

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

REPORT

Prepared for Government of Nova Scotia
Department of Natural Resources

May 2011

Executive Summary

- Nova Scotia's forest products manufacturing sector is emerging from one of the worst global industry downturns in recent history. In comparison with many competing jurisdictions, the Nova Scotia industry has been able to keep much of its productive capacity in place – but not without considerable hardship.
- Permanent closures of mills, significant job losses and substantial financial losses by firms throughout the province have been devastating. Of particular concern, in the context of this report, is the loss of jobs in the province's logging sector. This is a serious structural weakness undermining a potential recovery. It may be permanent chronic weakness, because of the loss of these skills as loggers have sought (and found) work in other industries, and in other provinces.
- Another directly related very serious structural weakness is the 'disengagement' of a large number of private woodlot owners from any significant involvement in the province's forest products manufacturing sector. Private woodlot supplies of sawlogs and pulplogs are key to the province's forest economy – supplying over two-thirds of Nova Scotia's total timber harvest. Among the woodlot owners in Nova Scotia who were active participants in the industry a decade ago, only 64% are active today.
- Markets and product prices have been recovering, albeit slowly in many instances. Even so, for the past several years, overall activity within the province's forest industry has been well below the 'critical mass' required for its sustained and viable operation.
- Against this backdrop, we conclude that a policy shift by DNR to a 50% reduction in clear-cut volume harvest ('CCR50%') policy would not put Nova Scotia's forest products industry out-of-business -- provided that appropriate transition and mitigation measures are put in place, and are successful. This report outlines and recommends a series of mitigation measures.
- The cost implications to industry of implementing the 'CCR50%' policy are substantial. Even prior to this policy, wood costs have been on a rising trend. Wood costs account for the bulk of manufacturing expenses (about 60% in most cases). They have been rising for a variety of reasons, but mostly because traditional full-participation of all players in industrial activities, notably woodlot owners recently, has not occurred. Their participation is vital to balanced working of the traditional 'fully integrated' model which previously has worked well for decades in Nova Scotia and other parts of North America.
- DNR timber supply projections indicate that significant structural changes are occurring in the province's timber supply and harvest outlook. Likely to be of particular concern to industry is a shift away from softwood harvesting (which has provided the impetus for past industry expansion) to hardwood species.
- We conclude that the twin impacts of potential loss of harvest volume, notably in softwoods, along with 'CCR50%' related costs increases, would push the industry further below the critical mass level – contributing to additional adverse cost impacts. The worst case outlook could push fibre costs for Nova Scotia's pulp & paper sector up by 14%*** over the next five years, and by 47% within the next ten years – compared with 2010 Base Year levels. For the province's sawmilling sector (which we believe can be a future engine for value-added expansion), wood costs could rise by 7% within five years and by 30% over the next decade. Neither of these scenarios is financially sustainable for the industry, and we strongly recommend mitigating measures.
- With mitigation measures, pulp & paper sector fibre cost increases could be held down to 12% over the next five years, and to 15% (versus 47%, without mitigation) over the next decade. With mitigation, sawmill costs could be held to a 6% rise (average 2011-15) and 15% rise (average 2021+), respectively.

*** cost rises are expressed on a five-year indexed average basis compared with the industry's 2010 baseline costs. (i.e. average wood costs for the period 2011-15, in this case, would be 14% higher than in 2010)

Table of Contents

	Page
Executive Summary	2
Table of Contents	3
1. Introduction	4
2. Nova Scotia's Forest Sector	6
3. Timber Harvest, by Ownership	14
4. Proposed Changes to Forest Management Practices	20
5. Precedents	26
6. Identification and Estimation of Economic Impacts of CCR50%*	28
7. CCR50% Policy Risks: Economic Impact Mitigation – Market Based and/or Policy Based	46
8. Conclusions	53
9. Recommendations	56

* CCR50% = Clear Cut Reduction 50% (an acronym for a policy of reducing the amount harvested by the clearcut method to 50% within five years)

1.

Introduction

1. Introduction

This report is about economic impacts.

Specifically, it address the potential economic impacts likely to arise as a result of the Government of Nova Scotia's implementation of a policy of reducing the amount harvested by the clearcut method to 50% within five years, benchmarked from December 2010, as outlined under the December 1st 2010 document '*A Policy Framework for the Future of Nova Scotia's Forests*'. The effective starting date for the 50% target will be determined once the Natural Resources Strategy has been approved.

Our report has been commissioned by DNR. For convenience, we refer to this policy under the acronym of 'CCR50%' (= clear cut harvest volume reduction to 50%)

Our focus on economic impacts is defined by our terms of reference.

It is recognized that there will be other types of impacts, and issues, that DNR and the Government of Nova Scotia will take into account in its their evaluations of our findings and recommendations.

In accordance with our terms of reference, we do not take a view, either way, about the merits and demerits, or the non-economic impacts, of various forest management approaches including conservation, retention or selection harvesting and/or clear-cutting.

Natural Resources Strategy

Nova Scotia's Natural Resources Strategy was announced in May 2007 as a three year process. DNR's current policies for forests, minerals and parks have been in place since the 1980s and are in need of renewal. The biodiversity strategy will be the first for the province. The decision to re-evaluate DNR's policies on forests minerals, and parks, and to establish a policy on biodiversity, is in keeping with the Province's focus on sustainable prosperity and competitiveness and the shift to a green economy.

The Strategy has been developed in three phases.

Phase 1 - Citizen engagement – led by Voluntary Planning (January 2008 to April 2009).

Phase 2 - Technical expertise/stakeholder engagement – led by independent panels (May 2009 to March 2010).

Phase 3 - Strategy Development – led by DNR (May to December 2010).

The Natural Resources Strategy is commitment under the *Environmental Goals and Sustainable Prosperity Act*.

<http://www.gov.ns.ca/natr/strategy2010/framework-update.asp>

2.

Nova Scotia's Forest Sector

2. Nova Scotia's Forest Sector

Nova Scotia's forest sector is unusual, but not unique, within Canada to the extent that most of its commercial timberlands are privately-owned. Moreover, a significant part of the province's standing timber resources comprise industrial plantation forests (i.e. even-aged stands, at various stages of maturity) along with a substantial volume of non-industrial timber from private woodlots (mostly un-even aged softwoods and hardwoods) and a smaller area of Crown timberlands.

Pulp & Paper Sector Dominance

Based on the province's timber resources historically, along with low cost hydro-electric power sources and close proximity of mills to tidewater, growth in the province's forest products manufacturing sector was driven by the pulp & paper sector, notably newsprint in the 1920s. Groundwood processing technologies eventually gave way to equally energy-intensive thermo-mechanical (TMP) pulping, based exclusively on naturally high-brightness spruce-fir virgin fibre supply. Today, **Abitibi-Bowater** (newsprint, book papers) and **NewPage (SC)** produce a range of publication papers. A re-cycled paper plant (**Minas Basin**) is in operation.

Kraft pulping also is a key feature of the province's dominant pulp and paper sector. Today, **Northern Pulp** operates a bleached kraft (NBSK) pulp mill, and sells its market pulp to papermakers in a variety of markets for production of paper towels, facial tissues and printing and writing papers. The estimated value of Nova Scotia's pulp and paper output in 2009 was around \$700 million (Figure 1).

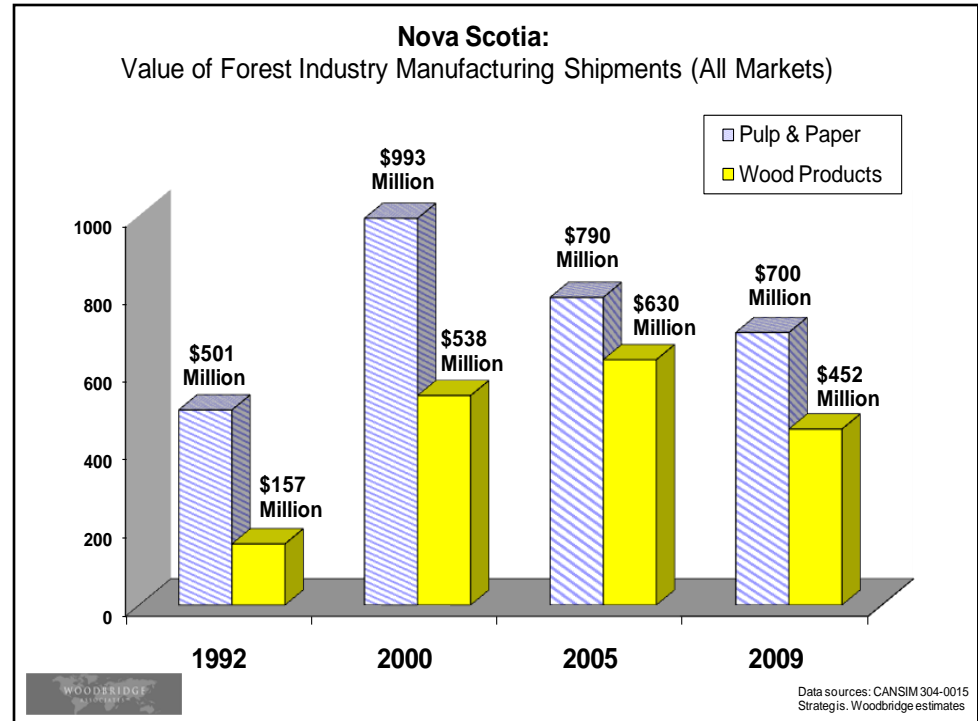
Wood Products Capacity Growth Started in the 1990s

In 1992, Nova Scotia's wood products sector was comparatively undeveloped. The province has a hardboard panel mill (**Louisiana Pacific**) built in 1967 and which, for the most part, has survived the downsizing of this sub-sector within North America.

The province has long had an independently owned and operated sawmilling sector (along with some pulp and paper company integrated wood products assets, such as the large scale Bowater sawmill). Based on many family-owned sawmilling businesses, the province has a variety of specialty lumber mills (e.g. pine boards and some small-scale hardwood lumber mills).

The major focus of Nova Scotia's softwood lumber industry, however, is its dimension and stud spruce and fir sawmills. Starting in the late 1980's/early 1990s, many mills (e.g. **Ledwidge**) switched away from selling green (i.e. undried) lumber to the U.K. market. Using small log technologies, they switched to producing kiln dried lumber for the U.S. and Canadian markets. In the process, the large volume of dry, white residual chips becoming available helped Nova Scotia's pulping sector reduce costs – and expand in tandem with the growth in softwood lumber output – up to around the early-2000s.

Figure 1



Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

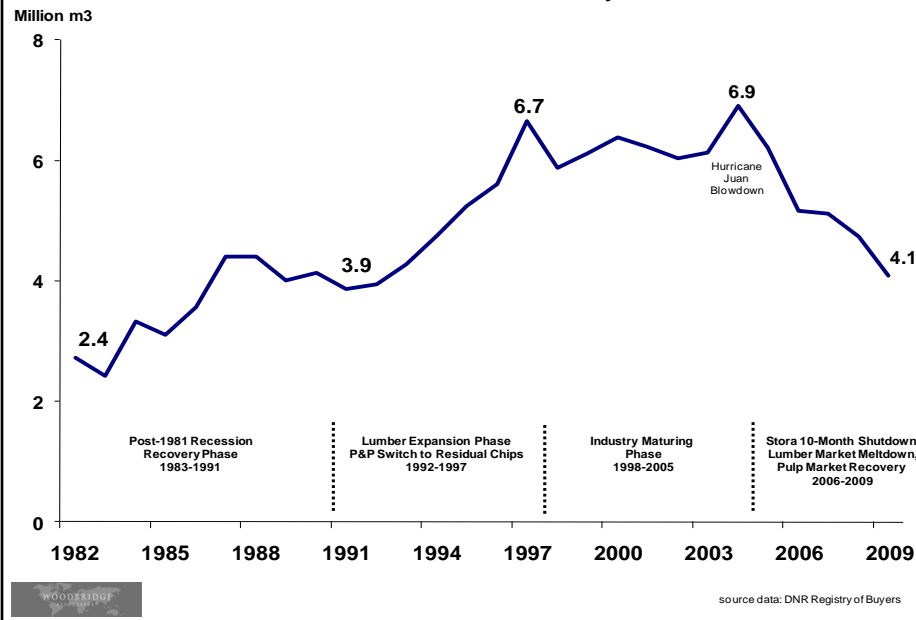
Nova Scotia's Forest Sector (continued)

Sawlog Harvest Growth

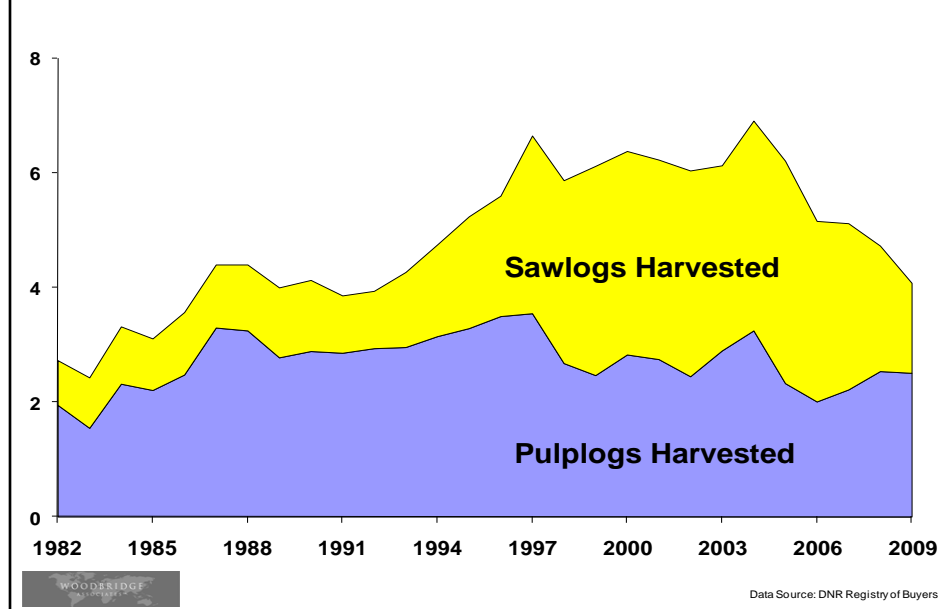
The dominance of the pulp & paper industry in Nova Scotia's forest products manufacturing sector was reduced considerably over the period 1991 to 1997. The pulp & paper industry continued to grow over this period, and beyond – but at a much slower rate. This particularly was the case during the sharp downsizing of the North American and European newsprint and publication papers industry during the early part of the 2000s decade. Numerous provinces, states and countries experienced extensive mill shutdowns over this traumatic period for the industry. Nova Scotia fared reasonably well, in comparison. The total harvest volume remained high (Figure 2).

