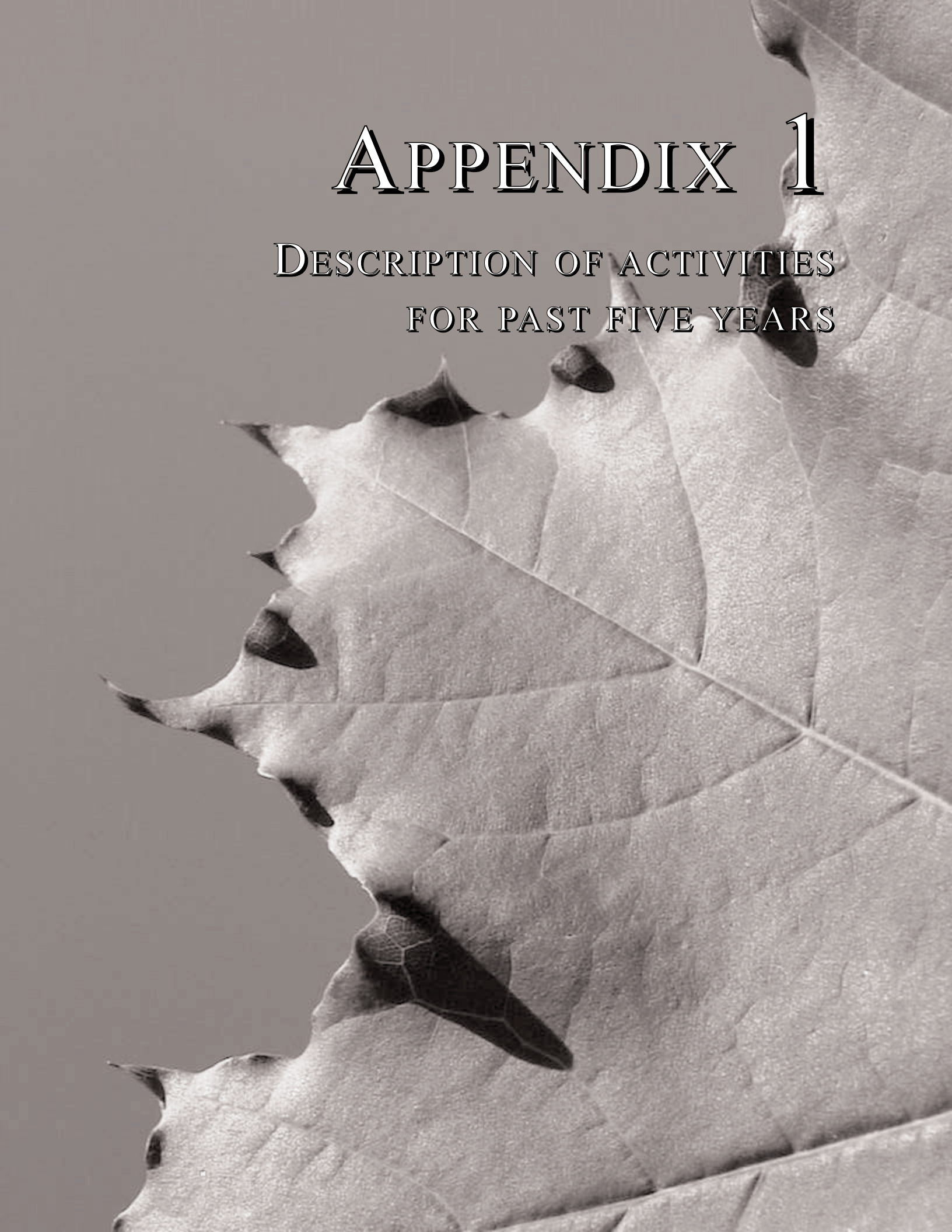

Appendix 1

Description of activities for past five years

SUMMARY OF PAST FIVE YEAR ACTIVITIES

The Twenty Year Forestry Development Plan 1996-2015 was a shift from traditional forest (timber) management to an adaptive ecosystem-based management approach. This new management direction highlighted two key strategic issues:

1. Emphasizing the importance of ecosystems and the development of an ecosystem-based management system.

2. Securing a sustainable timber supply.

The following programs were implemented to support the two key strategy issues:

1. Adaptive ecosystem management;
2. Indicators of sustainable development;
3. Decision support systems;
4. Mapping forest ecosystem resource values;
5. Stakeholders in partnership;
6. Woodlot management;
7. National and international initiatives;
8. Resource roads;
9. Insect and disease protection;
10. Silviculture and research.

