

Chapter 3

Department of Natural Resources Silviculture

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Silviculture

Introduction

- 3.1** Forests are a cornerstone of the economic, environmental, and social foundation in New Brunswick. Forestry is a pillar of the New Brunswick economy. The Province's 2012 economic development policy "Growing Together" identified the forestry sector as a mainstay of the provincial economy. Timber or fiber harvested from Crown lands forms a base of supply for the forest industry.
- 3.2** In October of 2013 we chose to undertake a project within the Department of Natural Resources (Department) to learn about forest management practices in the Province and identify specific areas where we believed further work would provide value to the Legislative Assembly and the public. The Crown forest is also our legacy to future generations to ensure they can benefit from a strong forestry sector and can continue to enjoy the natural beauty and diversity of our forests.
- 3.3** We interviewed Department management personnel in key areas, stakeholders from industry, representatives of private woodlot owners and environmental groups as well as academics from the University of New Brunswick.
- 3.4** We researched forest management in other jurisdictions and reviewed government of New Brunswick commissioned reports over the past decade as well as Department documentation related to topic areas of interest.
- 3.5** We chose forest management within the Department for a number of significant reasons:
- The intrinsic value of forest land to New Brunswick residents is significant;
 - Economic value of the forest industry is significant to the Province;

- Management of Crown forest is complex; and
- The Province has a significant direct financial interest in Crown forests.

The intrinsic value of forest land to New Brunswick residents is significant

3.6 A survey undertaken in 2007 found “94% of NB residents visit forests during the year”¹ and “over 95% of respondents participate in forest-related activities”². Clearly New Brunswick residents utilize and value forests of the Province.

3.7 The survey found “environmental aspects remain the two most important values.”³ The two environmental aspects were:

- protection of water, air, and soils, and
- valuing forest as habitat for animal and plant life.

Economic wealth and jobs ranked third.

Economic value of the forest industry is significant to the Province

3.8 The economic value of the forest industry to the Province is often expressed in terms of contribution to provincial Gross Domestic Product (GDP) and overall employment.

3.9 In 2011, a government commissioned Private Forest Task Force, mandated to “review and set timber objectives for private lands in New Brunswick”⁴, reported the forest sector in New Brunswick accounted for 5 % of total GDP and greater than 10,000 jobs in 2010⁵.

¹ T.M. Beckley et al. “*Public Views on Forest Management in New Brunswick: Report from a Provincial Survey*”. (Natural Resources Canada, 2007), page 9.

² Ibid, page 13.

³ Ibid, page 13.

⁴ Government of New Brunswick News Release. “*Government announces actions to help strengthen, renew forest industry*”. 2010. < http://www2.gnb.ca/content/gnb/en/news/news_release>.

⁵ Donald W. Floyd, Robert Ritchie, and Tony Rotherham. “*New Approaches for Private Woodlots: Reframing the Forest Policy Debate*”. (Province of New Brunswick, 2012). 4.

3.10 Natural Resources Canada cited Statistics Canada 2012 direct employment numbers at 11,900 direct jobs based on the Labour Force Survey⁶. The value of 2012 exported forestry products to the Province per Natural Resources Canada⁷:

- primary wood products \$31,313,432
- pulp and paper products \$1,014,192,573
- wood-fabricated materials \$372,868,145

***Management of
Crown forest is
complex***

3.11 Although the Department is responsible for management of Crown land, there are six Crown timber licensees that hold Crown timber licenses issued by the Province. A licensee enters into a management agreement with the Province governing how they will manage and use Crown lands, subject to the Minister's approval.

3.12 Licensees are required to submit three plans detailing their operations on Crown land:

- a 10-year industrial plan describing all aspects of the licensee's wood processing facilities;
- a 25-year management plan detailing their objectives for use of Crown land under their agreement and describing the manner in which they will manage Crown lands; and
- a 1-year operating plan detailing how much wood will be used, the source of the wood, and other operational information.

***The Province has a
significant direct
financial interest in
Crown forests***

3.13 The Province receives timber royalties (revenue) for wood harvested and processed. Gross timber royalties for 2012-13 totaled approximately \$65 million (before forest management and silviculture payments to licensees). Royalty rates are defined in regulation.

3.14 The Province pays Crown land licensees to manage their license at a defined overhead rate. The Province also pays licensees for undertaking silviculture work on Crown land.

⁶ Natural Resources Canada. "The State of Canada's Forests – Annual Report 2013". 49.

⁷ Ibid.

3.15 The Province's investment in forest resources is significant. Program budget and expenditures from the Department's 2012-13 annual report are presented in Exhibit 3.1. Overall, the Forest Management program accounted for 61% of the Department's ordinary account budget and actual expenditures.

Exhibit 3.1 - Department of Natural Resources – Ordinary Account 2012-13

Department of Natural Resources – Ordinary Account 2012-13					
Program	Budget	Percentage of Total Budget	Actual Expenditure	Percentage of Total Actual Expenditure	Difference
Forest Management	\$ 47,223,600	61%	\$ 45,916,800	61%	\$ (1,306,800)
Fish and Wildlife Management	11,179,000	14%	11,041,000	15%	(138,000)
Corporate Services	7,094,300	9%	7,426,300	10%	332,000
Land Management and Natural Areas	4,413,500	6%	3,966,500	5%	(447,000)
Regional Management	7,311,700	10%	6,715,800	9%	(595,900)
Totals	\$ 77,222,100	100%	\$ 75,066,400	100%	\$ (2,155,700)

Source: Created by AGNB from Department of Natural Resources 2012-13 annual report data (unaudited).

3.16 We selected two project areas for further examination. The first relates to Silviculture and can be found in this chapter.

3.17 Chapter four looks at the role and responsibilities of the Department of Natural Resources and the New Brunswick Forest Products Commission (Commission) respecting private wood supply.

Significance of silviculture

3.18 The sustainability of future timber supply depends on its successful regeneration. Silviculture⁸ is the aspect of forest management that focuses on achieving the continued regeneration of a high quality timber supply. This leads to a more productive working forest which in turn can provide more forest area to satisfy non-timber objectives, such as habitat preservation, biodiversity, and alternative forest uses like maple sugar production.

⁸ See Appendix I for a glossary of terms, including silviculture.

3.19 Average silviculture spending over the last five years by the Department of Natural Resources (the Department) has been approximately \$29 million. It is one of the largest expenditures of the Forest Management branch. Crown timber license management and silviculture are the two most significant cost components, which offset earning royalty revenue from Crown Timber.

3.20 The Private Forest Task Force report of 2012 stated, *“Silviculture activities contribute a higher proportion of GDP to gross output than forestry and logging and all manufacturing sectors, including the forest products industries.”*⁹

3.21 We believe it is important to the Legislative Assembly and the general public to know how the Department is safeguarding and overseeing the renewal of one of our most valuable natural resources.

Audit objectives

3.22 The objectives of our audit were:

- to determine if the Department of Natural Resources is meeting its responsibilities to enhance the quality and quantity of future timber supply through silviculture; and
- to determine if the Department of Natural Resources acquires silviculture services with due regard for economy and efficiency.

Conclusions

3.23 We have concluded past silviculture efforts will contribute to improvements in the future supply of timber. However, during our audit period of 2009 to 2014, the Department fell short in fulfilling some of its related management and oversight responsibilities. This includes not updating the forest management plans and agreements; failing to enforce compliance with treatment standards and not completing licensee performance evaluations, in addition to not keeping the public informed on the state of the Province’s forests and the impact of the Department’s silviculture activities.

3.24 We have also concluded the Department has not acquired

⁹ Donald W Floyd, Robert Ritchie, and Tony Rotherham. Socioeconomic Impacts of the New Brunswick private Woodlots Silviculture Program, Private Task Force Report, Appendix B, page 11.

silviculture services with due regard for economy and efficiency. However, it did demonstrate good controls over the receipt and billing for silviculture services received.

Results in brief

Department's silviculture strategy

3.25 Because of the collective efforts of the Province and industry stakeholders over the last 30 years, the future wood supply is expected to increase. However, the Department has not fulfilled its stewardship responsibilities to keep the public informed on the success of its efforts. During the audit period, the Department did not provide adequate direction and oversight of the silviculture program on Crown land.

3.26 The Department has sophisticated information systems and a wealth of forest data at its disposal. We noted a lack of documentation that provides macro level forestry analysis. There was a shortage of current summarized forestry data at the provincial level with which decision makers could evaluate alternatives and make informed decisions. This led us to question if silviculture related decisions are optimized relative to established objectives.

3.27 The Department's attention is concentrated on overseeing each of the licensees and monitoring compliance of licensees' current activities. The Department is less focused on managing the renewal of the Province's forests as a whole, but rather manages on a license by license basis.

Procurement of silviculture services

3.28 The Department does not acquire silviculture services in a competitive and transparent manner. The price paid for planting and thinning is set by the Department using a costing model with no competitive open market influence. There is no ongoing comparison between actual costs incurred by licensees, who are the sole source providers on Crown land and the model rates.

Standard setting and compliance monitoring

3.29 We found the main standards document, the *Forest Management Manual for New Brunswick Crown Land*, to be an interim, out of date document. Since last published in 2004 it has been superseded by other policies, directives and generally accepted practices. Lack of clear operational compliance standards makes monitoring more difficult and increases the risk of non-compliance.

Determining the value contributed by the silviculture program

3.30 We recognize the importance of continued investment in our renewable timber resources through the silviculture program. We found the Department does not provide adequate accountability information to the Legislative Assembly and the public relating to the effectiveness of the program. We also

noted a lack of clear financial accountability for how the funds are being spent, and what benefits will accrue to ensure adequate future timber supply.

3.31 Silviculture expenditures are an investment in our renewable timber resources. It is evident investments made over the past three decades will contribute to a growing timber supply in the future. However, the Province needs to do more to ensure it is accountable for the preservation and growth of this asset.

3.32 The Department is not accountable for the value generated from its silviculture expenditures. It does not have the processes in place to determine whether the spending of \$29 million per year is getting value for money from silviculture expenditures.

3.33 There is also a lack of accountability for spending of Private Silviculture Program funding of approximately \$5 million per year.

Apparent bias to economic development and industry

3.34 There is an unstated employment and economic development purpose for both the Crown and private silviculture programs.

3.35 We found silviculture processes and decisions were driven by an apparent Department objective to support industry and economic development. For example:

- standards have been changed to give licensees more operational flexibility such as relaxing the planting standards;
- financial and process concessions have been granted to a licensee for which deficiencies were found during compliance monitoring; and
- strategic direction has been delayed to allow government to find ways to help industry be more competitive.

Performance reporting for the silviculture program

3.36 The Legislative Assembly and the public are not made aware of the long-term impact decisions will have on the future wood supply.

3.37 The Department has commissioned several reports and studies over the last ten years. Many of the recommendations made in these reports have not been adopted or responded to by the Department.

Recommendations

3.38 A summary of our recommendations can be found in Exhibit 3.2.

Exhibit 3.2 - Summary of Recommendations

Recommendation	Department's response	Target date for implementation
Audit Objective 1 - To determine if the Department of Natural Resources is meeting its responsibilities to enhance the quality and quantity of future timber supply through silviculture		
3.76 We recommend the Department adhere to a regulated and predictable forest management planning cycle and ensure compliance with the <i>Crown Lands and Forests Act</i> by obtaining revised forest management plans from each licensee every five years.	<i>DNR agrees. Forest Management plans have now been filed with DNR covering all Crown timber licenses as of the end of 2014.</i>	<i>Complete.</i>
3.83 We recommend the Department regularly obtain forest management plans for all industrial freehold managed by Crown licensees and compare silviculture levels between licensee freehold and Crown land.	<i>DNR agrees. While silviculture strategy is already a main component of Crown forest management plans the analysis can be expanded to include a comparison for those Licensees that also manage freehold.</i>	<i>12 months</i>
3.104 We recommend the Department complete and finalize a silviculture manual with performance standards based on best practices.	<i>DNR agrees. New Performance standards are being defined in the context of our outcome-based forestry. The approach links key structural attributes measured early on in stand development to the timber supply and quality requirements necessary to support long-term sustainable harvest levels. DNR is moving to adopt this approach this year.</i>	<i>6 months</i>

Exhibit 3.2 - Summary of Recommendations (continued)