The softwood lumber capacity expansion within Nova Scotia, which began in the early 1990s, drove a substantial increase in demand for sawlogs. The province's sawlog harvest rapid growth, in comparison with the slowly declining trend in pulpwood harvesting (and whole log chipping), is illustrated in Figure 3. In essence, prior to the early 1990s, it can be said that Nova Scotia's pulp & paper industry was not fully integrated with the province's lumber industry. This situation perhaps was emphasized by the extensive private timberlands owned by the pulp & paper firms. After 1997, full integration took place. The pulp & paper companies relied increasingly on lower cost sawmill residuals. Even so, they held (and today still hold) the high cards in timber supply – invariably trading sawlogs to sawmills for chips. As noted later, the dominant form of timberland ownership, namely woodlots, plays a subsidiary 'reserve' role in this flow of fibre. Moreover, woodlots owners increasingly have become disengaged.

Nova Scotia Timber Harvest: 4-Phases in Recent History Figure 2



Nova Scotia Timber Harvest: The Current Fibre Shortage at Pulp Mills is Caused by a Dramatic Decline in Sawlog Harvesting, Lumber Output and Sawmill Residual Chip Production Figure 3



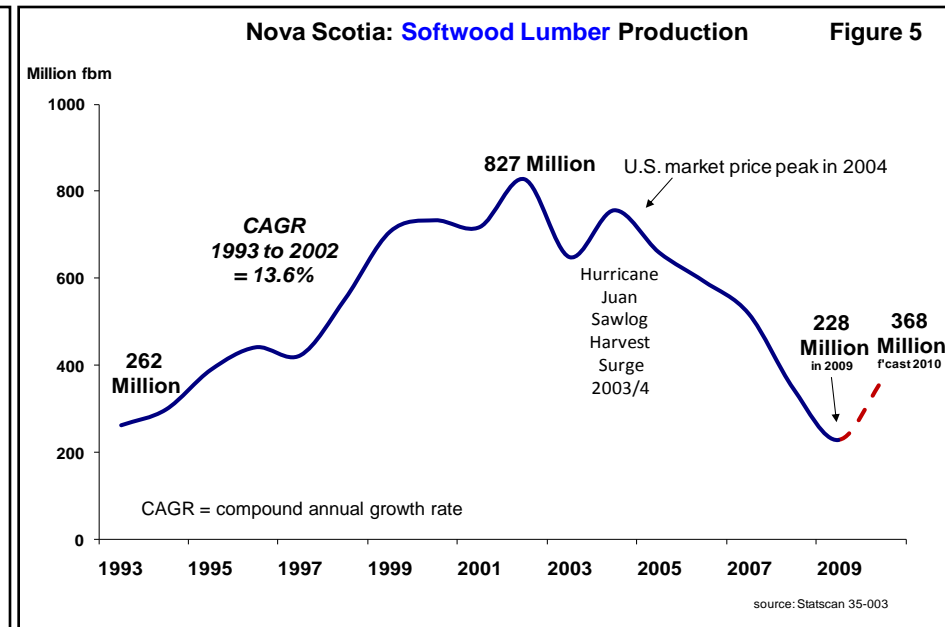
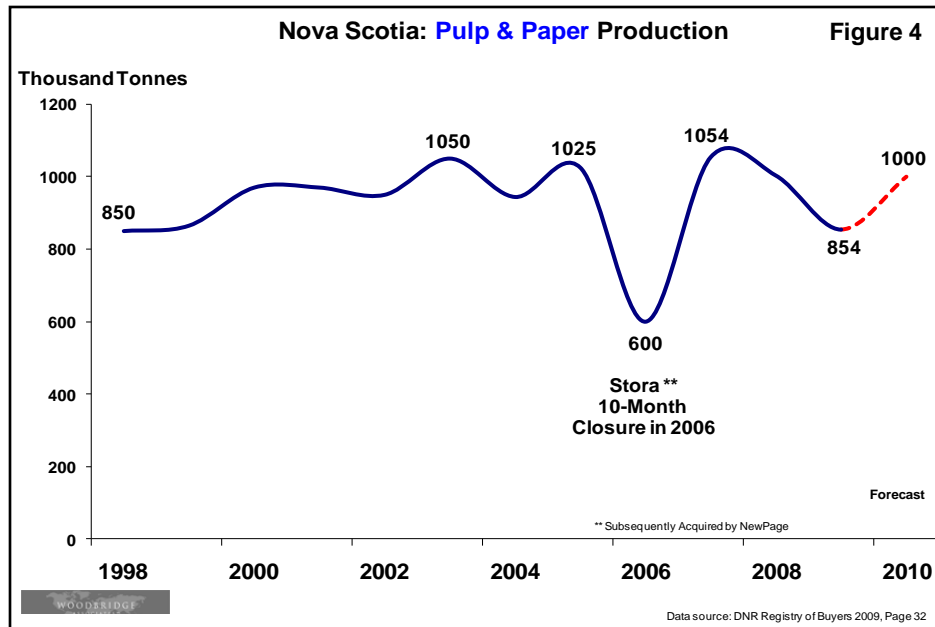
Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Nova Scotia's Forest Sector (continued)

Remarkably Consistent Pulp & Paper Output in Nova Scotia

Except for two events (Figure 4), Nova Scotia's pulp & paper production (a) has been remarkably consistent during a very turbulent period for the North American and global pulp and paper industry and (b) has kept operating, (although apparently incurring significant financial losses in papermaking), through adaption to very demanding world market conditions. Figure 4 shows annual production data for the industry. The two events are (1) the extended 2006 closure (10 months) of the **Stora** paper mill at Port Hawkesbury (now owned by **NewPage**) and (2) Nova Scotia pulp & paper sector's ability to cope with the very severe economic decline in western countries linked to the U.S. housing, sub-prime lending, and credit market meltdown from 2006 to today. It is not clear, however, what financial losses may have been incurred by the papermaking firms (Bowater and NewPage) at these mills. 3rd Party analyses indicate that most of the publication papers industry has been losing money for some years.

In terms of its production levels, Nova Scotia's softwood lumber industry is something of an enigma. Firstly, along with New Brunswick and others, Nova Scotia enjoys the 'Maritimes Exemption'. This exempts the Maritime provinces from duties and taxes payable by most Canadian provinces on shipments of softwood lumber to the U.S. The 'Maritimes Exemption' has existed for many years and has provided financial benefits to the province's sawmills shipping into the U.S. under two softwood lumber agreements (SLA1 1996 to 2001; and SLA 2006 which expires in 2013). Despite this, and very rapidly rising market demand in North America through 2005, Nova Scotia's softwood lumber production declined after its 2002 peak. We attribute this to high manufacturing costs and/or a shortage of sawlogs, as well as declining cost competitiveness of Nova Scotia's lumber in the U.S. market (notably because of the rising C\$ in U.S. funds, although this was common to all provinces). It was not due to any lack of market demand and/or the lack of attractive product prices during this period. The Hurricane Juan production surge in 2004 was an aberration.



Nova Scotia's Forest Sector (continued)

Constraints on NS Sawmill Output

In view of the focus of this report, to assess the economic impacts of timber management (i.e. reduction of clear-cutting to 50% within 5-years), it is important to determine how various sectors of the province's forest will be able to respond to (a) potential shortages of timber i.e. sawlogs in the context of sawmills] and (b) potential rises in costs that may be attributable to the announced policy changes.

Loss of Critical Mass

It is clear, from most anecdotal accounts, that Nova Scotia's sawmilling sector is operating well below the 'critical mass' needed to sustain a healthy softwood lumber industry.

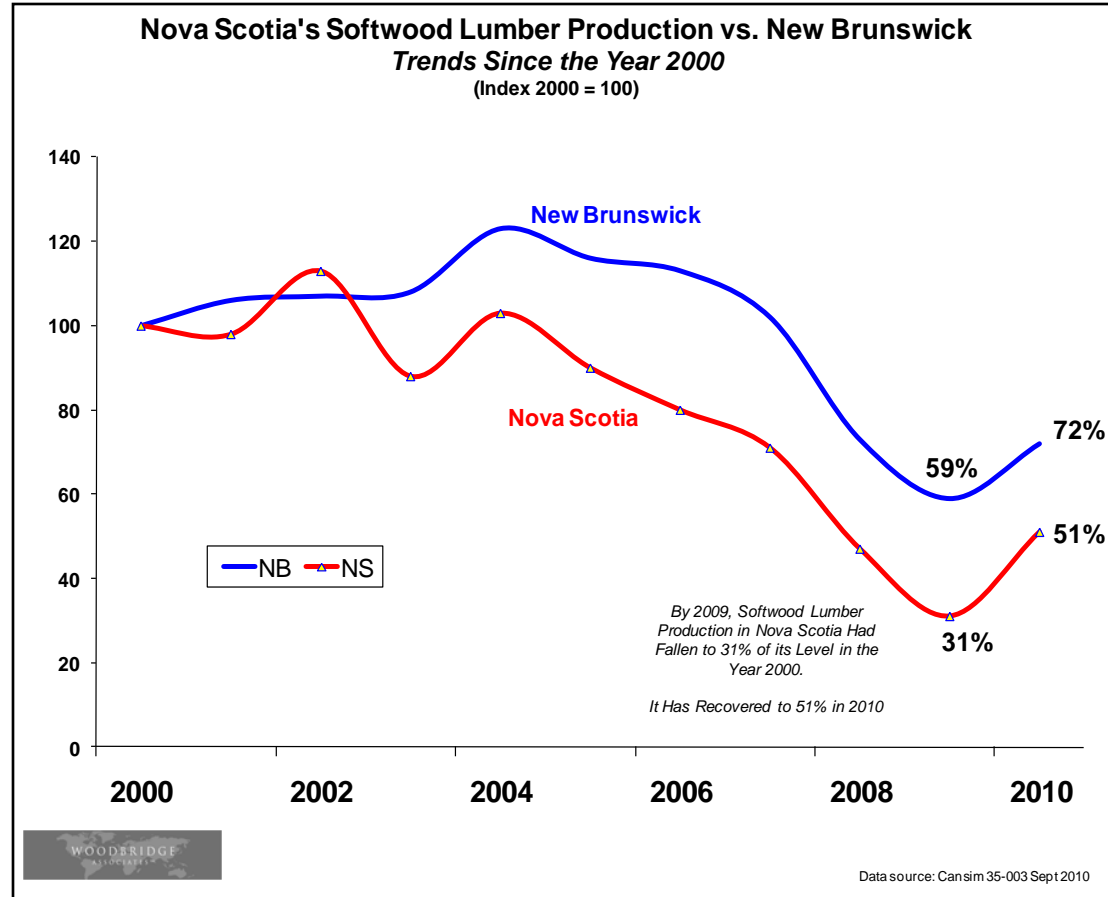
Numerous family-owned sawmills have closed or curtailed operations. **McTara**, formerly the largest sawmill in Nova Scotia, has closed, and the mill is in mothballs. Sawmill jobs have been lost and sizeable parts of the supporting supply-chain infrastructure (notably logging contractors) either have been lost to the industry (operators have left for jobs in other industries) or severely curtailed.

This situation has a direct bearing on the costs of announced policy changes. Moreover, it influences the potential effectiveness of any 'mitigation' measures that may be considered. One quantifiable indicator of the loss of critical mass in Nova Scotia's softwood lumber sector is provided in Figure 6.

Based on Statistics Canada monthly survey reports, it is estimated that, by 2009 (the low point of the market cycle) , production of softwood lumber in Nova Scotia had fallen to 31% of its Year 2000 level.

This level of decline was one of the most severe in Canada. In comparison, New Brunswick (which is generally comparable with Nova Scotia, and sells its lumber to similar markets) reached a cycle low point of 59% of its peak levels. It is worthwhile noting that, because they were desperate for sawmill residual chips, many of Nova Scotia's industrial timberland owners have substantially increased their flow of sawlogs to sawmills during 2010.

Figure 6



Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Nova Scotia's Forest Sector (continued)

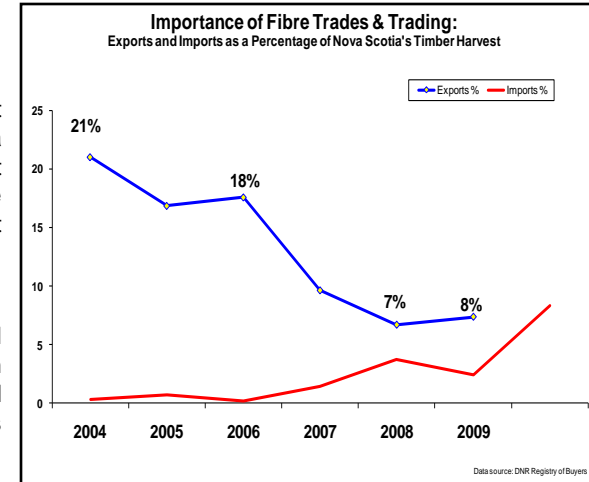
Other Wood Products, Bio-Fuels

In addition to its pulp & paper and softwood lumber mills, Nova Scotia is the location of a number of other forest products manufacturing facilities, and value-added secondary production plants. Louisiana Pacific operates a hardboard mill. Several hardwood lumber mills exist, along with veneer slicing. Wood pellet plants are an important fairly recent addition to the industry. In addition, several wood-based bio-fuel facilities are in operation, and others are proposed. As noted in a later section, the flow of wood fibre to bio-fuel operations is a vital part of the overall forest economy and green energy production. Significant volumes are involved.

Wood Trades and Imports-Exports

Extensive trading of wood in various forms takes place in Nova Scotia and with neighbouring regions. This is a vital and healthy part of the forest economy – and it optimizes the economic efficiency of the province's wood flows. With the substantial tightening of wood supply within the province over the past several years, exports have declined sharply (Figure 7) while imports have increased (Figure 8) – especially in 2010. As a percentage of the province's timber harvest, imports have increased to the equivalent of 8% of Nova Scotia's 2010 harvest volume (Figure 9).

