the infestation was expected to drop to 10 million hectares because of natural cycles, climatic factors and successful protection programs.

Pest management is an important aspect of British Columbia's forest management program. Forest pests, including insects and diseases, destroy timber and reduce the growth of forests by an estimated 31 million m³ annually which is equivalent to about one-third of the wood harvested in the province each year. About 11 million m³ of the 31 million m³ destroyed may be saved by applying practical protection techniques. Management programs to control mountain pine bark beetles were implemented in the mid-1970s and greatly expanded in 1984. The pine beetle infestation which began in the 1970s, reached a maximum infested area of over 400 000 ha in 1984. Control of the defoliators such as the western spruce budworm, Douglas-fir tussock moth and gypsy moth is an important aspect of forest protection. An extensive gypsy moth control program using the bacterial spray, B.t. has been successful in preventing the spread of this pest. There has been limited use of the bacterial spray on the spruce budworm and Douglas-fir tussock moth.

Regeneration. The provinces have taken measures to increase the area of denuded forest land that is reforested. In addition, dependence on natural regeneration alone continues to diminish. Left to nature, approximately one-third of cutover forest land fails to regenerate adequately in terms of desired tree species and stocking. Furthermore, present logging methods, such as clear-cutting, have reduced the area on which natural regeneration can be relied upon.

All provinces have increased the funding available for reforestation from their resources and through federal-provincial cost-shared agreements, and involved the forest industry in the planning and conduct of much of the reforestation on Crown land. Typically the provinces have assumed responsibility for the provision of nursery stock and reforestation of burned areas and of the backlog of lands that remain insufficiently stocked with tree cover. However, some provinces have encouraged the establishment of private nurseries and seed orchards rather than expanding provincial capacity.

Recently, the emphasis has turned from increasing the size of reforestation programs to

ensuring that these investments are cost effective. To this end, many provinces have increased the use of containerized seedling stocks, instituted quality control measures for nursery stock production and tree planting, developed and adopted treatments appropriate for various site types, and initiated the development of genetically improved planting stock.

To improve forest productivity, tree improvement is being pursued by all provincial governments. The provinces with the largest planting programs carry out both research and applied tree improvement programs. The other provinces are primarily engaged in applied tree improvement and rely on Forestry Canada and universities for research information and guidance. Co-operative tree improvement councils have been formed between industry and government in several provinces. As a result, seed collection areas and seed orchards have been established throughout Canada to facilitate the production and collection of superior tree seed for the production of planting stock. Stand improvement projects, including thinning, spacing, cleaning and pruning, are increasingly being undertaken.

In Newfoundland, during the three-year period, 1986-88, following the signing of the Resource Development Agreement, silviculture programs totalled 31 000 ha, including 9 000 ha of plantation and 13 000 ha of pre-commercial thinning.

Prince Edward Island has begun a long-term, comprehensive forest renewal program, directed at private woodlots which make up 90% of the productive forest. In addition to the planting target of 2.0 million seedlings per year, forest renewal activities include plantation maintenance, thinning of natural stands, reclamation of non-productive sites, and the establishment of access roads, bridges and boundary lines.

In Nova Scotia, the reforestation program has tripled since 1980 with almost 26 million trees planted in 1987. Small private woodlots represent nearly 50% of Nova Scotia's productive woodlands, where silviculture programs have more than tripled, from 5 400 ha in 1980 to 18 000 ha in 1987.

Under a large-scale silviculture program in New Brunswick, a total of 29 million seedlings were planted on Crown lands in 1981. This level was to be maintained for several years.

Quebec is involved in natural forest regeneration projects and programs. A reforestation program which began in 1988 will provide for the planting of 300 million seedlings per year in a joint provincial and private enterprise operation. In addition, a network of plantations is being