Recommendation	Department's response	Target date for implementation
<p>3.105 We recommend the Department enforce adherence to forest management standards and make amendments and exceptions only in light of new scientific knowledge and analysis of the effect of past treatments.</p>	<p><i>DNR agrees. An important element of DNR's migration to an outcome-based oversight approach will be the documentation and adoption of best-practices. As always, best practices will be used to guide silviculture on Crown lands. Best practices will be science-based, they will afford foresters flexibility to tailor treatments to specific block characteristics, and they will change over time as processes improve.</i></p>	<p>Ongoing</p>
<p>3.106 We recommend the area of Crown forest, subject to clear cut harvest, be reduced in favor of non clearcut harvest treatments as per the updated forest management strategy "A Strategy for Crown Lands Forest Management Putting our Resources to Work".</p>	<p><i>Clear cut harvesting is an appropriate tool for many of New Brunswick's forest types and is the most effective means at maximizing productivity and maintaining competitive industry costs. Where high-quality shade tolerant hardwoods exist and where special habitat and water quality considerations are a priority careful selection logging practices are used. DNR's current Crown forest strategy does not increase the reliance on clear cutting in the short term. In the future the industry will shift to greater reliance on commercial thinnings and clear cut harvesting will be reduced.</i></p>	<p>n/a</p>
<p>3.118 We recommend the Department continue with the silviculture annual monitoring program and apply consistent controls on silviculture services acquired.</p>	<p><i>DNR agrees, although the annual monitoring efforts are changing in substantial ways in order to bring about improvements in accountability. DNR will employ modern LiDAR-based techniques along with traditional field sampling to derive performance measures for silviculture. This approach will capture far more area and at a substantially higher resolution than traditional efforts. The new approach to monitoring will test not only whether areas were treated, but also how the trees are responding to management.</i></p>	<p>Ongoing</p>

Exhibit 3.2 - Summary of Recommendations (continued)

Recommendation	Department's response	Target date for implementation
3.122 We recommend the Department complete licensee performance evaluations every five years per the <i>Crown Lands and Forests Act</i> .	<i>DNR agrees. License performance evaluation for the 2007-2012 period is now complete and the documentation is being finalized for public release.</i>	6 months
3.123 We recommend evaluation data be verified by the Department for completeness and accuracy.	<i>DNR agrees. Indicators for the upcoming Licensee performance evaluation will be verified by the Department for completeness and accuracy.</i>	12 months
3.131 We recommend the Department monitor the results of silviculture treatments over time and hold licensees accountable through performance based measures.	<i>DNR agrees. As part of the outcome-based forestry approach, DNR will begin to evaluate silviculture performance well beyond the initial year of activity. A new approach will include a comprehensive growth & performance evaluation at age 15 for plantations and 5 years following any thinnings. The metrics will describe at a landscape-level both area treated and realized product development relative to management plan expectations.</i>	2 years
3.132 We recommend information self-reported by licensees be verified for completeness and accuracy.	<i>DNR agrees. See 3.123 above.</i>	12 months
3.142 We recommend the Department regularly report to the Legislative Assembly and the public on the status of New Brunswick's forest and its management.	<i>DNR agrees. DNR will release a web based information gateway that will provide increased transparency regarding New Brunswick's forest. We will look to use this as the basis for future reporting to the Legislature.</i>	12 months
3.143 We recommend pending the development and issuance of a consolidated "State of the Forest" report by the Department, the most recent forest management plans for all Crown licenses be made available to the Legislative Assembly and the public.	<i>DNR agrees. DNR will be releasing a regular state of the forest report that will highlight key information on the use and impact of silviculture treatments. This report will be filed with the clerk of the Legislative Assembly.</i>	18 months

Exhibit 3.2 - Summary of Recommendations (continued)

Recommendation	Department's response	Target date for implementation
Audit Objective 2 - to determine if the Department of Natural Resources acquires silviculture services with due regard for economy and efficiency.		
3.158 We recommend the Department include the use of an economic payback model when analysing resource allocations for silviculture program activities.	<i>DNR agrees. Working with industry and academic partners, DNR will work to strengthen economic factors in strategic modelling efforts.</i>	2 years
3.159 We recommend the Department implement a previous recommendation made by the Select Committee on Wood Supply to commit to, on a five year basis, the level of silviculture funding deemed appropriate to achieve stated timber and non-timber objectives.	<i>DNR agrees and will submit a funding plan to Government for consideration.</i>	8 months
3.163 We recommend the Department, in consultation with the Office of the Comptroller, calculate and record the value of the Crown timber asset in the Department's annual report and adjust this valuation to reflect harvest, silviculture and other changes. This valuation will quantify the impact of their management decisions.	<i>DNR agrees. Crown timber valuation is an important indicator of forest management success and DNR will move to adopt this as a regularly reported metric.</i>	2 years
3.167 We recommend the Department include long-term regeneration needs of the Crown forest and harvest trends to support distribution of silviculture funding.	<i>DNR agrees. Silviculture funding allocation decisions have always been supported by the forest management planning process and long-term timber supply models maintained within DNR. In the future, forest management planning documents will make clearer the scenario analyses and alternatives considered in silviculture strategy.</i>	2 years

Exhibit 3.2 - Summary of Recommendations (continued)

Recommendation	Department's response	Target date for implementation
<p>3.181 We recommend the Department regularly benchmark silviculture rates from other jurisdictions in addition to using the costing model.</p>	<p><i>Benchmarking exercises with other jurisdictions are problematic as changes in geography, forest type, labour costs, and similar factors can lead to legitimately differing compensation rates. Isolating factors of interest can be extremely challenging. DNR will make efforts to develop criteria for comparisons. DNR does work to produce a competitive rate for compensation of silviculture efforts that provides fair compensation to companies at the lowest cost to Government. DNR will continue to regularly re-calculate rates in the interest of reflecting changing market and forest conditions.</i></p>	<p><i>1 year</i></p>
<p>3.182 We recommend the Department require licensees to provide a reconciliation of actual costs incurred for silviculture services provided on Crown land against fees paid and that cost efficiencies realized be proportioned between the Crown and licensee.</p>	<p><i>DNR agrees in the principal of capturing and sharing cost efficiencies. Today, DNR and licensees are working on process improvements using LEAN methodology as a way of identifying and eliminating non value-added process steps and waste. Licensees will be asked to provide annual cost reconciliation for areas reimbursed under the silviculture program.</i></p>	<p><i>3 months</i></p>
<p>3.194 We recommend the standard reporting package prepared by the Forest Products Marketing Board include reconciliation between the audited financial statements and the schedule of silviculture funding and related costs.</p>	<p><i>DNR agrees. Forest Products Marketing Boards will be asked to reconcile to their audited financial statements for future silviculture reporting exercises.</i></p>	<p><i>12 months</i></p>

Exhibit 3.2 - Summary of Recommendations (continued)

Recommendation	Department's response	Target date for implementation
<p>3.196 We recommend the Department ensure a forest management agreement is signed by all current licensees to ensure compliance with the <i>Crown Lands and Forests Act</i>.</p>	<p><i>DNR agrees. We are actively engaging Licensees with the aim of signing amended and restated Forest Management Agreements. In the interim, existing 25 year agreements are still in place and valid.</i></p>	<p>2 years</p>
<p>3.206 We recommend the Province adopt a more equitable cost sharing arrangement for silviculture work that recognizes the direct benefits realized by the forestry companies.</p>	<p><i>The current model focuses on government funding such that future governments retain full control over issues such as harvest authorization and fibre allocation; however, DNR will review alternative models for consideration by Government.</i></p>	<p>5 years</p>

Background

3.39 New Brunswick forests have been the mainstay of the provincial economy for over a century, not only through forestry but also tourism, recreation, hunting and fishing. Our forests are an invaluable social, economic and environmental contributor to the quality of life enjoyed in New Brunswick and are our legacy for future generations. New Brunswick forests are one of our most valuable assets and they are critical to the current and future prosperity of the Province. It is important that they be managed and cared for properly. The Department of Natural Resources (the Department) is charged with this challenging task.

3.40 The Department is the steward of this public resource. Within the Department it is the Forest Management branch, along with regional and district office staff, who undertake the management of the Crown forests in New Brunswick.

Forest Management in New Brunswick

3.41 The *Crown Lands and Forests Act* assigns the Minister of the Department of Natural Resources responsibilities for both Crown and private forest lands. It states the Minister is responsible for the development, utilization, protection and integrated management of Crown Lands including:

- access to and travel on Crown Lands;
- harvesting and renewal of timber resources;
- habitat for the maintenance of fish and wildlife populations;
- forest recreation; and
- rehabilitation.

3.42 It is important to note that forest management and management of Crown land are not the same. Forest management is a subset of Crown land management. Other elements of Crown land usage that need to be managed are mining, aquaculture, wind farms and tourism and recreation. Forest management has been expanded to include an aspect of private wood supply in addition to Crown timber.

3.43 The Department is responsible for the management of resources on Crown Lands including timber. The Department must exercise its responsibility for the forest resources in a way that maintains its productivity, and capacity for renewal, while preserving the ecological process and biological diversity. In relation to the conduct of forest management practices the Department is responsible for “*setting forest management*

goals, objectives and standards that reflect public values.”¹⁰

- 3.44** Sustainable forest management means balancing the various socio-economic and environmental values and other non-timber objectives with timber objectives. *“It requires an adaptive management approach that recognizes a forest’s potential to sustain a range of values to users and strives to find the best balance of uses based on relative benefit and impact.”¹¹*
- 3.45** Crown forests are managed by the licensees (major industrial participants) under the oversight and direction of the Department through a series of agreements, plans, standards, and procedures.
- 3.46** The forest management model in place on Crown land has been followed in New Brunswick since establishment of the *Crown Lands and Forests Act* in 1982. At that time the Province was divided up into ten licenses and management licenses were granted to the largest producer on each license, predominantly pulp mills. Through attrition and consolidation the list of Crown licensees has been reduced to five companies (Exhibit 3.3), with one additional license under interim management by the Department after closure of the Weyerhaeuser mill in Miramichi. Only one of the original New Brunswick-based companies is left as a licensee. Recently, for efficiency purposes, the ten Crown licenses have been consolidated into six management units (Appendix II).

¹⁰ *Forest Management Manual for New Brunswick Crown Land*, Department of Natural Resources, June 2004, sect 3.5

¹¹ *Ibid*, sect. 2

Exhibit 3.3 - Current Crown Land Licences

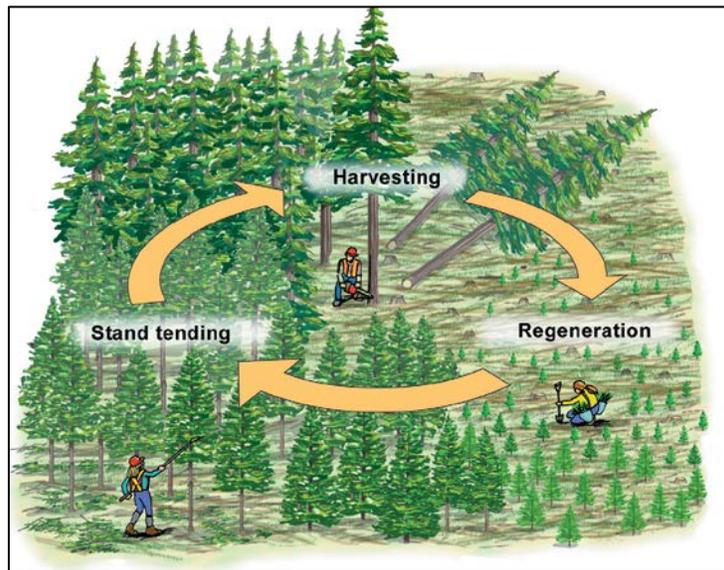
Current Crown Land Licences				
Licence	Licensee	Parent Co. / Head Office	Land Area (ha)	% of total
Upsalquitch	AV Cell Inc.	Burla Group, Mumbai, India	418,850	13%
Lower Miramichi	Fornebu Lumber Company Inc.	Umoe Group, Lysaker, Norway	944,320	29%
Kent	Kent License Management Team ¹²	N/A	71,942	2%
Fundy	Irving Pulp & Paper, Limited	JDI, Saint John, NB	1,046,967	32%
York	A.V. Nackawic Inc.	Burla Group, Mumbai, India	257,668	8%
Carleton	Licence holder-Twin Rivers Paper Company/ License manager Acadian Timber	Madawaska, ME / Vancouver, BC	530,659	16%
Total			3,270,406	100%

Source: Department of Natural Resources Annual Report 2013

3.47 In this type of management framework, the Department sets and enforces the parameters and private companies carry out the management functions. The reasoning behind this framework was that private companies are better suited to this role, having the infrastructure, staff and technical expertise in place to complete these services for their respective license area. Private companies in the forestry sector should also be more adaptable to changes in the science of forestry and new forest management practices than a government department. All this in turn should allow for cost efficiencies in the management of the Crown forest. If licensees did not provide management services, this responsibility would lie with the Minister.

¹² Kent license management team –negotiations are ongoing with Arbec as recent owner of a mill in Miramichi, to take over as licensee for the Kent license.

Exhibit 3.4 - Silviculture System



Source: British Columbia, Ministry of Forests, Forest Practices Branch, 2003, *Silvicultural Systems Handbook for British Columbia*

About Silviculture¹³

3.48 Silviculture is a major part of the forest management process. It encompasses regeneration, stand tending, and, selection of harvest methods. It is the purposeful regeneration of the forest to meet specific timber and non-timber objectives.

3.49 Silviculture is primarily used to enhance future timber production. It concentrates the potential yield of a given piece of ground into fewer higher quality trees that will reach harvestable size sooner.

3.50 Left alone most cut over areas in New Brunswick will regenerate trees naturally. Approximately 76% of Crown forested area harvested is left to naturally regenerate according to the 2014 strategy document and supporting table provided to us by the Department (see Appendix IV Key Forest Management Indicators).