Figure 9



Nova Scotia: Exports of Logs and Woodchips Figure 7

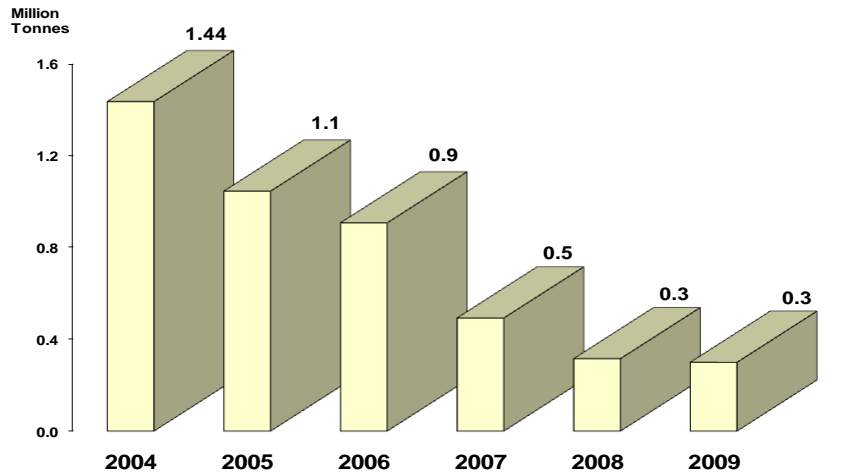
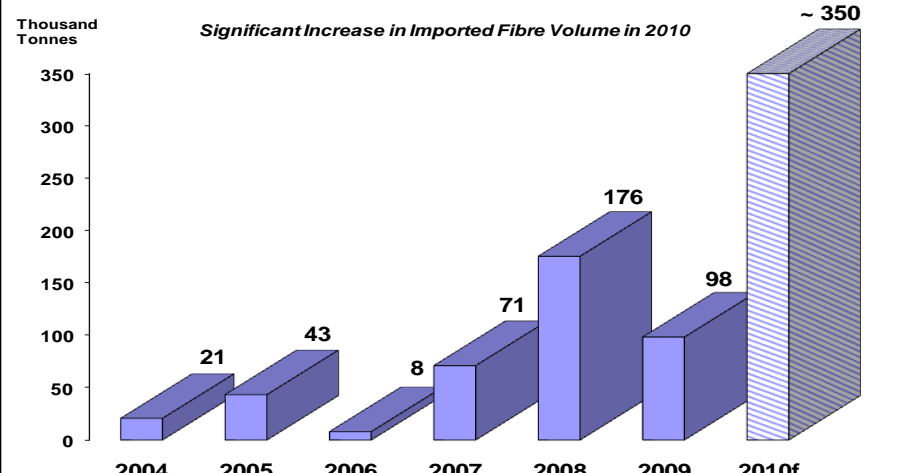


Figure 8 Nova Scotia: Log & Woodchip Imports



Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Nova Scotia's Forest Sector (continued)

Logging Sector

The logging industry in Nova Scotia is an integral part of the forest sector. Some sources** indicate that there are 77 logging companies registered in the province, as of June 2010. It is not known how many of these are active. Statistics Canada indicates that, for the year 2008, there were 387 contract logging establishments in the province – which refers to operating facilities rather than the number of companies involved in the business. Logging firms service all areas of Nova Scotia's forest regions (Figure 10) but many are part-time and a large number of the smaller firms are linked to woodlots and harvesting on woodlots. There are some major firms, comprising contract loggers and others.

Corresponding to the sharp decline in Nova Scotia's timber harvest since 2004, there has been a sharp decline in the sub-sector's revenues and earnings (Figure 11). Although contract loggers have fared reasonably well, others have lost their jobs. Their revenues declined from an aggregate of \$220 million in 2004 to a low point of \$87 million by 2008 (the latest data available from Statistics Canada). Anecdotal evidence indicates further attrition in this sub-sector, as many have left to find jobs elsewhere or in other industries. As noted later, in the discussion of economic impacts, there is significant concern within Nova Scotia about the capacity of the logging sector to recover.

Figure 10

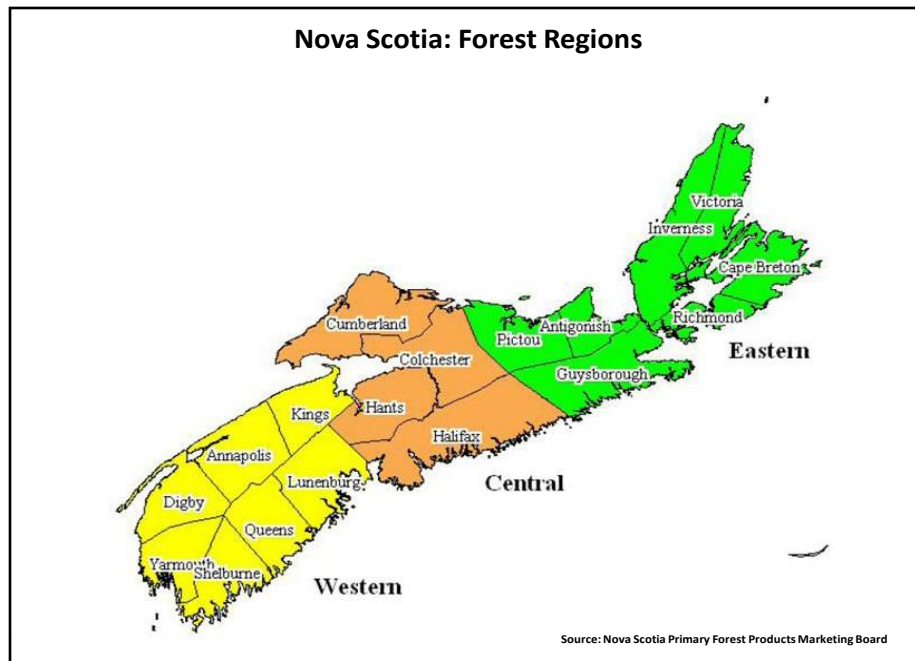
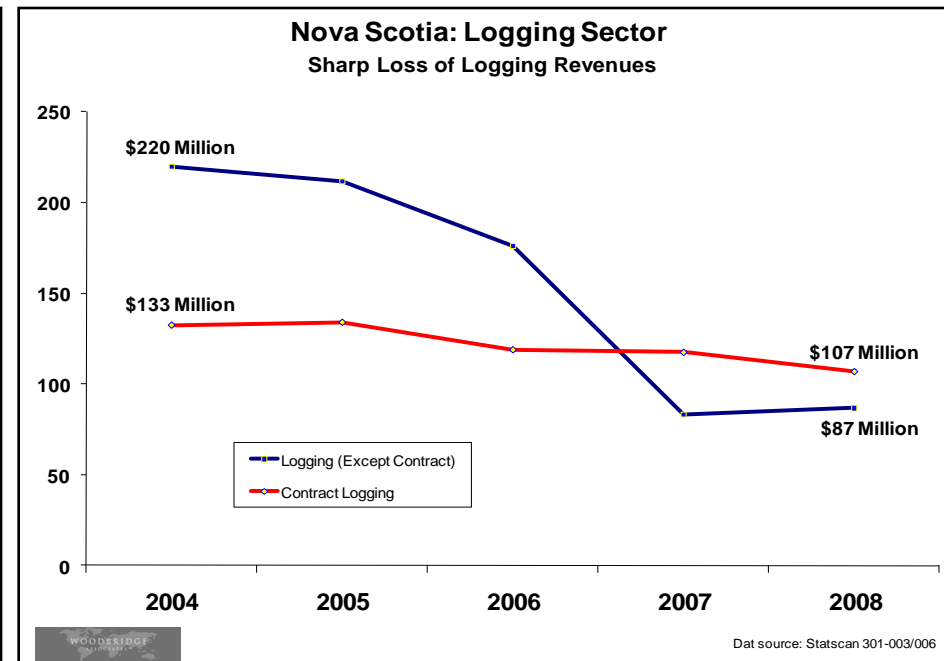


Figure 11



** source: <http://www.manta.com/world/North+America/Canada/Nova+Scotia/logging--E019B/>

Nova Scotia's Forest Sector (continued)

Geographical Market Focus

Over a period of time, Nova Scotia's softwood lumber industry has become less focused on export markets (e.g. the U.S.; Europe) and increasingly focused on serving domestic markets. As noted on previous pages, the province's softwood lumber production is substantially down from peak levels. Figure 12 shows that there also is a declining trend in the 'export intensity' of Nova Scotia's lumber industry.

Despite the competitive advantage of the 'Maritimes Exclusion', Nova Scotia's lumber industry has turned away from exports sales to the U.S., in favour of sales to the Canadian domestic market.

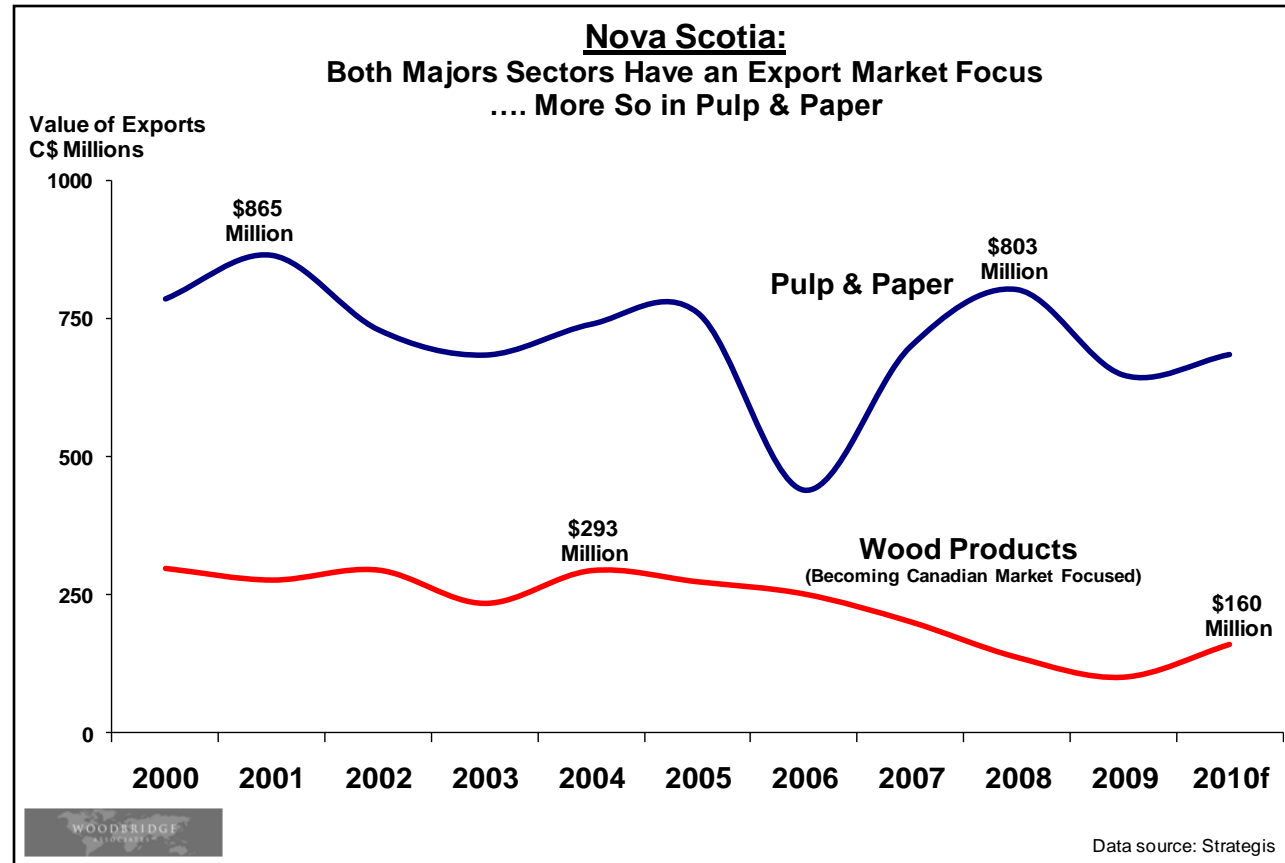
In some cases, domestic 'niche' markets can provide better market prices than those obtainable from export markets. In other cases, it is an issue of taking the easiest option. For instance, compared with a decade ago, the Canadian dollar is very strong in U.S. funds.

Thus, whereas softwood lumber exporters to the U.S. formerly could earn a substantial exchange rate premium, today that premium virtually has been wiped out.

The province's pulp & paper industry faces the same loss of export market competitiveness relating to foreign exchange conversion. Even so, as the Figure shows, the pulp & paper sector in Nova Scotia has to maintain and expand its export markets because the domestic market for its products is limited in size.

In some added value products, we believe that the province's softwood lumber and wood product industry has some growth opportunities, as discussed later.

Figure 12



3.

Timber Harvest, by Ownership

3. Timber Harvest, by Ownership

Dynamics of Timber Demand in Nova Scotia

In Nova Scotia, the dynamics of commercial timber demand are defined by the manufacturing capacity in place, levels of capacity utilization, the structure of the manufacturing industry, contractual relationships, fibre sources and prices, net imports, product markets and prices. In 2009, the provincial harvest was 4.127 million m3. If firewood and specialized operations (e.g. house logs for log homes) are excluded, the fibre volume available to the forest products manufacturing and exporting sectors was 4.079 million m3 (Table 1).

The Table provides the calculation basis for the final disposition of this volume as summarized in Figure 13.

In 2009, a low point in the lumber cycle, the province's pulp and paper industry accounted for 75% of the direct and indirect flows of fibre, plus a majority of net imports ~5%.

Thus, it accounted for almost 80% of the fibre flows available for forest products manufacturing.

Nova Scotia's lumber industry accounted for 17% of fibre used (net of residual fibre sold to the province's pulp & paper mills).

Net imports, mainly from New Brunswick and PEI, but also a small volume from Quebec, less exports, accounted for 5% of total fibre sources which, as noted, mostly is added back to pulp & paper activities.