Implementation of these programs during the past five years are reported as follows:

1. Adaptive Forest Ecosystem-Based Management

- Adaptive management programs were implemented to verify tree growth and yield forecasts; the protection of water quality and trout habitat through treed buffer zones was tested in the Copper Lake Watershed; predicted wildlife use of treed corridors in district 18 is being assessed; pine marten habitat guidelines are being applied in the Main River Watershed.

- Specific measures to protect forest biodiversity include:
  - leaving snags;
  - providing no cut trees and buffer zones of varying widths;
  - securing pine marten habitat;

- development of a draft biodiversity strategy;
- white pine conservation strategy developed;
- hardwoods/shrubs not to be cut during thinning operations;
- use of local seed sources for planting program;
- 15 % to 20% of forests to be older than 80 years old;
- forested landbase of proposed protected areas not included in wood supply calculations.

- The planning framework was implemented in all districts across the Province. Implementation of the planning process in Labrador included the signing of a process agreement between the Department of Forest Resources & Agrifoods and Innu Nation. The process agreement defines a mechanism to involve Innu Nation in planning.

- The proposed creation of a Forest Ecosystem Committee, comprised of government resource managers did not occur. However, to make progress in implementing an ecosystem-based forest management strategy within a government organization structure, will require establishment of a functioning Forest Ecosystem Committee.

- Forest Ecosystem Values
  - Ecosystem value maps were developed during the district planning processes. These maps defined the location of non-timber values within districts.
  - To protect archeological resources, either stage one archeological assessments were undertaken or specific no- cut buffers were implemented.
  - Within protected water supplies a stringent regime of no-cut buffers were established along with fuel storage requirements. Approval to conduct forest management activities required the approval of the Water Resources Division and consultation with Town Councils.
  - Where pine marten inhabit a district, leave areas for marten are required by the Inland Fish and Wildlife Division.
  - Fish habitat protection was provided through implementing the Department of Fisheries and Oceans forestry guidelines to protect fish habitat.

2. Indicators of Sustainable Development

- The Newfoundland Forest Service (NFS) adopted the Canadian Council of Forest Ministers Criteria and Indicators for Defining Sustainable Forest Management. The Western Newfoundland Model Forest conducted a process to develop possible provincial indicators under the six criteria.

- The province's last strategic plan proposed collecting data on the spatial distribution of disturbances and forest values, riparian zones, clearcut size,

fragmentation of the forest landscape and their effect on wildlife. This activity was not delivered in the past five years. Likewise, an ecosystem monitoring framework and program was not implemented.

3. Decision Support Systems

- The NFS used software developed by Remsoft Inc. known as Woodstock and Stanley to conduct the wood supply analysis. This decision-support management system was evaluated against other software systems and Woodstock and Stanley was deemed most appropriate to our needs.

- The NFS in partnership with the Western Newfoundland Model Forest, Corner Brook Pulp and Paper Limited and the Inland Fish and Wildlife Division are pursuing a course filter biodiversity assessment management tool. The computer model will assess forecasted landscapes for edge, patch sizes and species composition. At the fine filter level, a pine marten habitat model has been prepared and will be tested in conjunction with the coarse filter biodiversity model.

4. Mapping Forest Ecosystem Values

- Forest ecosystem values have been mapped at the district level. The 1996-2015 Twenty Year Forestry Development Plan proposed to define timber production forest. The designation of timber production forest for districts 8 and 10 was never approved by the Inter-departmental Land Use Committee (ILUC). However, timber production forests have now been designated for all areas identified for tree harvesting in district five-year operating plans that have been reviewed and released through the environmental assessment process.

5. Stakeholders in Partnership

- The NFS has established District Planning Teams across the province. Participation rates of local citizens and organizations vary, depending on the population base, forest issues and interests of local citizens.

6. Woodlot Management

- The woodlot program was downgraded to an extension service involving district 14 staff. No government program funding was available. Locally, grown Christmas trees are now common, however, the Christmas tree program is managed by the Agriculture Branch of the Department of Forest Resources & Agrifoods.