3.51 Common silviculture treatments include:

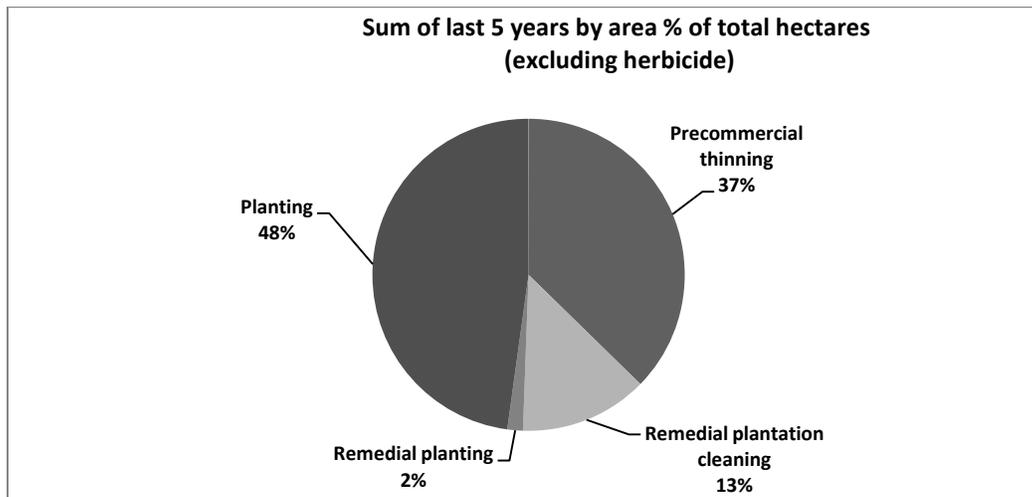
- planting;

¹³ See Appendix III for more detailed background information on silviculture.

- pre-commercial thinning/plantation cleaning;
- scarification (plantation site preparation); and
- herbicide application.

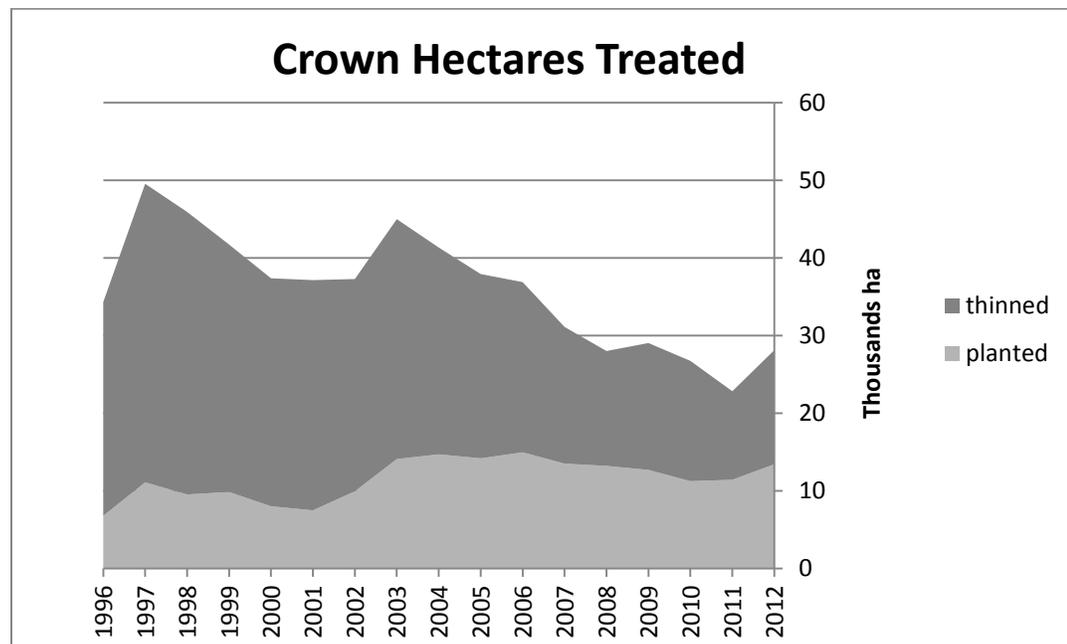
3.52 On Crown land in New Brunswick the two most commonly applied silviculture treatments are planting and pre-commercial thinning. Together they make up most of the treated areas (Exhibit 3.5).

Exhibit 3.5 - Silviculture Treatments Used in NB on Crown land



Source: Esily certification data (unaudited), graph prepared by AGNB

Exhibit 3.6 - Crown Hectares Treated



Source: Department annual reports (unaudited), graph prepared by AGNB

3.53 As seen from Exhibit 3.6, the Province has a long history of re-investing in our forests through silviculture treatments. The Province has spent \$125 million over the last five fiscal years with an additional \$22 million spent on the private land silviculture program for a total investment in our New Brunswick Forests over the last five years of approximately \$29 million per year.

Exhibit 3.7 - Department Historical Silviculture Program Expenditure

Departmental Historical Silviculture Program Expenditure (\$ Thousands)					
	Actual 2009/10	Actual 2010/11	Actual 2011/12	Actual 2012/13	Projected Actual 2013/14
DNR Planning and Monitoring	\$ 844.7	\$ 771.3	\$ 1,035.5	\$ 893.0	\$ 704.1
Nursery	3,830.4	3,947.6	3,954.5	3,863.1	3,686.3
Payment to Licenses	20,409.3	19,257.7	16,225.5	17,695.5	17,160.0
Herbicide	2,053.7	1,924.7	2,250.4	2,099.8	2,317.6
Subtotal Department and Crown land program	27,138.1	25,901.3	23,465.9	24,551.4	23,868.0
Private Land silviculture program	4,027.9	4,000.1	4,000.0	4,998.9	5,000.0
DNR TOTAL SILVICULTURE EXPENDITURE	\$31,166.0	\$29,901.4	\$27,465.9	\$29,550.3	\$28,868.0

Source: Department of Natural Resources (unaudited) - adapted by AGNB

Roles and Responsibilities

3.54 The Department has defined its roles and responsibilities pertaining to silviculture delivery to be:

- monitor licensee compliance with pre- and post- treatment standards;
- establish reimbursement rates;
- approve licensee silviculture budgets; and
- reimburse licensees for successfully completed treatments.

3.55 The responsibility to plan and implement silviculture has been delegated to the licensees. Licensees are intended to implement silviculture treatments on hardwood and softwood sites to support maximum increases in both present and future sustainable wood supplies and the provision of non-timber objectives as defined in their management plan.

3.56 However as the steward of the public forests the Department is ultimately responsible and accountable for the successful regeneration of New Brunswick's forests for the benefit and enjoyment of present and future generations. Each licensee is focused on their own Crown license and successfully operating their business in a very competitive and global industry. It is the Department who must coordinate and effectively manage the Province's timberland to ensure public goals are being achieved.

3.57 The roles and responsibilities will be further defined in this report as we discuss each of the components through which the silviculture program is managed. The three main components are:

- silviculture planning;
- silviculture treatment standards; and
- silviculture monitoring and reimbursement.

Audit Scope

3.58 Our focus was predominantly on the Crown land silviculture program, given the importance that Crown timber has on the future wood supply and the size of Crown timber lands. It also has the largest direct expenditure. We also included the private land silviculture program in our findings and recommendations. Crown and private land silviculture processes are quite similar.

3.59 We reviewed the legislative framework under which the Department operates. We examined data and documentation provided by the Department and other participants in program delivery, as applicable. We also reviewed data and information related to silviculture and forest management practices. This included the results of similar performance audits conducted by other jurisdictions, as well as studies and analysis prepared by government, academia and industry related to silviculture treatments and silviculture investment analysis. We conducted data analysis to identify trends and areas of potential risk. We reviewed key Department processes around program delivery and observed a joint assessment of silviculture treatments carried out by the Department and a marketing board. We conducted on the ground site inspection of treated blocks.

3.60 We conducted interviews with Department management and staff in both head office and selected regions. We also conducted interviews with representatives of other organizations and stakeholders, including:

- the Forest Products Commission;
- two licensee organizations;
- the New Brunswick Forest Products Marketing Boards;
- the New Brunswick Federation of Woodlot Owners; and
- select members of the academic community and professional foresters.

3.61 Our audit did not include a detailed examination of the forest management plans and operating plans required under the provisions of the *Crown Lands and Forests Act*. Although we examined some of these documents in order to gain a better knowledge of the Department's business, we are not expressing an opinion on the detailed silviculture and forest management processes carried out by the licensees.

3.62 Our audit covered the period from 2009 to April 2014. However, as part of our work and to gain sufficient knowledge of the subject matter we sometimes had to review Department documentation and reports prepared prior to 2009.

3.63 The audit criteria we used for each objective are listed in Appendix V.

3.64 Our audit was performed in accordance with standards for assurance engagements, encompassing value-for-money and compliance, established by the Chartered Professional Accountants of Canada, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

3.65 Certain financial and statistical information presented in this chapter was compiled from information provided by various entities directly involved in the topic area. It has not been audited or otherwise verified. Readers are cautioned that this financial and statistical information may not be appropriate for their purposes.

Objective 1

3.66 Our first audit objective was to determine if the Department is meeting its responsibilities to enhance the quality and quantity of future timber supply through silviculture.

Strategic Direction

3.67 One of the main responsibilities of the Department is to set the forest management goals and objectives for sustainable timber management and non-timber objectives including biodiversity and habitat protection. The goals and objectives set by the Department help to ensure New Brunswick Crown forests are being managed in the best interest of its citizens.

Silviculture is a major component of forest management and an essential tool for shaping renewal to support achievement of the Department’s objectives. As described earlier, it is the part of forest management that focuses on managed regeneration of the forest to best meet future timber objectives.

Failure to update strategic direction

3.68 We found that the Department did not have a revised forest management strategy in place for the most recent forest management planning period (2012-2017). The Department continues to operate under the previous forestry strategy “The New Brunswick Public Forest Our Shared Future, June 2005” and the accompanying objectives and standards for the 2007 to 2012 management period. According to the Department’s 2005 strategy, forest objectives were to be reviewed every five years.

Non-compliant with Crown Lands and Forests Act

3.69 The Department was not in compliance with the *Crown Lands and Forests Act*. The Act requires that the 25 year forest management plans be revised and brought up to date every five years. This was not done in time for the start of the 2012 to 2017 management period due to continued delays by the government in establishing a revised forest management strategy for licensees to follow when drafting new management plans.

Three forest management strategies in five years

3.70 We found that there were three iterations or attempts at a forest management strategy over our reporting period from 2009 to 2014. The Department was on track to meet the planning cycle timeline when the first strategy was published in 2009 entitled “A Balanced Management Approach for New Brunswick’s Crown Forest”. This strategy was formulated as a response to recommendations made by the “New Brunswick Task Force on Forest Diversity and Wood Supply” in their report “Management Alternatives for New Brunswick’s Public Forest (April 2008)” along with extensive public consultations.

2009 Strategy Formulated

2011 delay of 2009 strategy

3.71 However, in 2011 implementation of this strategy was delayed to allow for completion of two task force reports: “A path for a sustainable economic forest in New Brunswick, Report by the New Brunswick Crown Land Task Force”; and “New Approaches for Private Woodlots, Reframing the Forest Policy Debate” the Private Forest Task Force report.

2012 strategy delayed

3.72 In March 2012 the Department announced a new forest management strategy that would balance social, ecological and economic needs. Features of this plan as outlined in a press release by the Minister included:

- maintaining the allowable softwood harvest levels and reducing the allowable hardwood harvest;
- implementing non-clear-cut harvesting measures; and
- designating 28% of total Crown forest as “conservation forest”, which included 9.4% in Protected Natural Areas.

3.73 This plan was delayed by the Minister in a letter to all licensees, this time in order to develop ways to attract investment in the forest industry.

2014 forest management strategy released for 2012 to 2017 management period

3.74 In 2014 the government produced the third version of the forest management strategy for the 2012 to 2017 management period. This version of the strategy featured an increase to the allowable softwood harvest and maintained the allowable hardwood harvest. It claimed to double the amount of Protected Natural Areas to 8% of productive forest area, which equates to the 9.4% of total Crown forest area announced in the 2012 strategy. The Department indicated that a key goal of the strategy is to put the New Brunswick forestry sector in a stronger position.