Figure 13

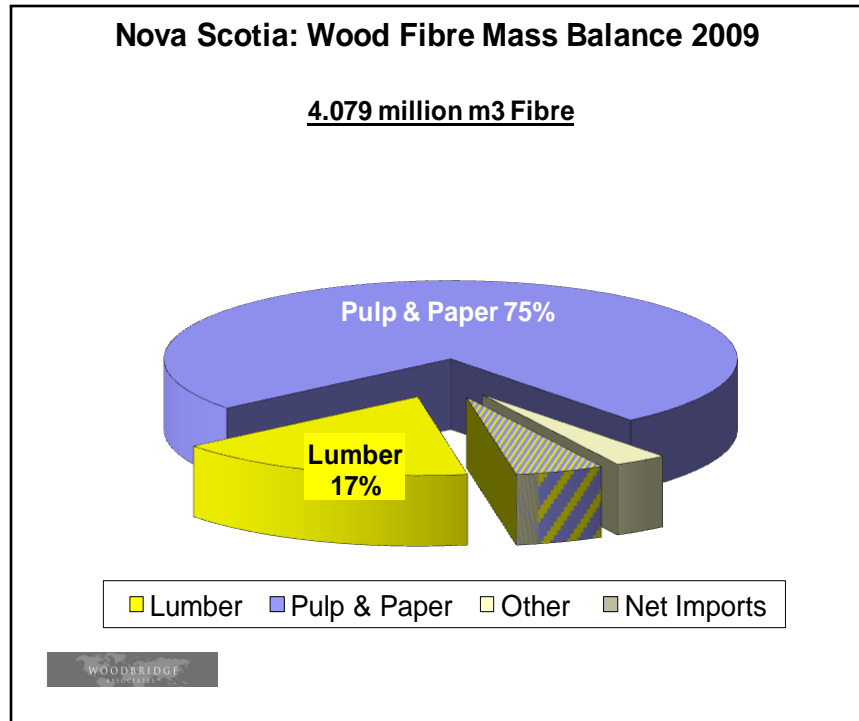


Table 1

NS Fibre Mass-Balance (Swds + Hwds) 2009

	000m3
Provincial Timber Harvest	4,127
less firewood/specialty.	-0.05
Total Manufacturing Sector	4.079
Sawlog Harvest	1.571
Exports	0.092
Sawlogs Available	1.480
Converted to Lumber	0.701
Converted to WW Chips	0.779
Total Sawlog Fibre	1.480
Pulpwood Harvest	2.504
Processing losses	-0.130
Exports	-0.207
Imports of Chips & RW	0.098
add Sawmill WW Chips	0.779
Total Pulpmaking Fibre**	3.044
Total Fibre Used in NS Manufg	3.750
Summary of Net Exports	0.199
Other	0.130
Total Manufacturing Sector	4.079
Percent Allocation	%
Lumber Industry	17
Pulp & Paper Industry	75
Net Imports	5
Other	3
Total	100

** Includes fibreboard

Excludes hogfuel and brown wood residual flows

Timber Harvest, by Ownership

Dynamics of Timber Supply in Nova Scotia (continued)

Wood for Energy & Bio-Fuels

The mass balance fibre flow calculations presented on the previous page refer to wood used in manufacturing forest products. For the pulp & paper industry, these flows include only whitewood fibre for pulp and papermaking. In addition, there are significant volumes of brownwood residuals, comprising hog fuel and chipped brown fibres, as well as whitewood and some brownwood fibres used for wood pellets (**Enligna, Shaw**) and bio-fuels, including power boilers.

With rising global costs of energy sources, and a rising trend in provincial prices for purchased electricity, the Nova Scotia forest products industry has a high level of exposure to energy costs. The kraft pulping process produces a significant level of bio-energy, which normally is used to recover process chemicals. Potentially some, however, may be available to feed into the provincial grid. The purchased electricity component for kraft mills generally is low. The TMP process used for pulping and publication grades papermaking in the province, however, traditionally has been very dependent on self-generated electricity sources (e.g. hydro-electric: **Brooklyn Power**) and investments in power boilers. These use wood bio-fuels (and other fuel sources) to produce a combination of heat and power (CHP) energy sources.

Further discussion of this topic is provided later, in the context of the operating costs at pulp & paper mills and wood product plants. When various sources of wood fibre used for this purpose are taken into account, they imply a substantial additional consumption volume. The bio-fibre need for energy production is growing, and the corresponding demands on the province's timberlands are rising. For instance, a 50 MgW power plant requires around 550,000 green tonnes of fibre per year. An increasing number of the province's production facilities are seeking to become self-sufficient in power – and, in part, contribute green electricity into the grid, in line with the Government of Nova Scotia's commitment to reaching its renewable energy goals.

Despite the potential attractions of bio-fuel facilities for companies desiring a greater element of self-sufficiency in energy supply (i.e. avoiding interruptibility) and costs (i.e. seeking to avoid anticipated higher costs of purchased power), the business case is complex. So too are many of the environmental issues. Often there is a sound case. Much depends however on the avoided costs. They can be defined in a number of ways.

Dynamics of Timber Supply in Nova Scotia

In Nova Scotia, the dynamics of commercial timber supply are defined through factors such as the province's timberland ownership structure, standing timber resources, species and timber types, the mature inventory volume, timberland and sustainable forest management, harvesting practices, industry and woodlot owners' policies and preferences, and government regulations. Many of these are addressed in The Forests Act and related legislation.

From the point of view of this report, one of the most important characteristics of timber supply in Nova Scotia is the relationship between the three principal types of ownership:

- **Non-Industrial** (also referred to in this report as **Private Woodlots** supply, but it also includes some private ownerships not included in industrial).
- **Industrial**
- **Crown**

The relationship between these three sources (to which net imports have to be added to determine net available supply) is illustrated in Figure 14, which also shows the harvest situation by these ownerships over the period 1990 to 2010 forecast levels.

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Timber Harvest, by Ownership

Dynamics of Timber Supply in Nova Scotia (continued)

Private woodlot owners dominate timber supply in Nova Scotia (Figure 14). In 2009, they accounted for 66% of the province's total softwood and hardwood harvest. Industrial timberlands accounted for 18% and Crown forests contributed the balance of 16%.

The total volume harvested in 2009 was 4.1 million m³, which was a 40% decline from the provincial harvest peak of 6.9 million m³ reached in 2004.

Clearly, the role of woodlot owners is one of the major keys to fibre supply for the province's forest sector. Figure 15 shows the same data for the private woodlot harvest volume, but in a separate chart. Before interpreting the trend data, some adjustments and comments should be made. Firstly, as a result of the Hurricane Juan blow-down in late 2003, salvage harvest volumes boosted the 2004 harvest. An adjustment is made on the next page.

Figure 14

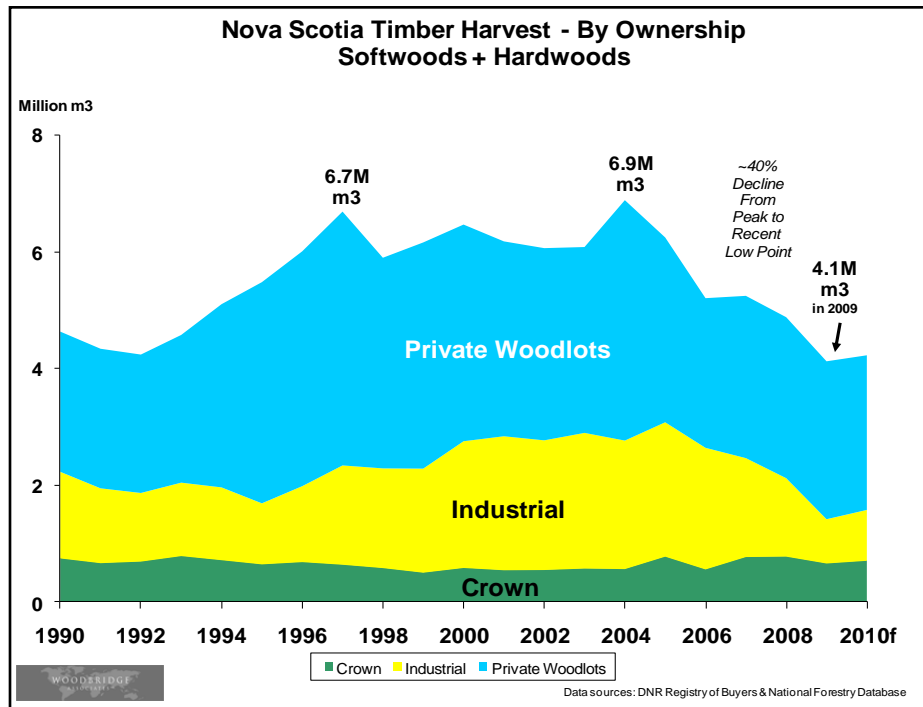
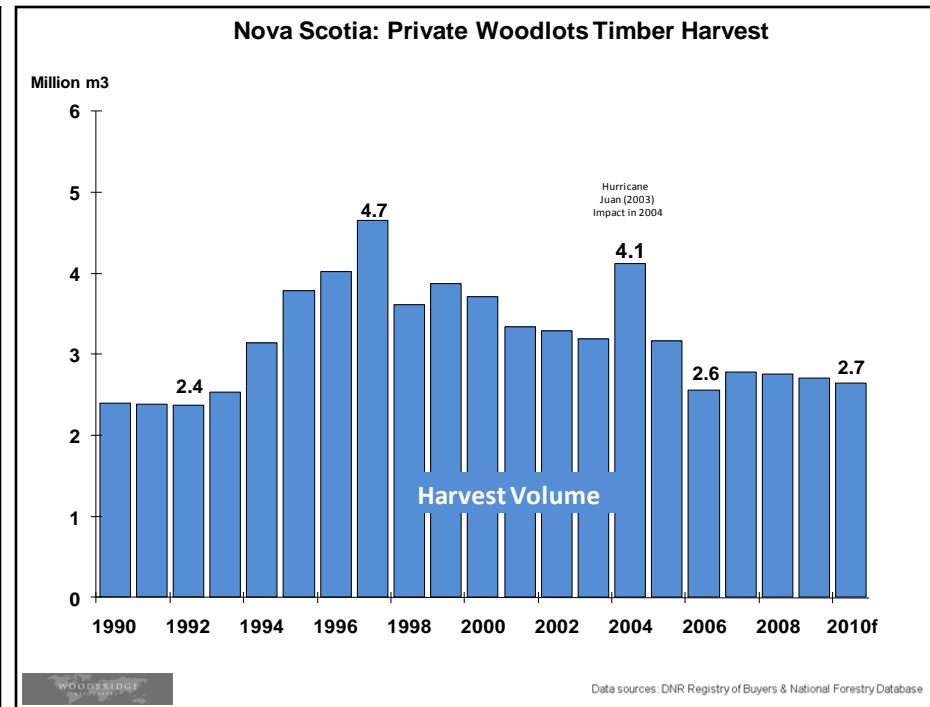


Figure 15



Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

The "participation rate" of formerly active woodlot owners has declined progressively – today to around 64% of its peak. Yet, private timberland stumpage values have been high, and the pulp & paper sector is acutely short of fibre. This low participation rate among previously active woodlot owners is a substantial constraint to the prospects for a recovery in the province's harvest volume – and a major policy challenge.

Timber Harvest, by Ownership

Dynamics of Timber Supply in Nova Scotia (continued)

In Figure 16, woodlot harvest data have been 'normalized' to eliminate the Hurricane Juan effect. Also, although no adjustment has been made, the sharp decline in 2006 reflected a 10-month shutdown at the Stora pulp and paper mill. When these special situations are taken into account, three phases of woodlot harvesting activity are evident. The first, lasting from the early-1990s to 1997, was a period during which woodlot owners generally responded positively to rising market demand by increasing their harvest levels. The growth in activity peaked in 1997. After this, there is a clear trend of declining harvest levels from woodlot owners – in both sawlogs and pulpwood. Yet, as noted before, this was a period during which demand for timber products was still rising rapidly – and when near record product prices were being attained. This high level of 'disengagement' among previously active suppliers of logs from woodlots is at the core of the forest industry's loss of critical mass.

Not all woodlot owners participate in commercial timber operations. Some prefer to pursue other forest values. Others, to date, have not chosen to participate – for a variety of reasons. We are not in a position to speculate on these reasons for this situation. We have, however, calculated an approximate "participation rate" for **formerly active woodlot owners**, using peak 1995-97 woodlot harvest levels as the benchmark. This is only an approximation, as there is no way of knowing how many woodlot owners and operators subsequently have withdrawn from commercial activities. Even so, on the basis of this rough measure, it appears that the formerly active woodlot owners "participation rate" has declined progressively – and today stands at around 64% of its peak (Figure 17). As a measure of the loss of critical mass in the province's forest industry, these data indicate a significant loss of logs and fibre supply capacity. Yet significant mature volumes of merchantable woodlot timber exist.

Figure 16

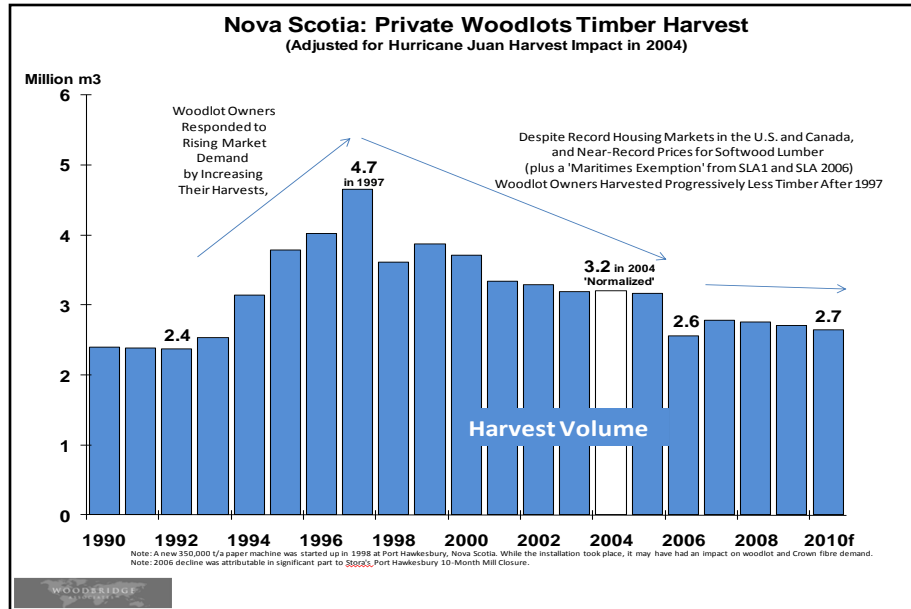
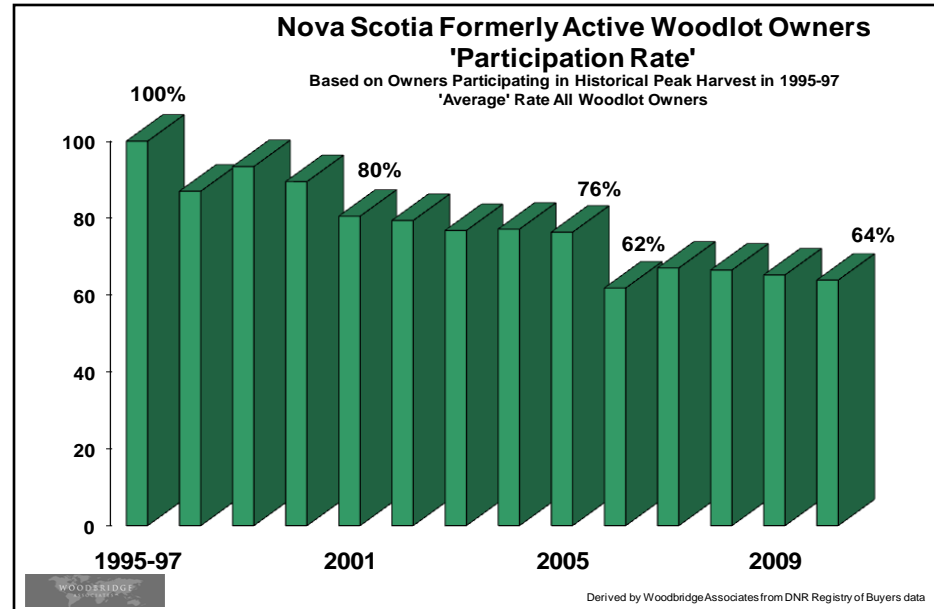