7. National and International Initiatives

- The CCFM criteria and indicators were the foundation for the provincial indicators found in this strategy. Similarly, the Department of Forest

Resources and Agrifoods and the Newfoundland and Labrador Registered Professional Foresters are both signatories to National Forest Accord. A Provincial National Forest Strategy Coalition was established to direct the implementation of the national strategy. The coalition developed an action plan, monitored implementation progress and reported to the mid-term and final evaluation committee.

- The NFS supports third party certification. Both CBPPL and ACCC have attained ISO-14001 certification. The NFS had a gap analysis completed of their ability to meet the ISO 14001 standard.

8. Resource Roads

The provincial resource roads program is an essential component of the Department's SFM strategy. To satisfy the goals associated with SFM it is important that an adequate road network is in place and is properly maintained. The primary objective of the program is to provide access on crown limits to mature and overmature softwood and hardwood stands for the purpose of timber harvesting, intensified silviculture, forest protection and wildlife management.

With an annual budget of approximately $2.0 M, the resource roads program constructs some 50 km of new access road and the reconstruction of an additional 20 km per year. The majority of these roads are located in timber stands which are being accessed by small to intermediate sized, independent sawmill operators who are located in many rural areas throughout the province. As a result of the program, sawmilling in these rural areas remains viable and forms an important part of their economies.

By the end of 2000, the Department had funded the construction of over 2,930 kilometers of access road through all regions of the province. In addition to providing access for SFM, these roads play an every increasing role in the development of eco-tourism and are utilized by the general public for recreation, hunting and firewood collection.

All roads constructed for forestry purposes must be built to minimum standards established by the Department. Some roads which are deemed no longer necessary are deactivated in such a fashion that the area previously occupied is returned to a productive state. The Department can also close roads during times of poor operating conditions, especially during spring breakup, at times of high fire index levels, and for any purpose deemed in the best interest of forest management.

During the last five years, the forest resource roads program completed the construction of 210 km of new forest resource road and the re-construction of an additional 111 km on unalienated Crown land (Table 6a). The majority of these roads accessed stands having mature and overmature timber or were areas with potential for intensified silvicultural treatment. In management districts with a high percentage of Crown land, the demand for resource road construction continued to grow and in all years exceeded the resource road program budget.

In the past five years, a total of $7.8 million dollars was spent on the construction of 321.5 km of resource road in Newfoundland and Labrador (Table 7a). This figure includes the installation of some 43 steel panel and wooden timber bridges. The Eastern Region which includes Districts 1 through 11 saw $2.7 million worth of projects tendered. Due to better ground conditions and the

high number of road construction contractors located in this region, average road construction costs were the lowest for the Province; $16,700/km. Costs were somewhat higher for the Western Region ($28,370/km) and can be attributed to the lack of suitable subgrade material and difficulties associated with road building in mountainous terrain of the west coast.

Over the past five years road building in Labrador has been restricted by the land claims process and for the most part has been limited to the south coast. Unfortunately, road building costs are quite high, coming in at $47,000/km. The high costs can be attributed to a number of factors which include; rough ground conditions, lack of suitable subgrade material, high transportation costs for equipment and the low number of contractors participating in the tendering process. However, it is anticipated that construction costs will drop in this area, once the Trans Labrador Highway is completed.

Although no major environmental difficulties were experienced during the past five years, the Department recognizes the need for environmentally sound road construction methods and has revised the Road Construction Guidelines section in its contracts to reflect appropriate environmental standards. Much work has also been done with round wood harvesting contractors who wish to construct their own access roads. New construction guidelines for these operators have been drafted, and implemented by district office staff. Continual monitoring of road construction practices is needed if the Department is to limit environmental damage.

Table 6a. Resource Road Program by Region, 1996-2001.

Region	New Construction (km)						Re-Construction (km)						Grand Total
	96-97	97-98	98-99	99-00	36891	Total	96-97	97-98	98-99	99-00	36891	Total	
Eastern	18.5	16.7	22.4	14.4	7.8	79.8	18.1	7.5	17.6	10.5	29.2	82.9	**162.7**
Western	17.6	20.6	29	28.5	20.8	116.5	0.5	1.5	5.9	1.3	3.3	9.2	**125.7**
Labrador	3	0	5.8	2.1	3	13.9	3	4	0	9.5	2.7	19.2	**33.1**
	39.1	**37.3**	**57.2**	**45**	**31.6**	**210.2**	**21.6**	**13**	**23.5**	**21.3**	**35.2**	**111.3**	**321.5**

Table 7a. Resource Road Expenditures, 1996-2001.