Indecisiveness inhibits long-term planning and investment

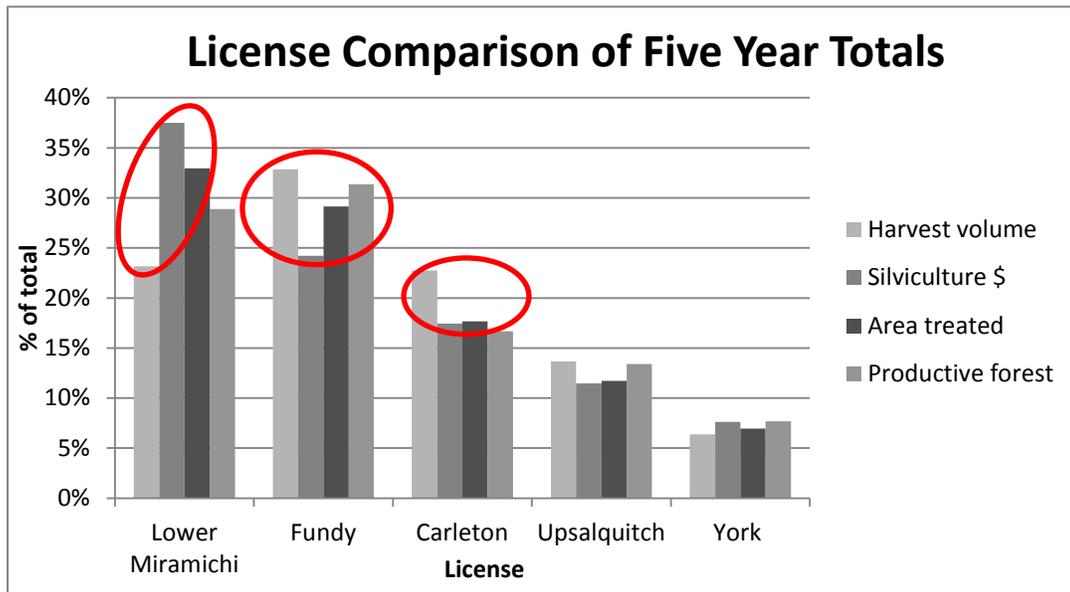
3.75 Forestry by its nature is a long-term endeavor and sustainable forest management requires a stable and predictable regulatory environment in order to allow treatment measures to develop and mature. Appropriate mid to long-term plans and actions need to be made without fear of short-term changes in forestry goals and objectives. Indecisiveness in determining strategic direction creates an environment of uncertainty and constant change that inhibits long-term planning and investment.

Recommendation 3.76 We recommend the Department adhere to a regulated and predictable forest management planning cycle and ensure compliance with the *Crown Lands and Forests Act* by obtaining revised forest management plans from each licensee every five years.

Separate strategy on each license 3.77 It is the responsibility of each licensee to develop and implement a forest management strategy for their own license that will incorporate the objectives set by the government and adheres to standards and regulations. The strategy must also work to meet the production needs of the licensee and sub-licensees.

3.78 We found the regeneration of provincial Crown timberlands are not being overseen or managed as a whole, but on a license by license basis. This means that while the basic rules are the same across the Province, there are up to six different forest management and silviculture strategies being followed on Crown land (one for each administrative unit). The strategies must adhere to the forest objectives and standards set by the Department. Within that broad framework, each licensee manages the license to best satisfy their timber needs and the needs of the sub licensees on the license.

Exhibit 3.8 - License Comparison of Five Year Totals



Source: Department data (unaudited) graph prepared by AGNB

Note: "Silviculture \$" is silviculture payments to licensees and excludes cost of seedlings provided by the nursery and herbicide treatments.

3.79 Licenses have been managed with different levels of intensity, and have followed different silviculture strategies.

3.80 Exhibit 3.8 shows how varied the operations and results are across the licenses. While some of this variance is attributable to ecological and economic differences across the Province, the management intensity and unique agenda of each licensee plays a significant role.

No comparison to licensee freehold

3.81 A significant portion of the industrial freehold land in the Province is held by the licensees who manage both Crown and freehold land. The Department does not evaluate silviculture plans on Crown license with what is done on licensee's own freehold. In accordance with section 40(1) of the *Crown Land and Forests Act*, the Minister may obtain from the licensee management and operating plans for freehold land. The Department requested information on licensee freehold silviculture activity in 2005 in response to recommendations made by the Select Committee on Wood Supply. We could not determine what the Department did with the information obtained and they have not made any subsequent similar requests. Regular analysis of information would enable the Department to determine if silviculture efforts on freehold land differ significantly from Crown land where they are being funded by the Department.

3.82 The Select Committee on Wood Supply stated that *“Industrial lands are not all being as intensively managed as the Crown. Industrial freehold represents 18% of the productive forest area of the Province. While some industrial land owners have aggressively implemented silviculture programs on their own lands, others have not. Intensive management should be supported on all lands where the primary goal is fibre production.”*¹⁴

Recommendation

3.83 We recommend the Department regularly obtain forest management plans for all industrial freehold managed by Crown licensees and compare silviculture levels between licensee freehold and Crown land.

¹⁴ *Final Report on Wood Supply in New Brunswick*, Select Committee on Wood Supply, September 2004, page 25.

Setting Standards

3.84 We examined the documents and processes used by the Department to establish the standards, criteria and procedures in place to direct the performance of silviculture planning and implementation on Crown land.

Out of date and interim standards

3.85 Some jurisdictions have a separate Crown land silviculture manual. In New Brunswick, silviculture standards and procedures for Crown land are contained within the *Forest Management Manual*. This manual is an interim document, which has never been finalized because the Department has not been able to get industry acceptance of the standards it contains. It has, however, served as the standards compliance document since 2004 for both licensees and the Department.

3.86 Since last drafted in 2004, the manual has been superseded by other documents, policy statements and changes in procedures. It cannot be relied on as the sole definitive set of standards for silviculture work.

3.87 The lack of a single set of standards for silviculture treatments makes the Department's job of monitoring licensee's compliance to standards inefficient and potentially ineffective, and adds risk that they may not adequately protect public interest and future generations.

Silviculture standards for the Acadian forest not implemented

3.88 The forested area in New Brunswick has mixed stands of conifers and deciduous species. It is characterized by a wide variety of tree types, with mixed stands of both softwood species such as red, black spruce and shade tolerant hardwood such as yellow birch and sugar maple. This has been generally categorized as the Acadian forest.

3.89 The Department is responsible for setting forest management objectives that reflect public values. Our review of commissioned studies, reports and Department announcements and strategies over the last ten years, indicated that preservation of forest diversity was an important public value.

3.90 We found that current forest management approaches do not adequately quantify the successful regeneration of

Acadian forest, mixed species stands.

3.91 Past forest management strategies have committed to “*maintain the natural diversity and ecological characteristics of the Acadian Forest*”¹⁵ and “*maintain important stand structural and compositional characteristics of the Acadian forest*”¹⁶. This was also a recommendation made by the select committee on wood supply.

3.92 We found the Department had, in consultation with stakeholders, drafted a set of silviculture standards that was designed to maintain the integrity of the Acadian forest but never adopted them. We were informed that industry lobbied against adoption of the standards. As of completion of our audit work the policy had not been adopted, and there were no plans for its implementation.

Standards favour softwood regeneration

3.93 In our review of silviculture practices and standards we found them to target high value softwood regeneration, primarily spruce and pine. According to the Department this is because industrial users predominantly use softwood in their mills. The Department acknowledged that eastern cedar, red spruce, and shade tolerant hardwood (e.g. yellow birch, sugar maple, red oak) and mixed wood stand types have historically declined due to timber management practices.

3.94 The Department has had a tolerant hardwood policy in place since 1992. Its objective is to maximise the sustainable supply of hardwood logs in stands where the volume of shade tolerant hardwood species is greater than 50%.

Hardwood regeneration

3.95 The “Report of the Task Force on Forest Diversity and Wood Supply (April 2008)” stated that “*increased use of non-clear-cut treatments favours regeneration and development of shade tolerant [hardwood] tree species*”.¹⁷ They also stated that a high or increasing content of shade intolerant hardwood (red maple, white birch) and poplar

¹⁵ “The New Brunswick Public Forest Our Shared Future,” Department of Natural Resources, June 2005

¹⁶ “Be...sustainable in this place A balanced management approach for New Brunswick’s Crown Forest,” Department of Natural Resources, 2009

¹⁷ Thom Erdle et. al. Management Alternatives for New Brunswick’s Public Forests, Report of the New Brunswick Task Force on Forest Diversity and Wood Supply. Page XV.

species is inconsistent with the natural character of the Acadian forest.

3.96 Regeneration of shade tolerant hardwood species is important not only for ecological reasons and biodiversity, but also for the forest industry. Many mills use hardwood and there are many value added forest products that rely on high grade hardwood such as for flooring, furniture and tissue paper.

3.97 One of the best ways to manage regeneration in tolerant hardwood stands is through partial and selective cut treatments. Hardwood relies on natural regeneration. It is not planted like some softwood species. Partial cutting treatments such as selection cutting, patch and strip cutting have been widely used in hardwood silviculture treatments in eastern North America. The Department has accepted selective harvesting in its tolerant hardwood policy as a best management practice.

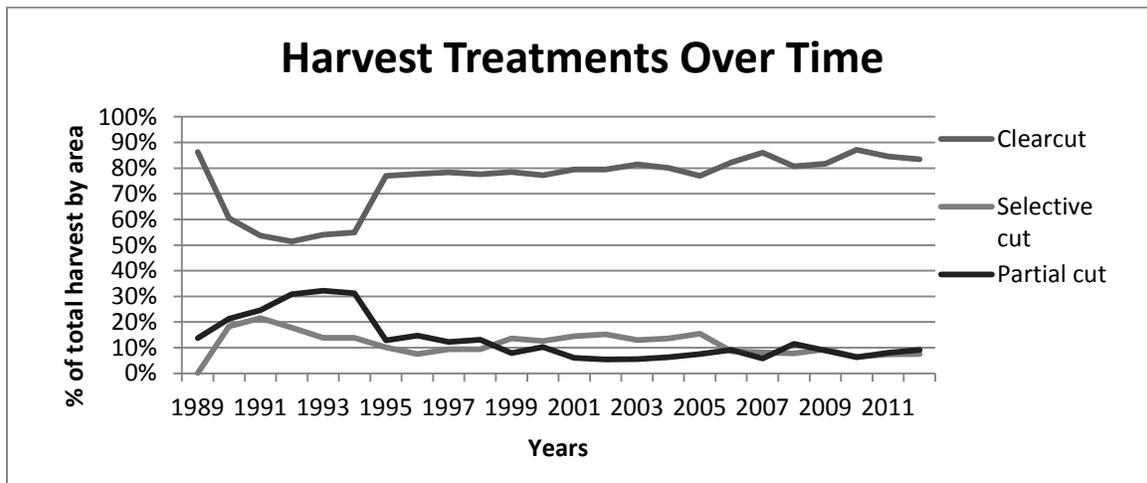
***Increase in area
clear-cut***

3.98 The Department's previous forest management strategy prior to 2014, "The NB Public Forest Our Shared Future (June 2005)," stated "*To further enhance diversity and sustain the Acadian Forest, non-clear-cut harvest prescriptions will be required*". The forest management objectives included in the strategy stated that "*wherever possible, clear-cut harvesting will be reserved only for those stands not suitable for other harvest prescriptions*".

3.99 Furthermore, the Select Committee on Wood Supply recommended "*that the amount of clear-cut harvesting on [Crown land] be reduced.*"

3.100 As shown in the Exhibit 3.9, we found that since the late 1990's clear cut as a percentage of total harvest has remained near or above 80% of the total area harvested. The recommendations made to reduce reliance on clear cut as a harvest treatment do not appear to have been followed.

Exhibit 3.9 - Harvest Treatments over Time



Source: Department harvest data (unaudited) graph prepared by AGNB

Mixed species plantations

3.101 We were pleased to see during our plantation site visits that, while not required by Department standards, the licensees had been using mixed softwood species in the plantation. It was also encouraging to note that greater care is being taken in plantation species selection to select appropriate species for the sites being planted.

Relaxed planting standards

3.102 During the conduct of our audit we were told that the Department had made changes to the planting standards on Crown land. By relaxing some of the criteria for natural stocking and timing of treatment, it made it easier for harvested sites to qualify for full softwood planting treatments. Before the change there were fewer sites that would qualify and this was making it harder for licensees to meet the budgeted/planned planting levels.

3.103 In our review of silviculture standards, we noted an inconsistency in the plantation stocking standards. Balsam fir is not counted towards new softwood growth when assessing the suitability of a site for planting. However, naturally growing balsam fir trees mixed in with planted species are allowed to count towards meeting stocking standards in the ten year survey. This allows more ten year plantations to meet the standard and lessens the burden on industry to bring non-performing plantations up to standard.

Recommendations

3.104 We recommend the Department complete and finalize a silviculture manual with performance standards based on best practices.

3.105 We recommend the Department enforce adherence to forest management standards and make amendments and exceptions only in light of new scientific knowledge and analysis of the effect of past treatments.

3.106 We recommend the area of Crown forest, subject to clear cut harvest, be reduced in favor of non clearcut harvest treatments as per the updated forest management strategy “A Strategy for Crown Lands Forest Management Putting our Resources to Work”.

**Compliance
Monitoring**

3.107 The Department is responsible for monitoring licensee compliance with silviculture treatment standards. The Department focuses a great deal of effort on this area. The Department maintains open lines of communication and a regular presence on the ground.

*Significant effort on
compliance
monitoring*

3.108 The silviculture annual monitoring program checks compliance with standards and verifies the Department received the services for which it has been invoiced. This process applies to both Crown and private silviculture programs. As with any purchasing program, there needs to be some form of receiving control to ensure the product or service delivered agrees to what was ordered and billed.

3.109 Upon completion of a silviculture treatment, a treatment certification form is uploaded by the licensee into the Department’s silviculture management system (Esilv). The form attests to various details of the treatment such as size of the area treated, what species were planted, and the treatment completed.