Figure 17



Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Timber Harvest, by Ownership

Dynamics of Timber Supply in Nova Scotia (continued)

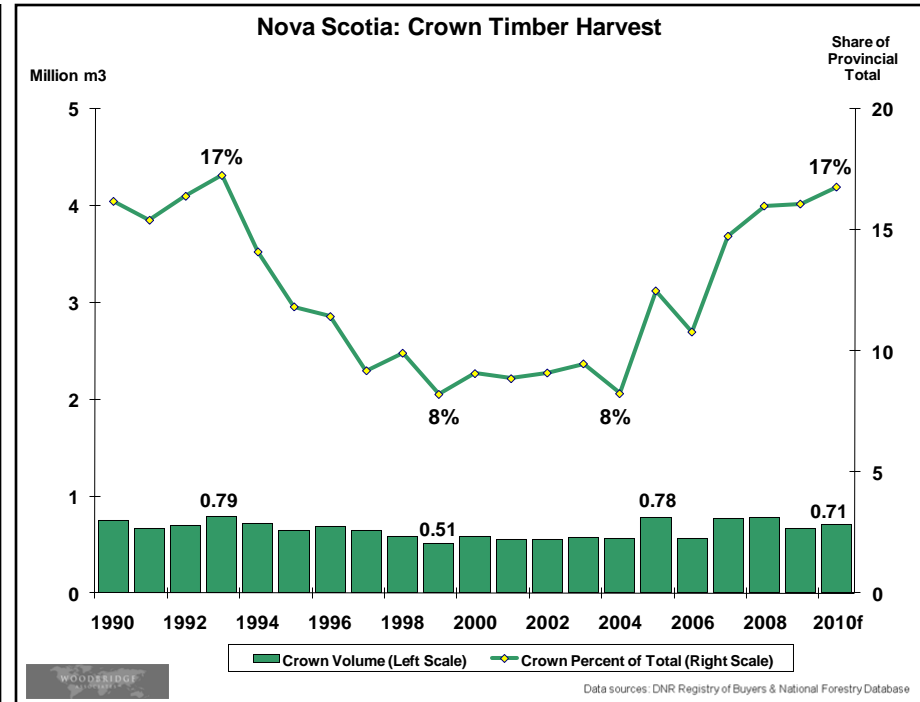
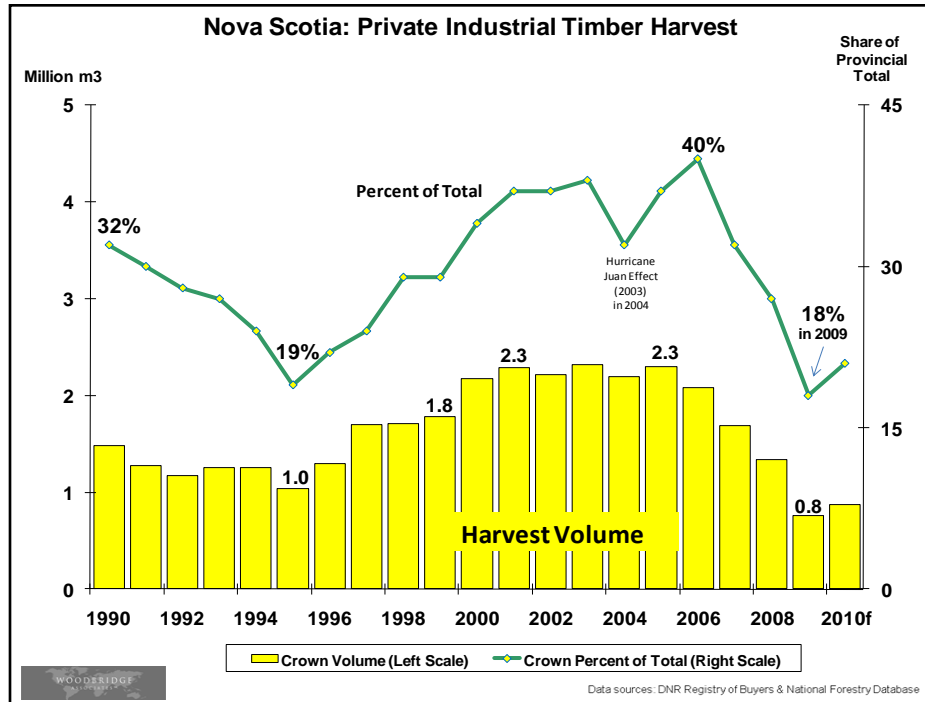
Private Industrial Lands

Harvest volumes on private industrial timberlands, which are owned extensively by major firms in the manufacturing industry, also show a sharply declining trend in recent years (Figure 18). Like many forests in the province, these areas comprise a variety of even-aged (plantation) and uneven-aged stands, with a wide range of age-classes and different available volumes of mature merchantable timber. In some cases, maturing even-aged stands will become eligible for harvest within the next decade, while others will take several decades to mature. Moreover, throughout the province's three forest regions, the 'mix' and quality of sawlogs and pulplogs varies widely.

Having contributed a rising proportion of the provincial harvest from the mid-1990s to the mid-2000s, rising from 19% to 40% of the total in 2006, harvest levels on private industrial timberlands declined sharply from a peak of 2.3 million m3 in 2005 to a low point of 0.8 million m3 by 2009. Part of the explanation was the higher proportion of sawlogs harvested from industrial lands during the period when softwood lumber markets were buoyant. The Crown timber harvest remains comparatively steady (Figure 19), and is an important, but marginal volume, source of timber especially during tough markets when private industrial supply typically diminishes.

Figure 18

Figure 19



4.

**Proposed Changes to Forest
Management Practices**

4. Proposed Changes to Forest Management Practices

Focus of This Report

The process of developing a Natural Resources Strategy was announced by the Government of Nova Scotia in May 2007, as a three year process expected to be completed by December 2010. Our report was commissioned in October 2010. The focus of our report, based on the terms of reference provided, is to determine the likely economic impacts of five wood supply scenarios developed through DNR modeling exercises and supplied to Woodbridge Associates Inc by DNR in mid-to-late October.

Our initial findings were presented to DNR during November 2010. In early December, the Government of Nova Scotia released the strategic directions for future forestry policy (*'A Policy Framework for the Future of Nova Scotia's Forests'*). These strategic directions are shown on the next page (Figure 21).

DNR Models: Objective of Reduction in Clearcutting

The *Principles* were not available to us when we began our work. Nevertheless, some possible directions of policy were clear. A proposal to reduce the proportion of wood harvested by the clear cut method to no more than 50% of all forested lands within five-years had been talked about widely. In addition, this possible policy direction was the focus of four of the five wood supply modeling scenario data spreadsheets provided to us by DNR for evaluation (Figure 20).

Figure 20

The Nova Scotia Crown Lands Forest Modeling (CLFM) framework was the basis used by DNR to formulate the scenarios. Although designed for Crown land forest management planning it was extended to encompass the provincial scope. DNR believes that the CLFM framework represents the best option for evaluating the above scenarios given time and resource constraints.

Key formulation objective and assumptions included:

1. Maximizing the short-term softwood harvest volume with a focus on spruce and fir.
2. Maintaining an even-flow wood supply from each management unit.
3. Utilizing a standard set of softwood fiber based silviculture options that included: plantation, early competition control, and pre-commercial thinnings.
4. Having an extended set of silviculture options for partial harvesting that included: selection harvest, commercial thinning and shelterwood harvest.
5. Constraining silviculture spending to less than 15 million dollars per year as a base case.
6. Accepting the framework without any explicit indicator for wood cost while understanding that any results will need additional analysis and/or interpretation for potential changes to associated wood costs.

1. **Base Case Scenario** (essentially the status quo forest practices case)**
 2. **Revised Harvest Practices (50% Provincially), Constant Silviculture**
 3. Revised Harvest Practices (50% by Management Unit), Constant Silviculture
 4. **Revised Harvest Practices (50% Provincially), Increased Silviculture**
 5. Revised Harvest Practices (50% by Management Unit), Increased Silviculture
- ** Note that this is not a status quo land use case, because it assumes completion of the 12% Protected Areas objective

The CLFM framework was formulated to examine potential future wood supply impacts under the given assumptions. Due to the strategic nature of the objectives and assumptions, the focus was on the relative change and patterns that arose among the different management strategies being explored. The targeted functionality behind this application of the CLFM was to inform on general trends, not to design detailed/operational forest management plans. Fibre imports and exports were not included by DNR.

Strategic Directions Announced December 1, 2010

A Policy Framework for the Future of Nova Scotia's Forests

The Government of Nova Scotia is committed to making life better for families. Protecting our natural resources, balanced with the need to protect good jobs that grow the economy, will help us meet this commitment.

Nova Scotians have sent a clear message through the *Natural Resources Strategy* process that a new course of action is required on forest harvesting. At the same time, any changes must consider the vital contribution the forest industry makes to Nova Scotia's economy.

The best decisions will be those that enable Nova Scotians to make a good living from our natural resources while ensuring future generations will be able to enjoy similar benefits. Policy development in the forestry management area, therefore, must integrate economic, social and environmental values in order that a balanced solution can be reached.

The following strategic directions provide the basis for future forestry policy. Specific rules and guidelines to support these directions will continue to be developed as the *Natural Resources Strategy* is approved and implemented.

Strategic Directions

- **Reduce** the proportion of wood harvested by the *clear cut method* to no more than **50% of all forested lands** over a five-year period. Commercial harvests will be registered with the Department of Natural Resources and progress will be reported annually. Existing ecosystem-based forest management analysis of Nova Scotia's forests identifies approximately 50% of the land is appropriate for uneven-aged management. The *Code of Forest Practices* will provide consistent principles and standards of ecosystem-based science to support the goal.
- **Prohibit** the removal of whole trees from the forest site in order to maintain woody debris at these sites, with the exception of Christmas tree harvesting. This practice is important for soil and biodiversity maintenance and is consistent with the province's *Renewable Electricity Plan*.
- **Public funds** will not be directed to herbicide spraying for forestry.
- **Private land owners** will not be required to have management plans to harvest their woodlots for non-commercial energy use.
- **Undertake** an analysis of options regarding a province-wide *Annual Allowable Cut* in order to limit total harvested amounts.
- **Incorporate** the requirements for harvesting forest biomass in the *Code of Forest Practices* and, as stated in the *Renewable Electricity Plan*, revise the regulations under the *Forests Act* to ensure commercial users of biomass for energy or fuel production are registered buyers and subject to the same rules as the existing forest industry.

Source: <http://www.gov.ns.ca/natr/strategy2010/framework-update.asp>

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Proposed Changes to Forest Management Practices (continued)

DNR Models: Objective of Reduction in Clearcutting

DNR's modeling comprised the assumption of a mix of forest management practices – for all ownerships. Key features are presented in Figure 22. These include continuation of clear-cutting on some even-aged stands, along with pre-commercial thinning and commercial thinning on these lands. Assumptions also included the extensive adoption of shelterwood harvesting on even-aged stands. With regard to un-even aged forest units, selection harvesting was assumed, involving the removal of mature trees – individually or as groups.

Silviculture Assumptions

As already noted, the wood supply scenarios assumed a variety of approaches to silviculture including varying levels of management of replanting and young growth, depending on the harvesting method. Correspondingly, as with the harvesting scenarios, the silviculture scenarios imply a range of direct costs used in the economic analysis (see below) as well as indirect costs.

Approach to the Economic Analysis of DNR Scenarios

It was clear to us from an initial review of the DNR modeling data that a significant degree of complexity was involved in the identification of possible economic impacts of these scenarios.

At the provincial level alone, the scenarios imply substantial changes in management approaches in all types of ownership. Moreover, not all lands are at a 'status quo' level. Some operators (including a major pulp and paper company) already manage their forest lands at substantially less than the '50% clearcut level'. Thus, the potential cost impacts vary widely between operators.

Two of the four alternative scenarios (i.e. reduction in clearcut options) relate to possible reductions by management unit. This is a level of modeling detail for which economic impact data currently do not exist. Early in the assignment, we advised DNR that, in the absence of a provincial wood supply-demand flow schematic and balance, plus annual projections to match the DNR scenarios, it was beyond our scope of work to estimate economic impacts at the management unit level.

Instead, we concentrated our analysis at the provincial level. We also identified the key parameters of the wood supply modeling data which would have the most significant economic impacts. Key items are discussed in the economic analysis section of our report.

Key Harvesting & Silviculture Approaches

Figure 22

Treatment	Code	Description	Management Type
Clearcut Harvest	CC	The removal of an entire forest unit through a single treatment event. This assumes minimum regulatory retention levels.	Even-Aged
Early Competition Control	EC	Control of hardwood competition in regenerating softwood stands by way of herbiciding.	Even-Aged
Plantation	PL	Artificial establishment of a new forest stand of native, genetically improved, or exotic tree species. The scheduling of this activity assumes all competition control and density management is carried out for the targeted survival and free to grow conditions.	Even-Aged
Precommercial Thinning	PT	Density and species control on young over stocked naturally regenerating forests	Even-Aged
Selection Harvest	SH	The removal of mature trees, either as individuals or scattered groups, at relatively short time intervals repeated indefinitely that encourage the continuous establishment of desired species.	Uneven-Aged
Commercial Thinning	CT	Density and species control within well stocked natural or managed stands where by some merchantable fiber is harvested in the process.	Even-Aged
Shelterwood Harvest	SL / OR	Removal of an entire forest unit through a series of treatment events within a relative short time to encourage the establishment of regeneration	Even-Aged

Source: DNR October 2010

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Proposed Changes to Forest Management Practices (continued)

DNR Modeling Results

Results of DNR's scenario modeling are summarized in Figure 23. A key to the scenario codes used by DNR, and discussed earlier, is provided in Figure 20 (repeated above). DNR has estimated the future maximum theoretical harvest under each scenario. Correctly, in our view, DNR also has focused particular attention on the softwood harvest and on the spruce-fir harvest potential. This is a sensible approach from the perspective of our economic analysis because these latter volumes are the drivers of industrial and commercial activity in the forest sector.