Region	96-97	97-98	98-99	99-00	36891	Total	Avg Cost/km
Eastern	$577,381	$511,292	$671,893	$580,683	$374,147	$2,715,396	**$16,689**
Western	$530,218	$613,369	$933,549	$781,716	$695,481	$3,554,333	**$28,276**
Labrador	$231,343	$219,095	$397,050	$377,258	$328,640	$1,553,386	**$46,930**
sub-totals	$1,338,943	$1,343,756	$2,002,492	$1,739,657	$1,398,268	$7,823,115	
Total KM	60.7	50.3	80.7	66.3	67.1	325.1	

9. Silviculture and Research

Over the past five years, silviculture increased its focus on the intensive assessment of disturbed sites and the enhancement of natural regeneration stocking throughout Newfoundland and Labrador. In the previous five years, more focus was placed on pre-commercial thinning (PCT), with the objective being to bring young natural regeneration to merchantability as early as possible to help alleviate predicted wood supply deficits.

Several key issues have emerged which required this change in focus. Primarily, the 1996 wood supply analysis indicated that the ability for thinning to help offset the predicted wood supply shortage, is rapidly declining as the province moves further into the deficit period. Thinning impacts wood supply primarily through speeding up the time it takes for individual trees to reach harvestable size. This makes thinning a time sensitive treatment and having less impact on short term wood supplies. However, PCT still does have many positive benefits, such as increasing tree sizes (therefore increased sawlog content and value), reducing future harvesting costs and reducing rotation ages. PCT increases long term wood supplies and will continue to be a cornerstone of the provinces's Silviculture Program.

While the PCT Program has declined, it is important to note that the planting program has, in 2002, emerged as the largest element of the province's silviculture program. This strategic change occurred for several reasons, primarily, the first priority for Silviculture has always been to ensure all harvested areas are promptly regenerated (either through natural regeneration or through planting). While the planting levels have been relatively stable over the past five years, a relatively new planting program has emerged recently (ie., gap planting) and is the primary reason for the increase in planting efforts from approximately 7 million seedlings to 11 million per year.

The growth of gap planting (ie. the practice of increasing natural regeneration stocking with nursery grown seedlings) has occurred for several reasons:

- Insect epidemics continue to negatively impact the growth of balsam fir in NL and one way to offset this impact is to increase spruce content through gap planting.

- Balsam fir is our dominant species in the naturally regenerating forests and is increasing in scope and content throughout NL (especially in the absence of fire) at the expense of spruce. Gap planting with spruce is one method of addressing this growing imbalance in species composition.

- Moose favor balsam fir as a winter food source and where high moose populations exist, their excessive browsing can destroy large areas of natural balsam fir regeneration.

- Natural regeneration, after harvesting, is relatively good in NL. However, it is often less that optimum and post-harvest regenerating forests often have significant openings due to natural and human factors (e.g., skid trails, landings). Gap planting fills in these openings.

In essence, balsam fir regeneration is quite vulnerable to a host of natural predators and is not always optimum. This requires the implementation of long term strategies to decrease reliance on balsam fir, while at the same time, providing for increases in long term wood supplies.

One of the keystones of this strategy is gap planting and current thinking is to plant approximately 1000-1200 seedlings per hectare (as compared to 2000-2500 seedlings per hectare in full planting). The main species chosen to date is white spruce, which is more resistant to insects than balsam fir and it is also not browsed by moose. Secondary benefits of this treatment are that the resulting plantations will be composed of multiple species, often mixes of black spruce, white spruce, balsam fir and a variety of naturally occurring hardwoods.

Table 8a below outlines the level of silviculture treatments from 1997 to 2001. In summary, approximately $61.7 million was invested in silviculture to enhance approximately 65,000 hectares of productive forest land. It is interesting to note that from 1979 to 2001, some $250 million has been invested in silviculture by the Crown and two pulp and paper companies.