3.110 On a routine basis throughout the season, the Esilv system automatically selects a random sample of certifications for Department assessment and testing. A minimum of 10% of the treated area for each type of treatment is randomly sampled. The assessment consists of a verification of the certification data, measurement of the treated area and physical inspection by Department staff of the treatment to prescribed standards through test plots.

3.111 Any variance over 5% may result in a joint survey where both a licensee representative and the Department re-perform the survey of that block.

3.112 The monitoring process culminates in a year end reconciliation process to resolve differences between the

Department and licensees with respect to the measurement of treatment areas and compliance with standards for Crown land silviculture. If the total variance from the sampled blocks tested is greater than 2% an adjustment is made to the total invoiced amount for that treatment. This is a simple calculation done by applying the variance to the total amount paid for that particular type of treatment. A letter is then sent to the licensee notifying them of the results of the reconciliation for each treatment type and if any monies are due back to the Department for services that did not match what had been paid for. An invoice is issued for the recovery of these costs.

Reconciliation exceptions granted to one licensee

3.113 We examined post-treatment assessment summary data and reconciliation documents for last five years 2009-2013. We found one licensee was consistently (every year) in reconciliation for improper treatments and areas below standard. We found the Department consistently made exceptions and granted special considerations to that licensee.

Flexible approach adopted for licensee errors

3.114 Concessions were made for licensee errors in a treatment and data entry errors. Adjustments were made to reconciliation calculations and measurement methods in favor of the licensee.

We calculated close to \$1 million in exceptions granted to licensee

3.115 We found differences between the expected recovery amount based on the percentage variance and total payment and the amounts actually recovered from the licensee. The Department did not invoice the full amount due. We calculated a shortfall of \$931,000 over our test period of five years. However some of the difference was offset by the provision of in-kind work by that licensee.

3.116 The Department adopted a flexible approach when calculating the licensee's reconciliation. The changes in reconciliation methodology were not granted to other licensees. Sometimes this was done after lengthy deliberations with the licensee. This unnecessarily consumed Department resources and delayed eventual reimbursement until the following year. Given provincial budgetary processes, this meant recovered funds were no longer available for the silviculture program, but rather went into general government revenue when received.

Compliance monitoring and reconciliation is an important financial control

3.117 The monitoring program is an important control procedure that ensures the Department is receiving the services it is being billed for. This is evident in the fact that shortfalls and errors were found in every year we reviewed. The Department is considering discontinuing the annual monitoring and reconciliation program, and had suspended its use on one of the licenses for the 2014 season.

Recommendation

3.118 We recommend the Department continue with the silviculture annual monitoring program and apply consistent controls on silviculture services acquired.

Licensee performance evaluations overdue since 2012

3.119 The Department is required by the *Crown Lands and Forests Act* to complete a licensee performance evaluation every five years. The last performance evaluation was done for the 2002-2007 management period. No evaluation was done for the last management period ending in 2012.

3.120 From inspection of the last performance evaluation completed, three of the 20 performance criteria relate to silviculture. The criteria were:

- softwood planting conducted in the general forest;
- pre-commercial thinning conducted in the general forest; and,
- remedial treatment of plantation in the general forest.

3.121 The criteria are not true measures of performance of the silviculture treatments. The criteria are measures of whether the licensees performed the work indicated in their management plan. The performance evaluation is based on a system of self-reporting, without validation outside of the normal monitoring program.

Recommendations

3.122 We recommend the Department complete licensee performance evaluations every five years per the *Crown Lands and Forests Act*.

3.123 We recommend evaluation data be verified by the Department for completeness and accuracy.

Plantation outcomes not monitored for the long-term

3.124 There is a weakness in the monitoring processes regarding success over time of silviculture treatments. The monitoring program only looks at the immediate output or application of a treatment. For example, plantations do not get checked by the Department in subsequent years to see if they are

growing.

3.125 Plantations are typically tested the same year they are planted. This only allows for verification that the requisite number of seedlings per area were planted. If a seedling was planted but is dead at the time of sampling, it still counts towards achievement of the planting standard. This means mortality is not taken into account and likely success of the plantation is not considered.

Undue reliance on licensee self-reporting

3.126 The quality of plantations is not monitored by the Department. The Department relies on the long-term sampling by licensees. The licensees are required to assess plantation quality themselves at five and ten year intervals as part of the plantation survey. The surveys are submitted to the Department annually. The Department is not involved in monitoring or verifying the completeness or accuracy of the surveys. The survey results are not consolidated or analyzed. There is undue reliance on self-reporting by the licensees with no verification or monitoring by the Department.

3.127 From the compliance monitoring we can be reasonably certain about the amount of seedlings that were planted but it has been left to the licensees to monitor how well they are growing.

Insufficient effectiveness monitoring

3.128 We were unable to determine how the Department measured and monitored the effectiveness of the silviculture program over time. However, we are comfortable the Department's comprehensive inventory data and wood supply analysis incorporates the increases to the Crown timber supply on an ongoing basis. This is done through monitoring a series of sample plots in plantations and thinned areas. The measurement data generated is incorporated into the yield curves used in modelling the future wood supply.

3.129 The Department has the data systems and processes in place and is collecting and recording large amounts of forestry data. However based on our inquiry the Department is not following through on completing the other steps in effectiveness monitoring which are:

- reporting;
- trend analysis; and
- the examination of reasons behind the trend.

3.130 Effectiveness of the silviculture program is not being monitored by the Department.

Recommendations

3.131 We recommend the Department monitor the results of silviculture treatments over time and hold licensees accountable through performance based measures.

3.132 We recommend information self-reported by licensees be verified for completeness and accuracy.

Reporting

3.133 The Department has been entrusted with the management of one of New Brunswick's most valuable public resources. The Department has a responsibility to ensure the Legislative Assembly and the public are well informed on how well they are carrying out these responsibilities and also on the current state of the forest, what has changed, risks and concerns the Province faces and what actions will be taken.

No performance reporting

3.134 Significant amounts of public resources are being utilized to support and regulate silviculture in New Brunswick. Therefore, we would expect that performance information would be captured by the Department and reported publicly on a regular basis. This would allow legislators and New Brunswick citizens to evaluate the effectiveness of silviculture programs in achieving stated goals. It would also provide the Department with information which it could use in managing and improving the effectiveness of the program. However, such performance information is not generated and no reporting takes place.

3.135 The Department prepares an annual report that contains information related to the silviculture activities completed during the year and a tally of the funds spent. The Department does not report on the cumulative success of the planting program, such as:

- how well have past plantations done;
- how much more timber volume is available; and
- what impact past silviculture work has had on the annual allowable cut (AAC) and ability to meet other non-timber objectives.

3.136 The legislators and the general public are not receiving sufficient summary planning and performance information and therefore cannot determine the silviculture program's impact on future timber supply.

No report on state of the forest since 2008

3.137 The Province has only prepared one “State of the Forest” report, in 2008. There is no schedule or plan to continue with this type of report. Many other jurisdictions regularly produce a “State of the Forest” report and in some cases are legally mandated to do so. The reports typically include a description of how the forest is managed for ecological sustainability and use a criteria and indicator framework to measure performance. Given the importance of the silviculture program, information on its inputs would be a critical part of this report. The Select Committee on Wood Supply recommended that the Minister report annually to the Legislative Assembly on the status of New Brunswick’s forest and its management.

3.138 For example, a “State of the Forest” report is regularly produced by the federal government. It contains a list of 46 sustainability indicators. New Brunswick is a member of the Canadian Council of Forest Ministers and has committed to these same indicators. These indicators mirror the type of measures used in third party forest certification. Through the licensee, as directed by the Department, all Crown timber licensees receive third party certification (i.e. the SFI or Sustainable Forestry Initiative standard for their Crown license certification).

3.139 We found that when last prepared for the 2007 to 2012 management period by the licensees, the forest management plans included a description of the state of the forest within the respective license and the effect of actions taken, future challenges and opportunities. One of the objectives of the management plan is to report on key forest, habitat and wood supply indicators and trends. These documents are not made readily available to the public or the Legislative Assembly. The information within them is very descriptive and informative but it only pertains to the respective license. There is no equivalent provincial summary.

2008 “State of the Forest” report did not provide performance information

3.140 We would also note the 2008 “State of the Forest” report that was produced was not complete. For silviculture, it reproduced the activity data already reported in the annual report. It did not provide any performance information that would portray how well the Department has been doing at regenerating the Crown forest. There were no regeneration criteria and indicators included in the report.

***Lack of information
on forest
management in NB***

3.141 Overall, there is limited publicly available information which describes the current forest management system and the state of the forest in New Brunswick. Over ten years ago, the Department published a guide book on the management of New Brunswick’s Crown forest. This publication sought to provide the public with a step by step guide to the forest management process, showing how the Province plans to ensure that Crown forest are sustainably managed for the long-term benefit of New Brunswickers. However, this has never been updated.

Recommendations

3.142 We recommend the Department regularly report to the Legislative Assembly and the public on the status of New Brunswick’s forest and its management.

3.143 We recommend pending the development and issuance of a consolidated “State of the Forest” report by the Department, the most recent forest management plans for all Crown licenses be made available to the Legislative Assembly and the public.

Objective 2

3.144 Our second objective was to determine if the Department acquires silviculture services with due regard for economy and efficiency.

3.145 In this section we discuss how the Department exercises its fiduciary responsibilities in regards to the funding of the silviculture programs. We examined:

- how the Department determines the appropriate expenditure level; and
- what financial benefit taxpayers should expect to receive from funding provided for silviculture.

3.146 We looked at where and how the money is spent and how the Department establishes the rate paid for work performed.

3.147 We also examined the private silviculture program. It is not as significant in dollar terms (\$5 million is budgeted annually compared to \$20 million spent on Crown silviculture). However, it is significant given the Department’s responsibilities for private wood supply in the Province. This program supports silviculture investment and sustainable management practices on private wood lots.

Economic Payback 3.148 We expect the Department to monitor and be able to demonstrate that silviculture program expenditures are achieving the desired results at the lowest cost. While any level of silviculture activity will mean improved quality and quantity of future timber supply, it is important to determine the optimum level, type and location of silviculture treatments in order to maximize the financial return on investment to the Province.

3.149 The Crown Land Task Force believed the Province would benefit from silviculture investments based on some form of economic payback model. They thought this would help to improve investment levels, stability, perceptions and motivations around managing Crown timberland.

Insufficient financial analysis 3.150 We examined documents provided to us by the Department and interviewed management. We did not find a systematic process for evaluating investment levels against a set of defined performance criteria. We found a lack of financial analysis and information that would allow decision makers to evaluate the full cost associated with each alternative, and understand the trade-offs between environmental, social and economic benefits.

Results of operations not reported in business-like manner 3.151 In our 2001 report, our Office made a recommendation that the results of forest management activities be presented in a more business-like way to allow the reader to clearly see the net result of the Province's forest management efforts. This was seen as a way to potentially address public concerns that the Department was "giving away" the Crown resources. From our review of Department annual reports this recommendation has not been fully implemented. We could not find a statement of operations that showed revenue from the sale of Crown timber (royalty revenue) less the direct costs incurred to earn that revenue.

3.152 In an effort to determine the net contribution to the Province from timber management including silviculture activities, we present in Exhibit 3.10, a simple statement of operations from information contained within the Department's 2013 annual report and underlying financial records.

3.153 The net contribution to the Department after operating costs including Crown silviculture is insufficient to cover the other forest management commitments made by the Department.

Exhibit 3.10 - Statement of Forest Management Operations by Fiscal Year 2009 - 2013

Statement of Forest Management Operations by Fiscal Year (in thousands) (unaudited)					
	2013	2012	2011	2010	2009
Royalty Revenue	\$64,788	\$63,787	\$67,167	n/a ¹	n/a ¹
License Management Fees	\$26,517	\$27,685	\$30,653	n/a	n/a
Net Royalty Revenue	\$38,271	\$36,102	\$36,514	\$26,295	\$37,977
Gross Margin	59%	57%	54%	-	-
Planning, Inventory and Administration	\$8,776	\$9,198	\$9,087	\$9,696	\$9,280
Crown Silviculture	\$24,552	\$23,465	\$25,902	\$27,138	\$21,467
Operating Earnings (Loss)	\$4,943	\$3,439	\$1,525	(\$10,539)	\$7,230
Net Margin	8%	5%	2%	-	-
Other Provincial Forestry Related Revenue and Expenditures					
Other Revenue	(\$1,295)	(\$1,849)	(\$3,043)	(\$4,875)	(\$1,995)
Private Land silviculture ²	\$5,999	\$6,000	\$6,000	\$6,028	\$5,497
Fire Protection	\$6,602	\$6,136	\$6,977	\$7,033	\$7,502
Insect and Disease Protection	\$751	\$1,807	\$1,031	\$1,233	\$1,049
Private Land Development	\$498	\$803	\$1,265	\$674	\$442
	\$12,555	\$12,897	\$12,230	\$10,093	\$12,495
Forest Management (deficit) Surplus	(\$7,612)	(\$9,458)	(\$10,705)	(\$20,632)	(\$5,265)

1. Royalty revenue and management fee not separately recorded by the Department.
2. Includes \$1 million from Regional Development Corporation for private silviculture program

Source: Department of Natural Resources Annual Report 2013 and Oracle reports, prepared by AGNB

No direct benefit to Province's finances

3.154 The Department indicated it has no expectation of direct financial return from its silviculture investments. There is likely to be some amount of additional revenue realized from higher quality timber products available for harvest sooner than if left to regenerate naturally. The exact amount of this incremental revenue is not currently determined or analyzed by the Department. However, it is likely that the increased royalty revenue in the future is insufficient to offset the current cost of silviculture.