Under 'Base Case' assumptions, the maximum theoretical harvest achievable within the province of Nova Scotia, under long run sustainable yield (LRSY) estimates, is **nearly 7.3 million m³ per year**. This is based on DNR's detailed growth and yield calculations for Crown forests, generalized for other ownerships.

This is an aggregate. In fact, on some ownerships and smaller forest areas (e.g. low grade woodlots) growth and yield is lower. Conversely, on some of the more intensively managed lands, with a higher site index, and as a result of higher silvicultural spending, growth and yields are substantially higher.

This is one of the reasons why a 'blanket prescription' for forest management on all forest lands and ownerships would be inappropriate. From an economic analysis perspective, a 'blanket prescription' of this type could cause significant economic hardships where, in fact, bio-management goals could be achieved more readily if a more flexible approach to the CCR50% rule were to be adopted.

Harvest levels for the four CCR50% wood supply scenarios, as shown in the Figure, are discussed later in the economic analysis section. Importantly, although they represent a decline in volume from the 'Base Case', the 'increased silviculture' scenarios provide a potential boost in growth and yield.

A 'blanket prescription' for CCR50% forest management on all forest lands and ownerships would be inappropriate.

**Figure 20
(repeated)**

1. **Base Case Scenario** (essentially the status quo forest practices case)**
2. **Revised Harvest Practices (50% Provincially), Constant Silviculture**
3. Revised Harvest Practices (50% by Management Unit), Constant Silviculture
4. **Revised Harvest Practices (50% Provincially), Increased Silviculture**
5. Revised Harvest Practices (50% by Management Unit), Increased Silviculture

** Note that this is not a status quo land use case, because it assumes completion of the 12% Protected Areas objective

Figure 23

DNR Wood Supply Modeling: Scenario Volume Results

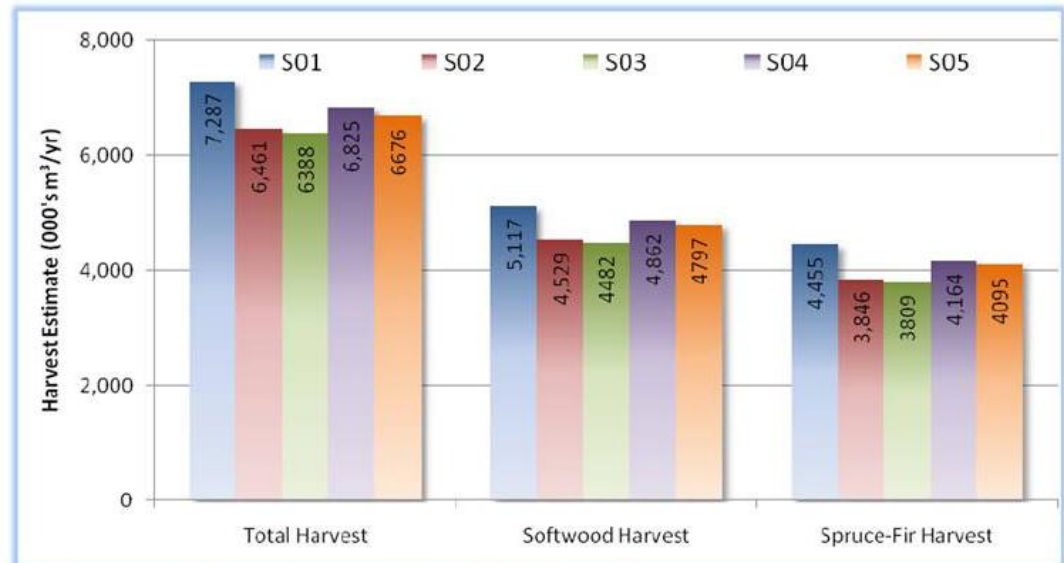


Figure 15. Provincial harvest level estimates by wood supply scenario.

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

In sharp contrast to DNR's valid, but theoretical, merchantable volumes, our 'commercial viability' analysis indicates that significant areas of Nova Scotia's forests will become inoperable under CCR50%.

Economic Evaluation of Results of DNR Wood Supply Scenario Modeling

Potential Decline in Operability is a Key Financial Issue

Among the key primary variables that would have significant economic impacts are (1) harvest volume per hectare (2) initial costs associated with these harvesting approaches and (3) future management of harvested lands, including management and silvicultural costs, but also including costs associated with future operability.

Volume harvested per hectare, and the costs related to this, are primary drivers of the forest economy. DNR's calculations of merchantable volumes are theoretical maximums. They do not take into account variables, such as market demand and prices for forest products, which define the financial viability involved for operators to harvest the forests at any given period of time. Nor do they take into account the operability of specific stands relating to the reduction of merchantable volumes which can be extracted in commercial harvesting.

We carried out an analysis of the possible decline in merchantable volumes, based on a 'CCR50%' (i.e. reduction to 50% in the amount harvested by the clearcut method). It should be noted that a clearer definition of what this means is required. The details are critical to the economic analysis. It also should be noted that a volume definition is not necessarily identical to an area definition.

Our analysis shows that a significant fall-down in volumes harvested is likely to occur on forestlands identified for harvesting under the Government's policy plan. Clearly, additional areas would have to be harvested in order to produce the same outcome as a volume target. Not all forest lands are identical (e.g. species, maturity, mix of softwoods/hardwoods, mix of sawlogs/pulplogs/biomass). Correspondingly, as the *Policy Framework* is elaborated and detailed, the implied increase in annual harvesting **area** will have to be determined.

Importantly too, harvestable **volumes** (under the various mixes of harvesting practices and ownerships) will have to be determined. Each detail of these scenarios has a cost element.

In order to approximate the costs involved, we examined DNR's merchantable volume assumptions (see example, Figure 24), and adjusted these for operability based on volume likely to be extracted.

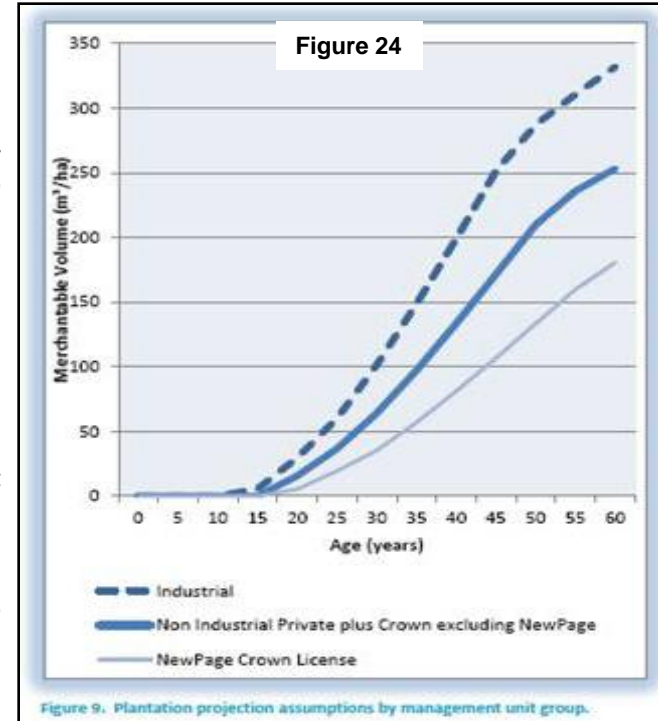
Our conclusion is that in sharp contrast to DNR's valid, but theoretical, calculation of merchantable volumes (i.e. they are valid estimates within the parameters assumed), our 'commercial viability' analysis indicates that significant areas of Nova Scotia's forests are likely to become inoperable under CCR50%.

Based on assumptions of rising product prices, we estimate that an additional, perhaps significant (depending on future wood prices) areas of mature inventory will become operable at certain times of each future market cycle. However decreased harvest volumes per unit area, and a related rise in unit harvest costs involved, attributable to CCR50% management approaches, is likely to make these areas operable only on a 'swing' volume basis.

Importantly, however, there are many other forest areas and ownerships on which, through various potential mitigation approaches, increased costs attributable to CCR50% can be partially or fully offset.

Other areas of mature inventory will become operable, but the increased harvesting and management costs involved will make these areas operable only on a 'swing' volume basis.

There are many areas and ownerships on which, through various possible mitigation approaches, increased costs attributable to CCR50% can be partially or fully offset.



5.

Precedents

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

5. Precedents

It is beyond the scope of this report to comment on the relative merits and/or demerits of reductions in clearcut harvesting. From an economic analysis perspective, however, it is important to note that several jurisdictions have proceeded in this policy direction. Two examples are the State of Maine (with a broadly similar forest type as Nova Scotia) and the BC Coast region. Assessment of the outcomes of these forest management shifts also is beyond the scope of our report, but identifying any readily apparent economic impacts is of interest to this report.

The State of Maine reduced its level of clearcutting in its annual harvest from around 45% in the late-1980s to 11% - within five years (Figure 25). There were subsequent reductions, to a low level. Today, Maine clearcuts only around 4% of its annual harvest volume. On the BC Coast region, the levels and average size of clearcuts were reduced substantially during the early 1990s. Anecdotal evidence suggest that reductions in clearcutting affect the harvesting of sawlogs differently from those of pulplog (and biomass) harvesting. With selection logging, fewer sawlog quality stems tend to be extracted – and the focus is on higher quality stems. Heli-logging on the BC Coast for example, focuses on the extraction of higher valued cedar and Douglas fir. Lower valued hemlock sawlogs frequently are left standing. In Maine, the softwood sawmilling industry's experience with the virtual ban on clearcuts appears to have contributed to a long term decline (Figure 26) in softwood lumber production. This is in spite of favourable lumber demand and price conditions for most of this period. In contrast, pulpwood harvesting remains buoyant, although Maine is a net importer of pulpwood fibre. A more rigorous comparative analysis, however, would be needed before firm conclusions can be drawn with respect to the policy changes being considered for Nova Scotia.

Figure 25

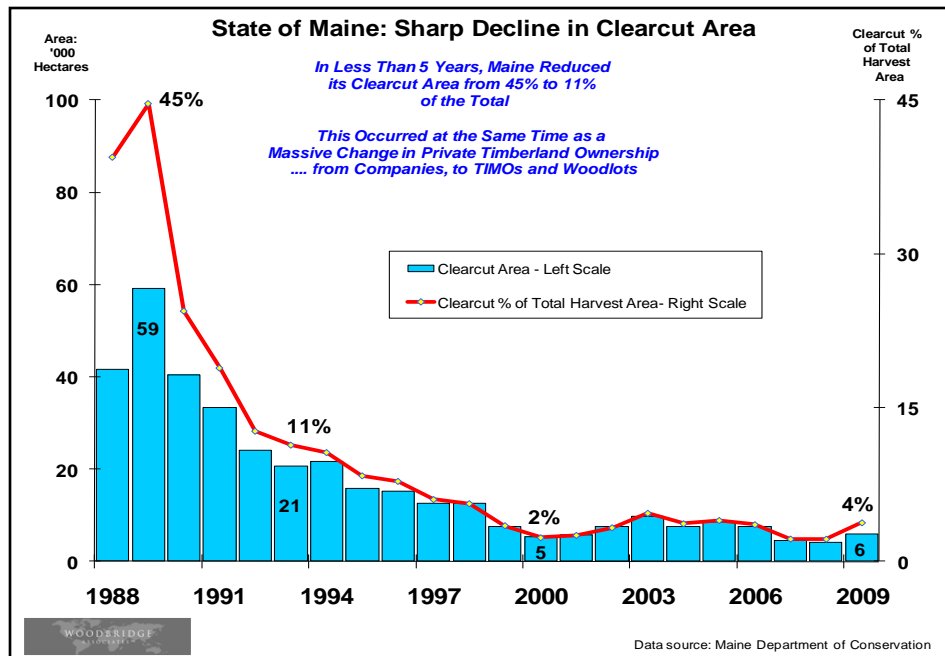
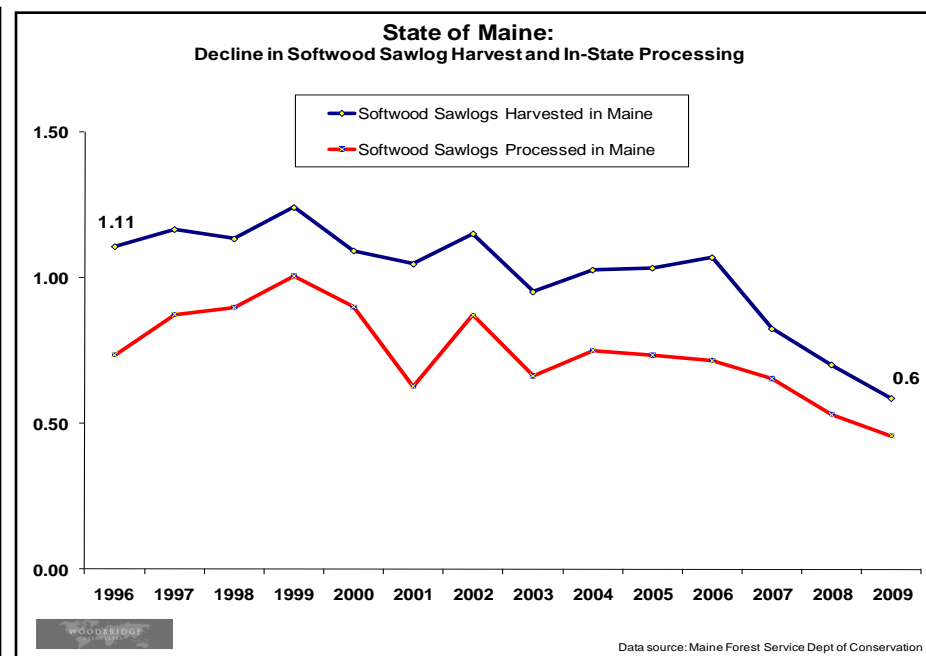


Figure 26



6.

Identification and Estimation of Economic Impacts

6. Identification and Estimation of Economic Impacts of CCR50%

Identification of Possible Impact Categories

Adoption of a CCR50% policy by Nova Scotia, applied to all forest lands and ownerships, could have a wide range of potential economic impacts – some negative and some positive. One set of these, the wider economic impacts throughout the provincial economy (Figure 27), would involve a 'ripple effect' of the policy's direct impacts. In this report, we have focused our attention on the direct impacts. But we recognize that other impacts would be likely. Among these would be important 'signals' sent to the global investment community – which we have not assessed. Most likely, these signals would depend on how the province's forest products industry is able to respond to the proposed policy moves, and what levels of cost mitigation can be achieved. The world of investment is dynamic. Other regions are shifting in competitiveness (plus or minus) compared with Nova Scotia. From an investment perspective, it would come down to how the region moves on the global cost curve.