Table 8a: Historical Silvicultural Levels (ha of treated forest) by Year and Treatment Type

Treatment	1979-95 (ha)	1996 (ha)	1997 (ha)	1998 (ha)	1999 (ha)	2000 (ha)	TOTAL (ha)
Planting	43,359	2,986	2,695	2,272	3,031	2,633	**56,976**
Gap Planting	539	453	769	1,328	1,043	1,553	**5,685**
PCT	93,580	7,822	6,699	4,686	4,960	4,190	**121,937**
CT	1,460	19	214	68	28	34	**1,823**
DLT	346	1,124	1,318	359	394	267	**3,808**
Site Preparation	34,644	1,684	1,553	1,144	1,610	2,295	**42,930**
Stand Reclamation	19,364	1,610	941	138	371	4	**22,428**
Vegetation Management	13,678	481	146	0	507	771	**15,583**
Other	4,946	365	48	31	162	39	**5,591**
TOTAL	**211,916**	**16,544**	**14,383**	**10,026**	**12,106**	**11,786**	**276,761**

Over the past 5 years, silviculture research was conducted in two primary areas; operational research and tree improvement.

Operational silviculture research is aimed at enhancing or improving existing silviculture practices through the establishment and monitoring of various field trials. Information from these field trials are used to improve the existing silviculture techniques or to develop new techniques and/or strategies. Over the past 5 years, in excess of 50 field trials were established and/or remeasured. Examples of research initiatives include: time-of-planting fertilization to enhance early growth on difficult sites; monitoring of cone predation by squirrels to determine impact on white pine cone crops; impact of thinning and pruning on the growth of yellow birch. Research results are published in a report titled Silviculture Notebook. Copies are available from the Forestry Library. Thirty seven Silviculture Notebooks were published over the past five years.

Tree Improvement is one of the best investments in intensive forest management, as it is aimed at enhancing the growth of native tree species through conventional tree breeding techniques. Seed orchards are established from seeds and vegetation material collected from the fastest growing trees in the wild. Seeds produced within these orchards are used to establish fast growing plantations, which will outgrow regular plantations by 10% to 30%.

Seed orchards have been established in Newfoundland since 1990 and the first improved seed was produced in 2001. Orchards for black spruce, white spruce, white pine, red pine, eastern larch and Norway spruce have been established at Wooddale Provincial Tree Nursery while white spruce, black spruce and Eastern larch orchards have been established at Pynn's Brook. This is an on-going program and it is expected by 2010 that all planted seedlings will come from improved seed.

10. Insect and Disease Protection

The insect and disease control program continues to be an essential component of forest management. In the last 30 years, impacts by two major forest insect pests, the hemlock looper and the spruce budworm, have been substantial and significant in terms of their defoliation and tree mortality and the resulting impact on both forest structure and on sustainable forest management. Insects continue to impact on the composition of existing forest stands and this will contribute to and influence future stand composition.

As the need for more intensive forest management occurs, along with a continually 'shrinking' land base, so to does the need for enhanced, timely and effective pest management. The growing importance of silviculture areas (plantations and pre-commercial thinnings) where significant financial investment has been made in anticipation of future forest requirements and uses, makes this management even more important. Implicit, is the need for increased vigilance in terms of insect population monitoring (surveys) of known important defoliators which have caused, and which can cause, serious defoliation and losses in terms of tree cover and / or growth loss. Another concern, and one which has been historically recognized, and with increasing global trade, is the accidental introduction of non-native (alien) organisms (insects and diseases) which arrive and potentially become major pests without the benefit of natural control agents from their areas of origin. The potential problem and magnitude has been documented at the federal level in recent years. The province must also be aware and be prepared to act expeditiously, as the need arises to such threats.

Program Parameters

The Department has both responsibility for, and a mandate to deal with, insect and disease surveys and control measures. Surveys are required to identify, interpret and evaluate insect and disease conditions, while control aspects are required to protect the forest through development, implementation and evaluation of control measures. The on-going strategy of protection programs is to keep as much as possible of the existing tree cover alive within the constraints of financial, environmental and human concerns.

Over the past five years, a number of insect pests have caused damage to forest stands including silviculture areas (Table 9a). Insect control programs associated with the hemlock looper, balsam fir sawfly and yellow headed spruce sawfly infestations have been carried out (Table 10a). Because of obvious limiting factors (environmental and human concerns, logistics, financial restraints, and including readily available, effective and approved tools) many stands have been left unprotected. Those where protection activity was carried out were priorized based on criteria such as pest population levels, stand value, location and operational considerations. Where adequate and timely treatment has been applied, these programs have been successful in limiting potential impacts.