- 3.155** The primary benefit to the Province from both Crown and private silviculture programs appear to be indirect economic ones. This would include employment, an increased corporate tax base, and higher GDP. The Department did not provide an analysis of the future economic benefits that would result from silviculture expenditures. They could not demonstrate if it is sufficient to meet any investment or economic development objectives.
- Appears funding objective is to maintain economic development and employment*
- 3.156** It appears the most significant factor influencing continued expenditures on silviculture for both Crown and private silviculture programs are increased employment and support to the forestry services industry sector. A regular annual expenditure in this area keeps a baseline demand for these services and helps to retain forestry firms and employment in the Province.
- 3.157** This is not a publicly stated objective for the program and is not clearly defined or measured. The Department provided us with an estimate of 668 jobs per year supported by silviculture program funding but no other analysis or measures to justify the \$25 million average annual expenditure.
- Recommendations*
- 3.158** **We recommend the Department include the use of an economic payback model when analysing resource allocations for silviculture program activities.**
- 3.159** **We recommend the Department implement a previous recommendation made by the Select Committee on Wood Supply to commit to, on a five year basis, the level of silviculture funding deemed appropriate to achieve stated timber and non-timber objectives.**
- No tracking of Crown timber asset value*
- 3.160** Currently, Canadian Public Sector Accounting Standards do not require government to record or account for the value of the Crown timber asset. This renewable resource is one of the most valuable public assets in the Province but is not valued in the financial statements of the Province or in the Department's annual report.
- 3.161** This is in contrast to private forest management companies. Accounting standards (International Financial Reporting Standards) require that they recognize the fair value of their timber assets and reconcile changes in that value year over year. This reconciliation includes gains from growth and decreases from harvest. Financial statement

users can see if management is depleting the asset by harvesting more than what has been grown. An example of the type of reporting provided to public company shareholders can be found in Appendix VI.

3.162 In this way, private sector management is accountable to their stakeholders for the effective management of the timber resource and are committed to not only current year profitability but also the long-term value of their timberlands. This is a level of accountability not currently available to the citizens of New Brunswick.

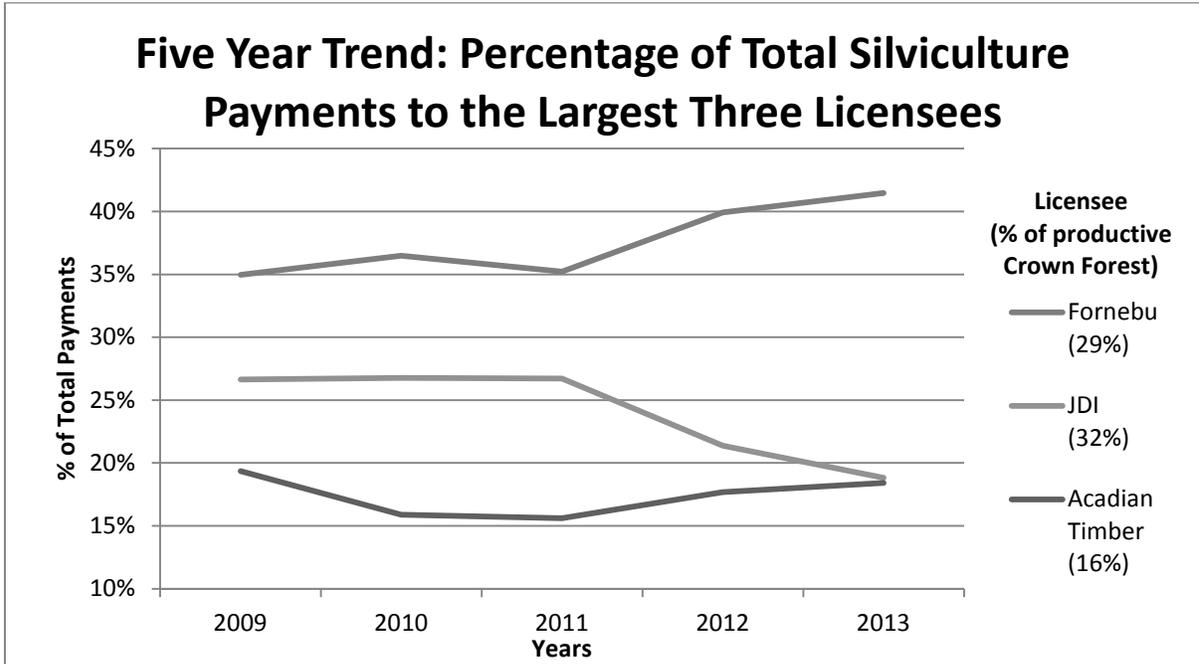
Recommendation

3.163 We recommend the Department, in consultation with the Office of the Comptroller, calculate and record the value of the Crown timber asset in the Department’s annual report and adjust this valuation to reflect harvest, silviculture and other changes. This valuation will quantify the impact of their management decisions.

Allocation of funding not on value for money basis

3.164 Allocation of silviculture funds across Crown lands is not done on a value for money basis. It is determined by the 25 year management plan for each license and the annual budget. Historically more silviculture work went into less fertile and poorer, more costly sites resulting in a disproportionate share of the program funding going to less productive areas. Exhibit 3.11 shows the trend for the three largest licenses over five years in terms of the percentage of total payments made to each licensee for silviculture work. Based on our discussions with Department representatives, money is not being allocated based upon where it would have the maximum benefit in terms of regeneration and increased future harvest levels.

Exhibit 3.11 - Five Year Trend: Percentage of Total Silviculture Payments to the Largest Three Licensees

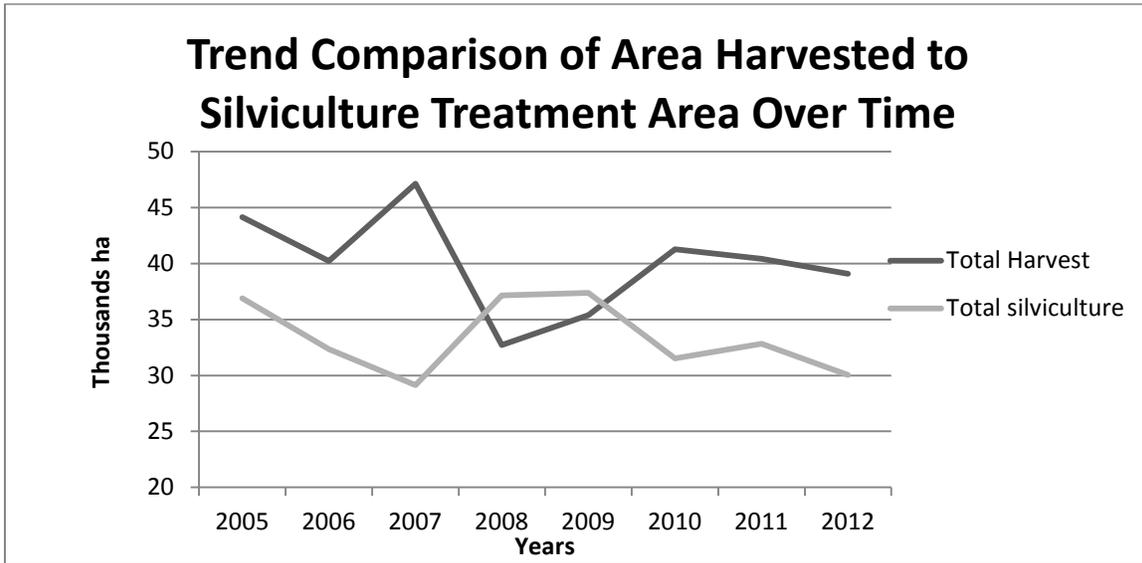


Source: Department Esilv system data (unaudited), graph prepared by AGNB

Silviculture not related to harvest

3.165 Our analysis of the spending patterns compared to area treated along with changes in the rates reinforced our belief that there is no relationship between program funding (investment level), the type, and amount of silviculture work done on each license and the Province’s timber objectives. Exhibit 3.12 shows harvest and silviculture treatment areas over time. We did not see a strong correlation between harvest and regeneration.

Exhibit 3.12 - Trend Comparison of Area Harvested to Silviculture Treatment Area Over Time



Source: Department of Natural Resources (unaudited) graph prepared by AGNB

3.166 Changes to the mix of treatments are sometimes impacted by a lack of suitable areas to treat. For instance, in recent years there was a decline in the amount of area suitable for pre-commercial thinning. The same is true for planting, which led the Department to relax planting standards to allow areas to qualify for planting sooner. This allowed licensees to continue to meet their planned silviculture levels and spend the full amount allocated in the Department’s budget.

Recommendation

3.167 We recommend the Department include long-term regeneration needs of the Crown forest and harvest trends to support distribution of silviculture funding.

Setting Payment Rates for Silviculture Activities

3.168 One of the key responsibilities of the Department in relation to the silviculture program is to establish the rates that will be paid for various silviculture activities.

3.169 Given the impact the individual treatment rates have on the area treated within the Province, we expect the rate setting process to be equitable, competitive and transparent.

Lack of competition in rates

3.170 On Crown land, contracting for silviculture work is not subject to a competitive procurement process. The Department sets the rates and approves the annual silviculture work plans put forward by the licensees. Each licensee is the sole provider of silviculture services for that license, although they may sub-contract the work. However, it is the licensee

who the Province pays for the work.

3.171 In this environment, it is important the Department have an equitable and transparent rate setting process and the rates remain competitive and market-based.

3.172 We examined the process used by the Department to establish rates for silviculture. The rate structure is complex with multiple rates for the same treatment depending on site parameters, and location.

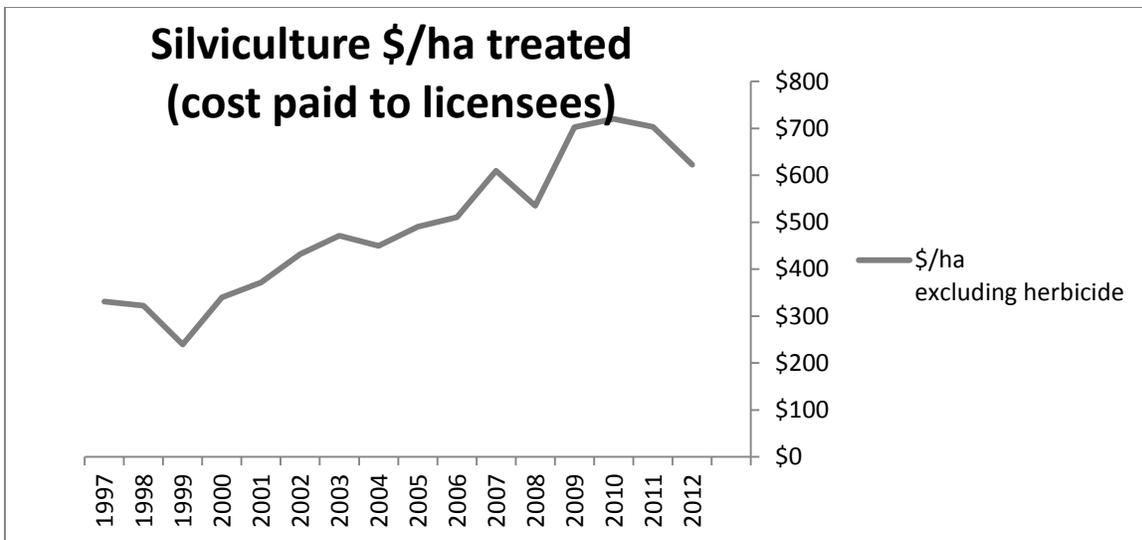
Rate review conducted

3.173 Prior to 2012, the Department undertook a review of the rate process in order to determine the appropriate costs of silviculture treatments. They contracted a third party to analyze the current rate structure and propose modifications as appropriate.

Rates determined by detailed costing model

3.174 The result was the development of a detailed costing model for select silviculture treatments. The costing model incorporated a comprehensive study of NB data including actual costs incurred by contractors, employment levels, rates of pay, density and dispersion factors. The third party firm was also able to draw on past experience and data from similar work done for other jurisdictions. A similar model was developed for both Crown and private silviculture work. The Department began using the rates from this model in 2012.