Identification of Direct Impacts

Implementation of the CCR50% policy could have direct impacts on the following categories of activities and sub-sectors of Nova Scotia's forest economy. The list is representative only. Calculations are provided later.

1. Woods Operations

1.1. Immediate Impacts Upon Implementation

- Reduction in volume per area harvested (m³/ha)
- Increase in wood costs based on this reduction
- Increase in harvesting costs based on expansion of the annual harvesting area.
- Loss of merchantable timber areas due to decline in operability.
- Loss of income by logging contractors and other direct service providers, relating to the above.
- Loss of ability to trade logs and fibre to others.

1.2 Longer Term Impacts

- Possible benefits in average stem size available from selection harvested stands.

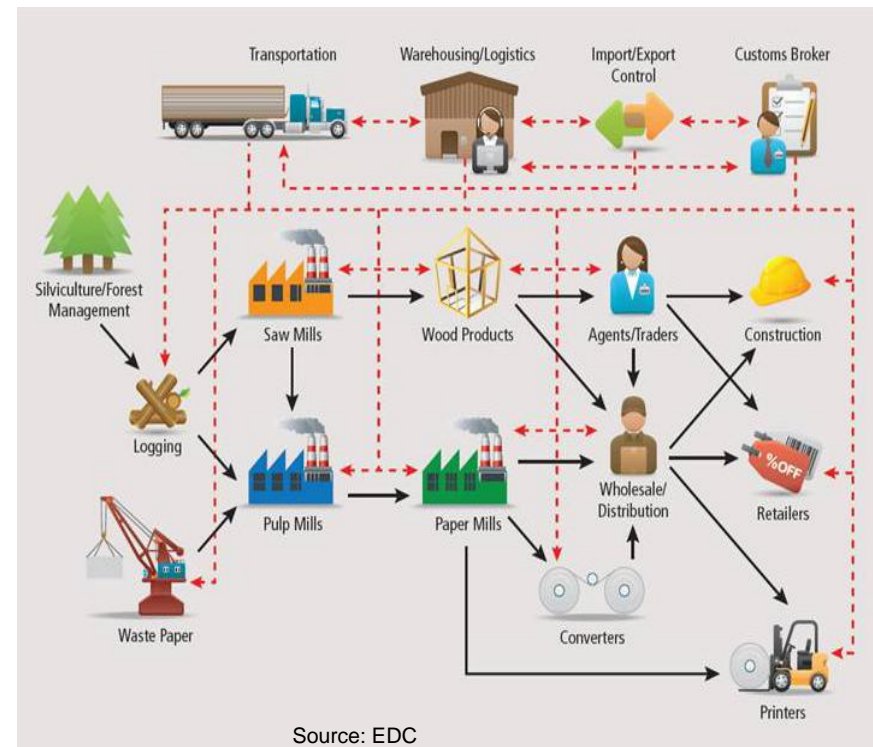
2. Manufacturing Operations

- Impacts of higher delivered **prices** for chips and roundwood received from woods operations and fibre swaps
- Impacts of **volume** of wood available
- Cost and volume impacts on integrated 'fibre supply partners'
- Impacts on mills'/plants' viability

3. Timber Ownerships

- Non-transferable (i.e. absorbable) cost impacts, and volume impacts, on the various timber ownerships.
- Cost and volume impacts of the need to import more fibre/logs.
- Stumpage values (Crown and private timberlands)

**Figure 27
Schematic of Possible Impact Areas of CCR50%**



Source: EDC

Integration of forest industry operations allows operating firms to achieve substantial economic synergies, and maintain a critical mass which minimizes unit production costs for all participants. Integration can be purely functional, without any shared ownership being involved. In fact, this has always been the model in Nova Scotia and in most parts of North America.

Identification and Estimation of Economic Impacts of CCR50%

Economic Impacts: The Importance of Critical Mass in Nova Scotia's Forest Sector

'Critical mass' refers to the close inter-relationships which exist between various forest enterprises in a forest economy which, if working well, develop a self-sustaining momentum and allow synergies to exist - which, in turn, provide cost reductions and a competitive advantage to the region.

In the past, this has been achieved in most forest economies through integration of each sector with the others. For instance, the existence of a healthy, prospering sawmilling sector results in benefits for loggers – who can harvest more profitable sawlogs along with typically less-profitable pulpwood. In turn, a high level of activity within sawmills, producing lumber, also yields about 50% of residual sawmill whitewood chips from each sawlog. This provides raw materials to pulp and paper mills which prefer these sources of chips because they are cheaper to produce than chipping pulpwood logs. Hog fuel is used to fire boilers and reduce the need for purchased power. Fibreboard plants use low grade logs which are unsuitable solid sawn products. Log home producers can bid the highest prices for premium logs.

Also in turn, private forestland owners who own pulp and paper mills may provide sawlogs to sawmills in trade for chips. Woodlot owners, working together to consolidate volumes of sawlogs and pulplogs, can generate external economies to mutual benefit – and make small harvest volumes viable for pick-up by logging truck operators and haulers. Again, these primary activities generate enough scale to justify the existence of machine shops for out-sourced equipment repairs, new equipment vendors and a wide variety of suppliers. Vessels call in ports when adequate volumes are available for shipment. Otherwise, they by-pass these locations.

Some analysts have characterized these activities as a tightly-knit "spider's web" in which an 'event' on one part of the web is felt in every single strand. In a forest economy which is working well, these synergies, and the critical mass afforded by comparatively high rates of capacity utilization, significantly reduce operating costs for each of the forest enterprises involved – compared with what would be the case for a stand-alone non-integrated operation. It also should be noted that 'integration' can be purely functional, without any shared ownership being involved. In fact, this has always been the model in Nova Scotia and in most parts of North America.

Current Status

There is ample evidence that, within certain key parts of Nova Scotia's forest economy, critical mass at the present time is below the levels normally considered to be healthy. For instance, the province's sawmilling sector is operating at or below the 50% capacity utilization level (even when adjustments are made for mills that are permanently closed). The province's largest lumber mill (McTara) has closed, and is in mothballs. The analysis in Section 2 provides the details. Correspondingly, the province's logging sector also is working well below capacity. Worse still, there are serious doubts that this sector has the ability to recover in the short term – and perhaps even longer. Section 2 provides details.

Activity levels (i.e. production) in Nova Scotia's pulp and paper sector (notably market pulp) currently is buoyant. Provincial timber harvesting levels are well below past and "normal" levels (Sections 2 and 3) and mean that the usual flow of fibre is severely constrained. Supply-constrained stoppages have occurred. The importation of high costs fibre supply from New Brunswick and elsewhere has been necessary – raising imports to the equivalent of 8% of the Nova Scotia's harvest in 2010. In the timber harvesting sector, a long term trend of "disengagement" by private woodlot owners has occurred and, if unchecked, seems likely to continue. It is estimated that, by 2010, **the 'participation rate' of formerly active woodlot owners in commercial harvesting activities has declined to 64% of its 1995-97 level** (Section 3).

A 'current status' assessment of the critical mass of Nova Scotia's forest sector also has to recognize the precarious financial situation of several of the largest pulp & paper firms in the province. As we point out in later sections, we believe that these enterprises are at a stabilization stage. Longer term, with the right operating and investment conditions, they can return we believe to a sustainable competitive global position. In the meantime, Abitibi-Bowater is just emerging from Chapter 11 and NewPage has excessive debt, and low debt servicing ability. On December 8th 2010, it announced the closure of its Wisconsin coated paper mill.

Overall, we believe that the sector is able to rebuild its critical mass – but this will take time. Further loss of critical mass could result in the closure of major enterprises and could exacerbate incremental costs associated with CCR50% -- resulting in a downward spiral. However, several crucial mitigation options exist (Section 7).

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Identification and Estimation of Economic Impacts of CCR50%

DNR Volume Scenarios

The DNR maximum theoretical annual harvest level projections presented earlier are shown, in a different format, in Figure 28 for the total provincial harvest. It should be noted that the 'Base Case' total harvest level of nearly 7.3 million m³ exceeds the historical peak harvest level of 6.9 million m³ reached in 2004. Detailed analyses by DNR show, however, that the detailed components of the two totals are not identical. They differ in important respects such as the proportion of softwood harvest vs. hardwoods; sawlogs vs. pulpwood.

There should be no surprise here, because forests and forest growth are dynamic. The detailed nature of the mature inventory varies over time, as do the various components of each age-class distribution, by location. Moreover, there are differences in the relative proportions of un-even aged mature inventory vs. even-aged between the 2004 peak harvest volume and the 'Base Case' projected volume. Simply put, the various components of the 'Base Case' projected harvest volumes will not be identical to the historical peak harvest in 2004. This has important implications for (a) harvesting (b) harvesting costs and (c) forest enterprises which process this timber.

Definitions

For the purposes of this report, we use the terms 'projected theoretical annual harvest level' and 'annual allowable cut ('AAC')' synonymously. They are not necessarily the same thing. The AAC for a province, region and/or licensee in most parts of Canada refers to a volume-based permissible harvest level on regulated (i.e. Crown) lands. Area-based licenses typically have a different basis of calculation.

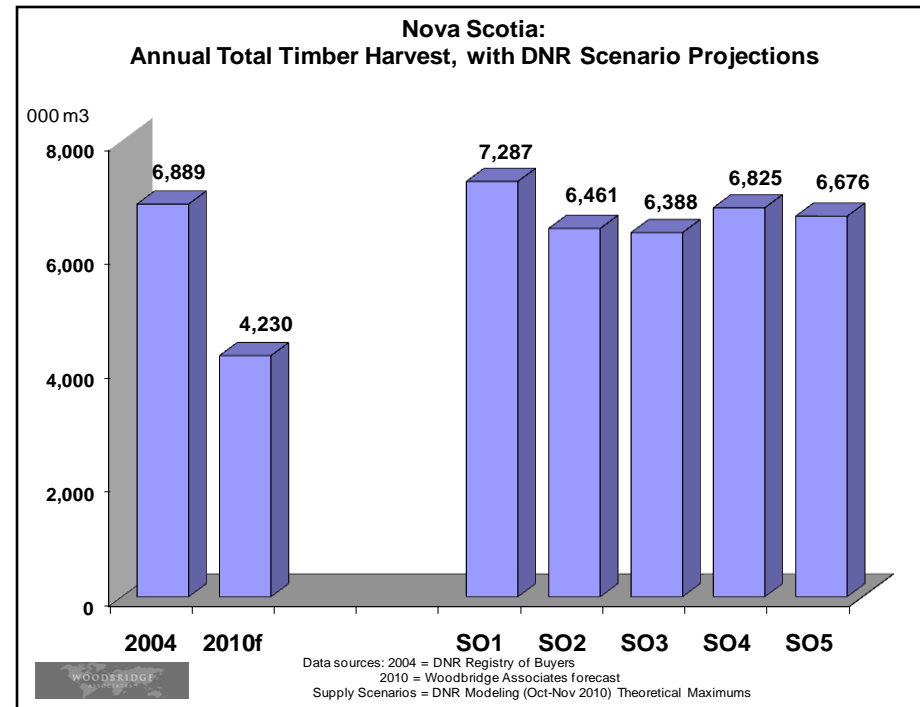
It is not clear, from the 'Principles' announced as part of the *Natural Resources Strategy* development (Section 4) if privately owned lands will be subject to a regulated AAC. For the purpose of this report, we assume that AACs, as indicated by the DNR's wood supply modeling, are province-wide throughout all ownerships.

Projected AACs

Figure 23 shows that the 'Base Case' AAC implies a harvest volume increase of 398,000 m³ compared with the 2004 peak harvest – or a 6% increase. With constant silviculture, Scenarios SO2 and SO3 indicate a volume decline of 6% and 7% for the provincial total and management units total, respectively. With increased silviculture, Scenarios SO4 and SO5 indicate a volume decline of 1% and 3% respectively.

Compared with our forecast for the 2010 total provincial harvest of 4.2 million m³, each of the DNR scenarios indicates a substantial potential recovery in supply. Analysis of DNR's projections of (1) the softwood harvest and (2) the spruce-fir harvest are provided on the next page.

Figure 28



Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Identification and Estimation of Economic Impacts of CCR50%

Under CCR50% projections, Nova Scotia's softwood harvest would decline by ~25% compared with previous peak harvest levels. Even without CCR50%, they will decline by 15%

Projected AACs: Softwood Volume

At first glance, DNR's total harvest volume projections, shown on the previous page, indicate favourable prospective AAC for the industry in the 'Base Case', but less favourable AACs under the CCR50% assumptions, compared with historical peak levels of operation in 2004 (when harvesting was increased due to hurricane impacts).

When the softwood harvest alone is considered, however, the volume implications become significantly less favourable for the industry (Figure 29). In the 'Base Case' (i.e. 'status quo'), the projections indicate a 15% decline in Nova Scotia's softwood AAC compared with the 2004 peak. Under CCR50% scenarios, the volume decline is projected to be substantially greater. With constant silviculture, the softwood harvest would decline by 24% provincially and by 25% on a Management Unit basis. Increased silviculture would do little to improve this dramatic decline, but could supplement supply when the spruce-fir harvest outlook under CCR50% is considered.

In its modeling, DNR correctly has identified the spruce-fir component of the mix as being crucial to commercial activities in the province. Historical data for the spruce-fir harvest volume are not available, but we estimate it as being in excess of 90% of the softwood mix at peak times of lumber production. DNR projections (Figure 30) indicate that the spruce-fir component of the softwood mix will be 85%-87% of the total under each of the CCR50% scenarios. The implications are considered on the next pages.