A number of initiatives / goals were set for the past 5 years. In 1998, Government re-affirmed the forest protection policy of initiating control measures, as and if required, using the most effective and efficient tools available at the time which have the least environmental impacts, subject to all regulatory requirements and environmental safeguards. As a component to this policy, Government directed that research into alternate methods to identify and develop better methods of protection which would be less intrusive and more environmentally acceptable. All

experimental tests would require Government approval as well as applicable licences and permits. The forest industry would be encouraged to be involved in all aspects, including cost-sharing.

The Department has carried out control programs as per the forest protection policy. Emphasis has been placed on valued forest areas and in particular silviculture sites. The Department continues to use the latest control application tools to deliver as safe, and as environmentally responsible, a program as possible, including the use of the latest satellite navigational equipment (DGPS) to ensure products are deposited on target. In addition, the Department utilizes computer technology to enhance the planning, development and delivery of the various components associated with control programs and surveys.

Although choices and options are few, progress has been, and continues to be, made to test and when approved, use the latest effective control methods. Examples in the past 5 years are the insecticides Dylox and Neem products such as the botanical insecticide, Neemix 4.5. Emphasis has been placed on developing solutions to local problems through Departmental funding of research conducted by the CFS, as well as with operational support. Progress has also been made in developing biological control products for the balsam fir sawfly, such as the detection, identification and research on the naturally occurring balsam fir sawfly virus (NeabNPV) and the testing of the botanical insecticide, Neemix 4.5. There are required protocols before any control product can be used operationally. Work must be carried out to ensure that the product is safe to use.

In addition, basic biological research and the parameters associated with the pre-commercially thinned forests and balsam fir sawfly problems were researched initially by CFS-Atlantic and then this was transferred to the University of New Brunswick through an NSERC grant. The NSERC grant allowed for expanded work through additional leveraging of funds. The forest industry and the Department has cost-shared and partnered in this work. Significant progress has been made in answering some of the fundamental questions.

The survey component has increased in importance and activity in the past 5 years. With the elimination of the CFS Forest Insect & Disease Survey (FIDS) function and the downsizing of CFS in general, the Department has had to take over the major aspects of that program as it relates to operational information. Previously, the Department provided assistance, both human resources and financial, for both the insect defoliation and insect forecast aspects. Now the Department conducts these surveys with cost-sharing from the forest industry. This has been a major addition to the mandate of the Insect & Disease Control Section of the Department.

With respect to being pro-active in terms of detection and possible early intervention for insect pest problems, the I & D Control Section has started (2000) a spruce budworm population monitoring program through the use of pheromone traps. These traps attract and capture male adult moths. The numbers caught can be used to determine both the distribution and population trends of this potentially serious forest pest. If numbers increase above a defined threshold, then this will trigger more intensive surveys and lead to evaluation of intervention / control requirements, as necessary. By determining early trends and initiating mitigating measures, it is hoped to avoid the devastating consequences of the last budworm outbreak witnessed in the 1970s.

Table 9a. Area affected by hemlock looper, balsam fir sawfly and yellowheaded spruce sawfly in Newfoundland 1997 - 2001.

Year	Area (ha) (nearest hundred)			Total
	Hemlock Looper [a]	Balsam Fir Sawfly [a]	Yellowheaded Spruce Sawfly [b]	
1997	8,600	30,300	1,200	40,100
1998	6,300	24,400	300	31,000
1999	16,200	18,400	300	34,900
2000	11,900	41,000	300	53,200
2001	28,700	47,800	-	76,500

[a] = Area with moderate + severe defoliation
[b] = Total area of plantations affected

Table 10a. Summary of area (ha) treated for operational control of hemlock looper, balsam fir sawfly and yellowheaded spruce sawfly in Newfoundland: 1997 - 2001.

Year	Area (ha) (nearest hundred)			Total
	Hemlock Looper [a]	Balsam Fir Sawfly [a]	Yellowheaded Spruce Sawfly [b]	
1997	4,300 [a]	-	-	4300
1998	7,200 [a]	3200	800	11200
1999	9,800 [a]	1300	-	11100
2000	15,300 [a]	-	-	15300
2001	59,800 [a,c]	1500	-	61300
TOTAL	**96,400 [a,c]**	**6000**	**800**	**103200**

[a] = Biological Insecticide *Bacillus thuringiensis* var *kurstaki* (B.t.k.)

[b] = Dylox (trichlorfon)

[c] = Mimic (tebufenozide) [Mimic = 3,000 ha]

APPENDIX 1