Exhibit 3.13 - Trend Analysis of Silviculture \$/Hectares Treated Over Time



Source: Department of Natural Resources Annual Reports (unaudited) - graph prepared by AGNB

3.175 From an analysis of the total amount paid to licensees over the total area treated it appears that after several years of increases, rates overall have stabilized or declined slightly as shown in Exhibit 3.13. However, this macro level view of the total treatment cost per hectare is also influenced by changes in the relative frequency of each type of treatment. The amount of pre-commercial thinning done has been declining for the past decade. The per hectare rate paid to licensees for full planting is significantly less than thinning (see Appendix VII for complete schedule of current rates).

Sole reliance on costing model

3.176 We are concerned with the Department's sole reliance on a costing model to determine a fair price for purchased services. The Department does not have a process in place or the ability to assess the reasonability of the model's outputs in the future. The Department is not aware of and does not benchmark what rates are in other jurisdictions for similar services.

No reconciliation to actual licensee costs

3.177 There is no regular review to ensure silviculture rates reflect costs incurred. There is the potential for a licensee to earn an inflated margin from the provision of silviculture services. The model is designed on a cost plus basis, meaning actual cost plus an additional amount for "contractor risk & profit". Many of the operating costs and their relationships to external variables are fixed within the model's calculations. If efficiencies are gained in operations or other cost saving methods employed such as reducing the number of supervisors, or transporting more than two planters per vehicle or if actual hourly pay is lower than what is in the model, then the rates calculated will not be a fair predictor of what is appropriate.

3.178 The *Crown Lands and Forests Act* stipulates that the Department shall reimburse licensees for expenses incurred for forest management. The Act specifically lists two silviculture treatments: tree planting and pre-commercial thinning.

3.179 The Department has the authority to access licensee financial records for work done on Crown land. Section 40(2) of the *Crown Lands and Forest Act* states, "*a licensee shall permit the Minister at any time to examine any books of account, statements, documents ...or other papers or records of a licensee which in any way relate to the operations of the licensee on Crown Lands.*"

3.180 Planning for silviculture is an integral part of the forest management and annual operating plans prepared by the licensees. The annual operating plan for example includes a detailed silviculture work plan for the current year. Licensees are compensated for this work through the forest management fees paid to them by the Department. We see the potential for overlap in compensation between the management fees and the silviculture billing for operational planning and management of silviculture work on Crown land.

Recommendations

3.181 We recommend the Department regularly benchmark silviculture rates from other jurisdictions in addition to using the costing model.

3.182 We recommend the Department require licensees to provide a reconciliation of actual costs incurred for silviculture services provided on Crown land against fees paid and that cost efficiencies realized be proportioned between the Crown and licensee.

**Silviculture
Funding on Private
Land**

3.183 The Department's total expenditure for silviculture includes \$5 million per year for the Private Woodlot Silviculture Assistance Program. This program encourages more active management of private wood lots by providing financial assistance for certain types of silviculture work to be done on private land. The most common treatment is pre-commercial thinning. The program is funded by the Department but it is delivered through the Forest Product Marketing Boards.

3.184 The financial reporting mechanism put in place by the Department to facilitate financial accountability to the program by the marketing boards is a report form called "Schedule A" (see Appendix VIII). This one page statement is meant to demonstrate to the Department, board compliance with the funding ratio and justification for expenditures on direct treatment and administration costs. It is to be prepared based on audited financial statements and submitted annually to the Department.

Province has no means of ensuring benefit from \$5 million per year

3.185 The Department stipulates there should be a reasonable expectation the work under this program will enhance the volume and/or quality of forest products over a 10 to 20+ year timeframe. The Province has no means of ensuring this expected benefit will be realized. There are no commitments any of the private land timber resulting from silviculture will actually be harvested or that it will be sold to producers in

New Brunswick.

Lack of accountability for private silviculture funding

3.186 Government funding for private silviculture is intended to be provided on a cost shared basis. Treatment rates (costs) are determined using a similar (but simplified) costing model as the one used for Crown rates. Essentially the provincially funded portion is 90% of the total treatment cost. The remainder of the cost (10%) is to be funded by the woodlot owner or marketing boards.

3.187 However, in our examination of the financial records we found two instances where 100% of silviculture costs were reported as having been funded by the Province.

No oversight of administrative fee retained by the Marketing Boards

3.188 The provincial funding includes an allowance for administrative costs incurred by the Marketing Board in delivering the program. The administrative portion retained by the Marketing Board is not to exceed 20% of the total amount of money given out by the Department (i.e. \$1 million).

3.189 However, we found instances where more than 20% was included in program administrative costs. Further, on examination of the financial records of selected Marketing Boards and their agents, we found two instances where the administrative costs applied against the program funding were not directly related to program delivery. We also found inconsistencies in the treatment of specific costs between the Marketing Boards.

Financial report is not audited

3.190 The Department does not inspect or audit the financial accounts and records related to the silviculture program of the Marketing Boards as is allowed for in the agreement.

3.191 The Department also does not reconcile the amounts reported in Schedule A with the audited financial statements of the Marketing Boards. We found that the schedule of silviculture funding and related costs (Schedule A) did not agree with and could not be reconciled to the audited financial statements of the Marketing Boards or their agents.

Funds did not go to intended recipient

3.192 We also found an instance where the funding did not reach the intended recipient Marketing Board. Instead the funds were held by the New Brunswick Federation of Woodlot Owners (NBFWO) and used to pay expenditures on the behalf of the Marketing Board. We were told this was due to concerns over the liquidity of the recipient marketing board and a fear that its creditors would take the program funds

intended for silviculture treatments. The Department was aware of and agreed with this arrangement.

3.193 Our concerns with these observations relate to financial accountability for program funding and expenditures. The actual silviculture work is well monitored. Based on our observations from document and process review, interviews and field visits, we are satisfied monitoring is being done to prescribed standards.

Recommendation

3.194 We recommend the standard reporting package prepared by the Forest Products Marketing Board include reconciliation between the audited financial statements and the schedule of silviculture funding and related costs.

Other Issues

Forest management agreements not updated

3.195 The Department was not able to provide us with current updated management agreements for all of the Crown licenses. The *Crown Lands and Forests Act* stipulates the 25 year term forest management agreements be updated every five years. At the time of our audit, the Department had a current updated forest management agreement with only one of the Crown licensees.

Recommendation

3.196 We recommend the Department ensure a forest management agreement is signed by all current licensees to ensure compliance with the *Crown Lands and Forests Act*.

Mitigation strategy

3.197 During our review of the previous set of management plans prepared for the 2007-2012 planning period, we became aware that the Department had introduced a mitigation strategy for the licensees to use to alleviate some of the constraints on timber supply imposed by changes to non-timber objectives in the 2007 forest management strategy. The Department's goal, through a provincial level mitigation, was to maintain the 2007 period one AAC at the 2002 Management Plan level. The Department proposed the following changes to mitigate the volume short fall:

- relaxing rules for harvesting in vegetation communities;
- relaxing rules for harvest in vacant deer wintering areas; and
- reducing the recreational buffer width and allowing harvesting in some provincial highway buffers.

Measures were not sustainable

3.198 In one of the 2007 forest management plans it was noted that these mitigation strategies were not sustainable and did not provide any new volume to maintain future harvest levels. They were artificially modified existing standards that resulted in an increase of 291 thousand cubic meters per year to the AAC. They were not the result of improvements from better forest regeneration or other improvements to the wood supply.

3.199 This type of short term decision making can occur when the Department has failed to establish and follow a clear long term plan.

Inequity in who pays for silviculture work

3.200 The Department, and ultimately the taxpayer, funds most of the silviculture work performed in the Province. However the benefits from this work do not go directly back to the taxpayer.

3.201 From our review of various studies including the Green River pre-commercial thinning trials, we found that many of the benefits from silviculture accrue to the harvester and processing facility. Silviculture treatments such as thinning concentrate the potential fiber yield into fewer but higher quality trees. This makes for more efficient and cost effective harvesting and provides higher quality products for the producers. The higher quality products also mean a higher royalty rate and increased revenue to the Province.

3.202 Many of the other jurisdictions reviewed as part of our background research have some type of alternative silviculture funding arrangements, so that all the costs are not paid for directly by the Province. In Ontario the Forest Renewal trust, paid into by forestry companies based on harvest volumes, provides dedicated funding for renewal of Crown forest. Saskatchewan also has a trust fund for reforestation paid into by forestry companies.

3.203 The exception on Crown land was in the case of remedial plantation treatment, such as cleaning and replanting. If, based upon the licensee's long term survey result, the plantation failed to meet density or stocking standards, the licensee was responsible for taking appropriate corrective action at its own cost. This may mean cleaning, which is thinning out the plantation.

3.204 In the past, the Department imposed a levy that went to a fund that would help pay the licensees costs for remedial treatments. It was possible that the current licensee company was not the same company who initially established the plantation. The levy and fund are not currently in use. We were informed by the Department that industry opted out of the levy.

3.205 Effective in 2014 the Department will compensate licensees for remedial plantation treatments. This change will take some of the accountability for poor performance away from licensees. This may reduce the funds available for other types of silviculture treatment work as it will come from the same budget. The Department has not disclosed the cost of this decision.

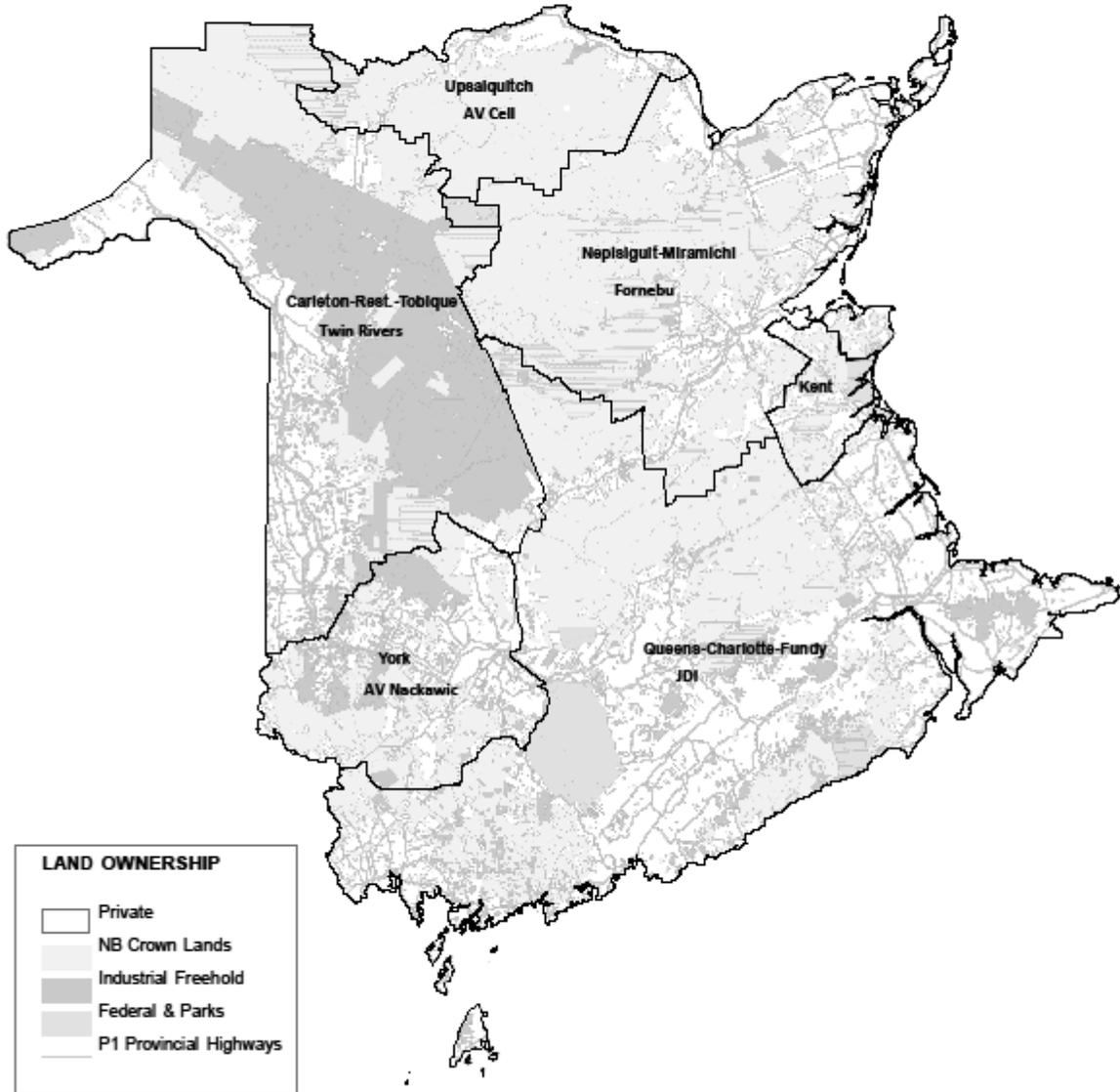
Recommendation

3.206 We recommend the Province adopt a more equitable cost sharing arrangement for silviculture work that recognizes the direct benefits realized by the forestry companies.

Appendix I - Glossary

AGNB	Auditor General of New Brunswick
Annual Allowable Cut (AAC)	The volume of timber that may be harvested during a given period to maintain sustained production. <i>Source: Select Committee on Wood Supply Final Report on Wood Supply in New Brunswick, Appendix F –Glossary of Terms</i>
Block	An area of land or timber that has been defined for management purposes. <i>Source: http://forestry.about.com/library/glossary/blforglb.htm</i>
Ecological	Relating to or concerned with the relation of living organisms to one another and to their physical surroundings. <i>Source: (Oxforddictionaries.com)</i>
Esilv	Department of Natural Resource’s silviculture management system.
Forest management	Involves actions at the level of the whole forest management unit: protection; forest renewal and stand tending; determining the size, location, and scheduling of harvests; and multiple-use planning. <i>Source: Natural Resources Canada, Canadian Forest Service, Silviculture Terms in Canada</i>
Free growing stand (Free to grow)	A stand of healthy trees of a commercially valuable species, the growth of which is not impeded by competition from plants, shrubs or other trees. <i>Source: Ministry of Forests, Lands and Natural Resource Operations, Forest Practices Code of BC Act, Part 1-Definitions</i>
Hardwoods	Trees which are generally deciduous, broad leafed species such as maple, birch, aspen. <i>Source: Select Committee on Wood Supply Final Report on Wood Supply in New Brunswick, Appendix F – Glossary of Terms</i>
Industrial freehold land	Land held by individuals or companies with a wood processing facility. <i>Source: Select Committee on Wood Supply Final Report on Wood Supply in New Brunswick, Appendix F –Glossary of Terms</i>
Plantation forest	Forest stands established by planting and/or seeding in the process of afforestation or reforestation which are either of introduced species (all planted stands) or intensively managed stands of indigenous species, which meet all the following criteria: one or two species at plantation, even age class, regular spacing. <i>Source: GoC, Natural Resources/Forest Resources/Glossary http://cfs.nrcan.gc.ca/terms/browse/P</i>
Pre-commercial thinning (PCT)	A silviculture treatment to reduce the number of trees in young stands, often carried out before the stems removed are large enough to be used or sold as crop trees so that at final harvest the end-product wood quality and value is increased. See Appendix III for more information on PCT. <i>Source: Select Committee on Wood Supply Final Report on Wood Supply in New Brunswick, Appendix F –Glossary of Terms</i>
Scarification	The mechanical preparation of improved seedbeds, primarily designed to expose mineral soil and remove vegetative competition. <i>Source: Natural Resources Canada, Canadian Forest Service, Silviculture Terms in Canada</i>
Selection cut	An un-even aged silvicultural system in which trees are removed individually or in small groups continuously at relatively short interval (e.g. 20 years for tolerant hardwood). This produces an uneven-aged stand. <i>Source: 2007 Crown Management Plan License 8, Glossary</i>
Silviculture	The theory and practice of controlling the establishment, composition, growth, and quality of forest stands to achieve the objectives of management. (Practices aimed at ensuring wise harvesting of forest resources : conservation, regeneration, reforestation, cutting, etc.) <i>Source: GoC, Natural Resources/Forest Resources/Glossary http://cfs.nrcan.gc.ca/terms/browse/S</i>
Softwood	Cone-bearing trees with needle or scale-like leaves such as spruce, fir, cedar and pine. <i>Source: Select Committee on Wood Supply Final Report on Wood Supply in New Brunswick, Appendix F – Glossary of Terms</i>
Stand	A community of trees possessing sufficient uniformity in composition, age arrangement, or condition to be distinguishable from the forest or other growth on adjoining areas, thus forming a silvicultural or management entity. <i>Source: 2007 Crown Management Plan License 8, Glossary</i>
Stripcut	In initial entry, a removal of up to 50% of the volume by harvesting alternating strips of a predetermined width of less than 20m. This treatment promotes the establishment of tolerant natural regeneration. <i>Source: 2007 Crown Management Plan License 8, Glossary</i>
Sustainable Forest Management	Management that maintains and enhances the long-term health of forest ecosystems for the benefit of all living things, while providing environmental, economic, social and cultural opportunities for present and future generations. <i>Source: Natural Resources Canada, State of Canada’s Forests 2009</i>
Timber	All trees of any species or size whether standing, fallen, cut or extracted. <i>Source: Select Committee on Wood Supply Final Report on Wood Supply in New Brunswick, Appendix F –Glossary of Terms</i>
Timberland	Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. In New Brunswick the Department refers to this as the general forest, other jurisdictions have termed it the working forest. <i>Source: Northeastern Forest Inventory and Analysis, USDA Forest Service, Common Definitions, http://www.fs.fed.us/ne/fia/methodology/def_gz.htm</i>

Appendix II - Province of New Brunswick Crown License Administrative Unit Boundaries



Source: The Department of Natural Resources, adapted by AGNB

Appendix III - Background Information on Silviculture

Silviculture is used to enhance timber production. “*Properly tended stands grow more quickly and achieve greater timber volumes in a shorter time*”¹⁸. Silviculture activities support higher sustainable harvest levels. Left alone most cut over areas in New Brunswick will regenerate trees naturally. However, the first trees to establish themselves and grow the quickest may not be the most marketable. The marketable trees that do establish themselves will be smaller and take longer to grow. Silviculture treatments concentrate the potential yield of a given piece of ground into the fewer more desirable trees that will reach harvestable size sooner.

Silviculture is also used to manage regeneration for certain habitats or stand types for non-timber objectives. It might take several generations for the forest to naturally transition back to its original state. Silviculture practices can speed up that process and can match the types of trees or stands to that area. It can also help to ensure certain tree species are present in the new forest to support local wildlife.

Silviculture can be summed up as the purposeful regeneration of the forest to meet specific timber and non-timber objectives.

Forest management involves actions at the level of the whole forest management unit:

- protection;
- forest renewal and stand tending;
- determining the size and location;
- scheduling of harvests; and,
- multiple use planning.

Silviculture is not forest management, although it is a major part of the forest management process. It encapsulates the regeneration; stand tending; and, harvest selection. Common silviculture treatments include:

- planting;
- pre-commercial thinning/plantation cleaning;
- scarification (plantation site preparation); and
- herbicide application.

¹⁸ Management of New Brunswick’s Crown Forest, Dept. of Natural Resources September 2003

Appendix III - Background Information on Silviculture (continued)

On Crown land in New Brunswick the two most commonly applied silviculture treatments are planting and pre-commercial thinning. Together they make up roughly 75% of the treatments applied.

Planting is when seedlings from nursery stock are manually planted over the entire block. In New Brunswick it is typically softwood species that are planted. A best practice is to plant a mix of softwood species on a block. Planting often involves site preparation before actual planting can occur much like tilling the soil in traditional agriculture. Certain species of coniferous trees need help getting started, otherwise they are initially squeezed out by other vegetation. According to the Industry, Economics and Programs Branch of the Canadian Forest Service, planting is a major source of annual income to the reforestation contracting industry.

Pre-commercial thinning is where a young relatively dense forest area is thinned out with brush cutters and chain saws. The best young trees are left and undergrowth and competing species are cut back. It concentrates the potential growth that a plot can yield on fewer trees and trees of desired species. This increases the tree size and lowers the age at which the stand can be harvested. It also reduces logging costs and increases product values. Wildlife and landscape values are often improved. It is called pre-commercial thinning because there is no market for the trees that are cut due to their small size and due to the difficulty in retrieving them without damaging the young trees that are left.

Not all harvested areas are actively treated immediately after harvest. Some of the area cut is left for natural regeneration. Approximately 76% of Crown forested area is left for natural regeneration. Natural regeneration is often an effective and low cost means of attaining a mix of intolerant hardwood and softwood. Within a year after harvest many sites in New Brunswick will see an abundance of intolerant hardwood regrowth such as red maple, white birch, poplar and softwood such as balsam-fir.

Appendix IV - Forest Management Indicators (Updated to 2014 Forest Management Strategy)

Key Forest Management Indicators	Last 5 Years	Short-Term Next 10 Years	Long-Term 40-60 Years
Timber Objectives - (million m³/yr)			
Spruce / Fir /Jack Pine	3.27	3.93	4.4 - 4.8
Hardwoods	1.81	1.81	1.6 - 1.7
Harvest Fall-Out - (thousands m³/yr)			
White Pine	127	140 - 170	120-160
Cedar	85	100 - 130	20 - 60
Conservation Zones (thousands ha) (zones overlap)			
- Protected Natural Areas	157	273	
- Riparian and Wetland Buffers	364	301	
- Deer Wintering Areas	266	141	
- Other Old Forest Habitat Types	306	284	
Land Allocation (% of productive forest area)			
Conservation Forest (accounting for overlapping zones)	30.2%	22.8%	
Operationally Constrained Forest (steep slopes, too wet, etc.)	1.7%	6.5%	
Area Prioritized for the Timber Objective	68.1%	70.8%	
Forest Condition (% of total Forest Area)			
Plantations	12.0%		20-25%
Thinned Natural Regeneration	14.0%		10-15%
Natural Regeneration (less than 25 years since cutting)	12.0%		15-20%
Young Forest	22.4%		15-20%
Old Forest	36.6%		25-30%
Multi-Story Selective Cuttings	3.0%		3-5%
Harvest Regime (% of annual harvest area)			
Clearcut & Overstory Removal	81.9%	80.0%	65-75%
Partial Harvests	16.4%	16.3%	10-15%
Commercial Thinnings	1.7%	3.7%	15-20%

Source: Department of Natural Resources

Appendix V - Audit Objectives and Criteria

Objective 1

To determine if the Department of Natural Resources is meeting its responsibilities to enhance the quality and quantity of future timber supply through silviculture.

Criteria

- the Department should include silviculture goals and objectives in its forest management strategy;
- the Department should monitor the performance of silviculture work and ensure compliance with standards and plans; and
- the Department should measure and report the effectiveness of silviculture on Crown land.

Objective 2

To determine if the Department of Natural Resources acquires silviculture services with due regard for economy and efficiency.

Criteria

- silviculture investments should be made based on an economic payback model;
- the Department should have an equitable, competitive and transparent rate setting process; and
- the Department should ensure private silviculture funding is used for intended purposes and within prescribed limits.

Appendix VI - Example of Private Sector Reporting of Changes in Timber Asset Value

Timber

Timberlands are classified as a growing forest, with the standing timber recognized as a biological asset for accounting purposes and thus recorded at fair value less costs to sell at each reporting date. The underlying land is considered a component of land, roads and other fixed assets accounted for under the revaluation method.

The following table presents the change in the carrying value of timber:

<i>(CAD thousands)</i>	
Balance at December 31, 2011	\$312,350
Gains arising from growth	26,596
Decrease arising from harvest	(25,993)
Gain from fair value price changes	2,302
Foreign exchange	(3,829)
Balance at December 31, 2012	\$311,426
Gains arising from growth	28,526
Decrease arising from harvest	(28,358)
Gain from fair value price changes	3,434
Foreign exchange	9,165
Balance at December 31, 2013	\$324,193

Appraisals by a licensed independent third party appraiser are completed annually for the timberlands to establish the fair value less costs to sell of the timber. The most recent appraisal was effective as of December 31, 2013. The appraiser uses a combination of the discounted cash flow and sales comparison approaches to arrive at the estimated value.

The discounted cash flow approach relies on the determination of the net present value of expected cash flows from the harvest and sale of timber. The expected cash flows are calculated based on the following assumptions:

- a. Annual growth is determined by multiplying the operable forested acres by the annual growth rate as determined by a combination of the appraiser's analysis of regional publications and data provided by management;
- b. Annual harvest volumes are based on annual growth, but for years one through ten reflect the appraiser's observed typical investor behavior in underwriting timberland acquisitions; and
- c. Log prices are based on regional standing timber ("stumpage") prices, the appraisers' analysis of historical stumpage prices and investor behavior.

Appendix VII - Crown Land Silviculture Reimbursement Rates

2013-14 Crown Land Silviculture Reimbursement Rates

(NOTE - no adjustments made in 2013 except reduction in seedlings allocation)

License	Precommercial Thinning						Full Planting		Fill Plantation Cleaning		Site Preparation		
	Low Density Zone		Medium Density Zone		High Density Zone						Disc Trencher	Drags	C&H Plow
	trees/ha	\$/ha	trees/ha	\$/ha	trees/ha	\$/ha	trees/ha ¹	\$/ha	trees/ha	\$/ha	\$/ha	\$/ha	\$/ha
1	19 363	696	25 426	839	36 136	1 041	2 000	338	16 500	630	237	244	319
3	19 363	725	25 426	873	36 136	1 132	2 000	335	16 500	627	239	247	322
5	19 363	642	25 426	774	36 136	N/A	2 000	308	16 500	585	241	246	321
7	19 363	689	25 426	830	36 136	N/A	2 000	326	16 500	N/A	233	238	313
8	19 363	683	25 426	823	36 136	N/A	2 000	322	16 500	610	257	263	341
9	19 363	N/A	25 426	853	36 136	N/A	2 000	330	16 500	618	241	248	324

¹ Full planting target density; 2,100 seedlings/ha allocated (5% variance)

Other Rates:

1. Reimbursement rate for purchased seedlings is \$294/ha (based on 2,100 seedlings/ha at \$0.14/seedling).

Source: New Brunswick Department of Natural Resources, Forest Management Branch, April 2013