Figure 29

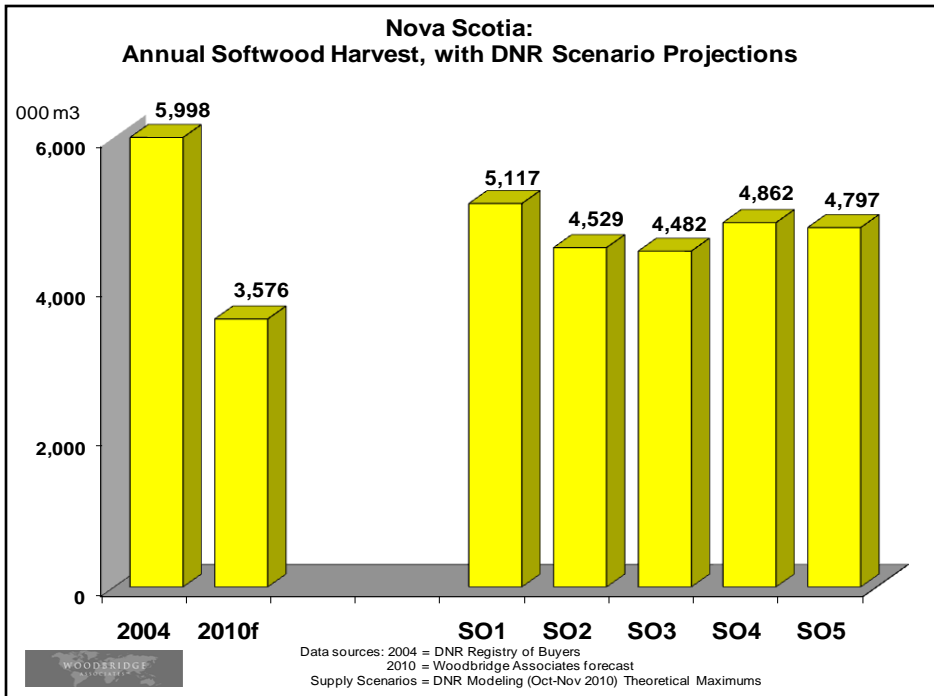
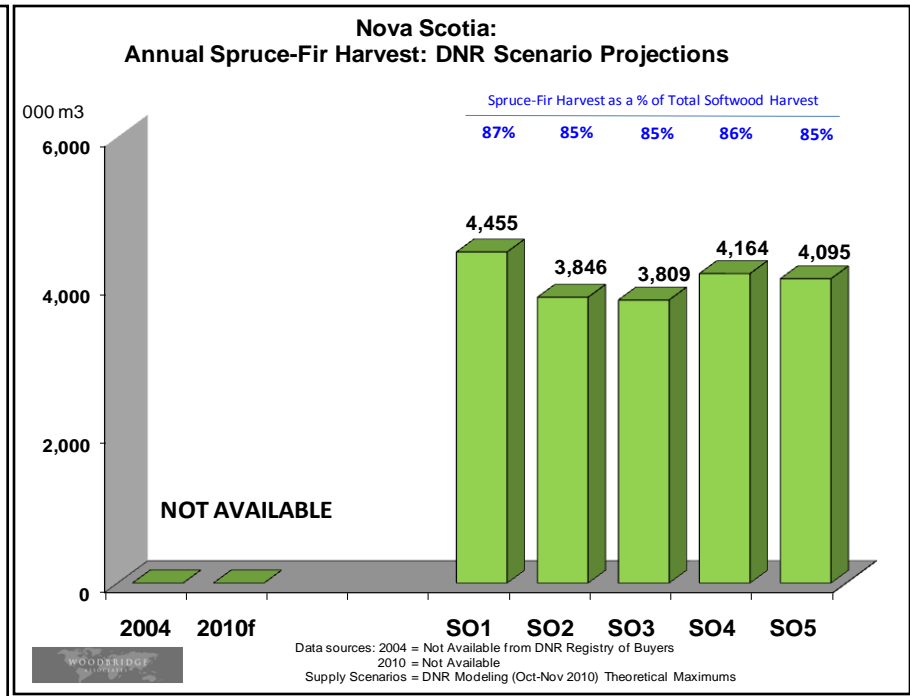


Figure 30



Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Identification and Estimation of Economic Impacts of CCR50%

Nova Scotia's Rising Hardwood Harvest Volume

For generations, Nova Scotia's forest economy has been driven by the harvesting and utilization of softwood species – primarily spruce and fir. As noted on the previous page, declines of 15% to 25% are projected in the softwood AAC. In fact, hardwood species have accounted for a rising share of the total harvest (Figures 31 and 32). Two peaks have occurred in the hardwood harvest volume to date – in 2003/04 and in 2009/10. At both times, hardwoods were around 14%-15% of the province's total harvest.

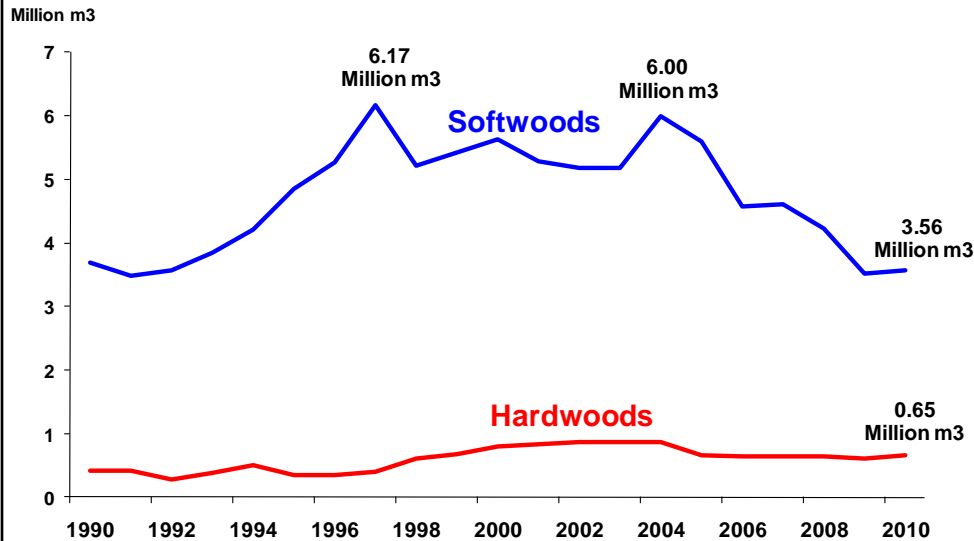
DNR's modeling projections show a substantial increase in the hardwood harvest provincially, and by management unit (Table 2). The outcome is the same, in percentage terms, under the 'Base Case' as well as the four CCR50% scenarios. In the 'Base Case' and CCR50% constant silviculture projections, DNR estimates that 30% of the total harvest will be hardwoods – compared with 15% at present. Increased silviculture spending would do little to change this outlook.

Table 2

	2004	2010	SO1	SO2	SO3	SO4	SO5
Volume 000 M3	861	654	2170	1932	1906	1963	1879
% of Total NS Harvest	13%	15%	30%	30%	30%	29%	28%

Nova Scotia's Total Annual Harvest
- Showing Softwoods and Hardwoods Volume

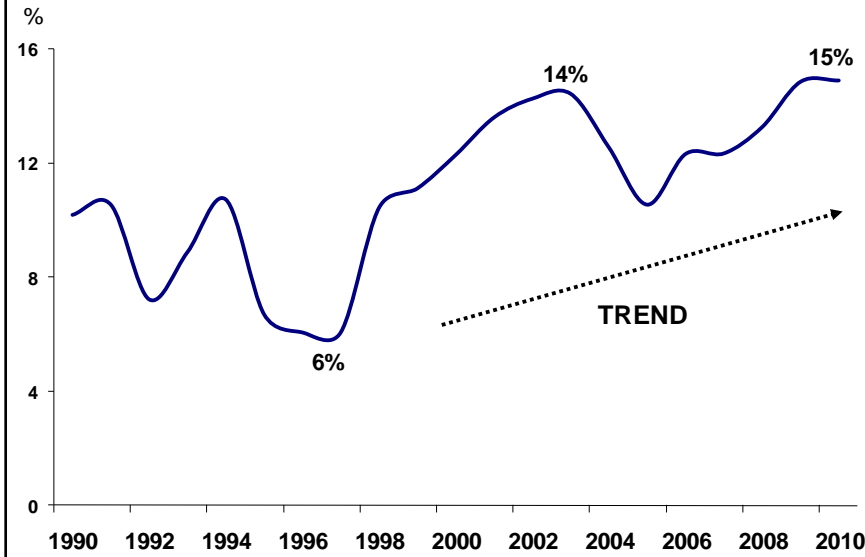
Figure 31



Data sources: National Forestry Database; DNR RoB; Woodbridge Associates

Figure 32

Nova Scotia:
Hardwoods Are a Rising Part of the Province's Total Harvest



Data sources: National Forestry Database; DNR RoB; Woodbridge Associates

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Regardless of whether the province proceeds under the status quo ('Base Case'), or under a CCR50% policy (i.e. a policy of clearcut reductions), the sector's reliance on a much higher volume and proportion of hardwoods is inevitable.

Identification and Estimation of Economic Impacts of CCR50%

Implications of Nova Scotia's Declining Softwood Harvest

The significant shift to a higher percentage of hardwoods predicted under the 'Base Case' and CCR50% projections is almost identical. In other words, regardless of whether the province proceeds under the status quo ('Base Case') or under a CCR50% policy (i.e. a policy of clearcut reductions), the industry's reliance on a much higher volume and proportion of hardwoods is inevitable. This is due to the growing stock and maturing inventory. It is not driven by, or affected by, the proposed policy changes under the 'Principles' of the emerging *Natural Resources Strategy*.

The significant shift towards hardwood utilization already underway in Nova Scotia is driven by the growing stock and maturing inventory -- not by proposed policy changes under the 'Principles' of the emerging Natural Resources Strategy.

Impacts on Nova Scotia's Softwood Lumber Industry

As noted in Section 1, a significant part of the total output value of Nova Scotia's forest products manufacturing sector is derived from the province's wood products industry. When markets and prices were far more buoyant than they are today for softwood lumber, and when other wood products were enjoying success, this sector accounted for 44% of the forest industry's total value of shipments. Even during the dark days of 2009, with extremely low demand and prices, the wood products sector contributed 39% of the Nova Scotia industry's total value of output.

Much of this value is driven by the legacy of the substantial build-up of softwood lumber capacity during the 1990s. Within the projections of declining provincial supplies of softwoods, notably under CCR50% policies, there is an expectation of an even sharper decline in the availability of economically-accessible merchantable sawlogs. Simply put, the province's sawmilling industry faces an increasingly tough future – in terms of gaining access to adequate supplies of softwood sawlogs.

Quite apart from any policy measures implemented under CCR50% initiatives, Nova Scotia's softwood sawmilling industry faces a future of rising sawlog costs. Under CCR50% policies, and without mitigation, the pace of rising sawlog costs will accelerate. This is likely to impact independent sawmillers and Crown-timber dependent sawmillers more negatively than those who have ownership of private timberlands with a growing stock containing merchantable sawlogs.

Later in this section, when we discuss the potential economic impacts of CCR50% policies (without and with mitigation measures), we note that Nova Scotia's softwood sawmilling industry faces a future of rising sawlog costs. Quite apart from any policy measures implemented under CCR50% initiatives, Nova Scotia's softwood sawmilling industry faces a future of rising sawlog costs. Under CCR50% policies, and without mitigation, the pace of rising sawlog costs will accelerate. This is likely to impact independent sawmillers and Crown-timber dependent sawmillers more negatively than those who have ownership of private industrial timberlands with a growing stock containing a higher proportion of merchantable (and often homogeneous, even-aged, sawlogs).

Our concern about this outlook is that 'blanket' CCR50% policies could force operators to adopt high-grading (selective logging) practices in order to extract merchantable sawlogs from forest regions and stands that would become 'low operability' lands under this policy. In contrast, what the CCR50% policy desires to achieve is an enhancement of the forest in question. As a bone fide silvicultural practice, selection logging (vs. selective logging) seeks to enhance the quality of the remaining growing stock in un-even aged forests. Relegating even some un-even aged forested areas to marginal productivity in terms of operability forces operators either to by-pass these lands or to log them selectively.

Impacts on Nova Scotia's Pulp & Paper Industry

The bulk of hardwood timber volume harvested in Nova Scotia today (principally chipped pulplogs) is low quality wood consumed for export chips (**Great Northern**), fuel pellets (**Englina**) and hardboard production (**Louisiana Pacific**). Even though most of Nova Scotia's hardwoods are cheaper sources of fibre than its softwood, only limited volumes are used in pulp and paper manufacturing. Paper mills (notably **NewPage**) potentially have a higher appetite, and/or market-driven tolerance, for hardwoods than does the province's NBSK pulp mill. Hardwoods (short fibres) improve the printability of the paper but softwoods (long fibres) provide the strength needed to run the paper on high-speed paper machines and presses. NewPage, which has a Crown license, apparently has increased its use of hardwoods in its paper furnish. It has been adding NBSK pulp for strength reinforcement. The province's NBSK pulp historically can 'tolerate' about 5% hardwoods (and take advantage of the lower cost of softwoods in order to reduce its weighted average wood costs) without adulterating the quality of its product. However, future tolerances of hardwoods, to reduce wood costs, are hard to predict.

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Identification and Estimation of Economic Impacts of CCR50%

What needed to be determined (and were addressed in this report), for all key expense items, were the increases in costs involved specifically attributable to the CCR50% policy.

Impacts on Nova Scotia's Pulp & Paper Industry (continued)

With a declining (rather than a recovering) softwood sawmilling industry in Nova Scotia, there would be fewer softwood residual whitewood chips available for pulpmaking (especially at the province's NBSK pulpmill) and declining volumes of brownwood residuals (i.e. hogfuel) needed for bio-fuel and green electricity production. Under this scenario, the critical mass of the sector would deteriorate further. As noted, at pulpmills, this would force greater reliance on hardwoods (with uncertain results).

The inevitable decline in Nova Scotia's softwood timber harvest, demonstrated in the projections and most notable in softwood sawlogs, is a crucial policy issue that will determine the future of Nova Scotia's solid wood products industry – notably the sawmilling sector.

In the industry's energy-generating sector we believe, however, that the province's growing and prosperous wood pellet industry would be able to cope well with a further shift to hardwood whitewood residuals and some increase in the use of brownwood residuals. Power boilers (CHP) linked to the province's pulp and paper mills would feel the financial strain of declining supplies of brownwood residuals as Nova Scotia's softwood sawmilling industry downsizes. The province's hardboard mill is likely to be a beneficiary of the rising hardwood harvest volume, but it should be noted that its products have become virtually a 'specialty' niche item in the non-structural panelboard business. We are not certain that LP has much volume growth potential at this mill. Clearly, however, the intricacy and 'critical mass' connectedness of these issues – and the integrated nature of much of the industry – point to the need to avoid 'blanket' application of CCR50% implementation. Rather, it should incorporate elements of flexibility in order (a) to optimize the ecological outcomes desired under CCR50% policy and (b) facilitate the effectiveness of mitigation measures on different operations.

Cost Impacts of CCR50%

In our cost impact analysis, we differentiate between cost changes that would occur anyway – regardless of implementation of the CCR50% policy – and those which can be attributed to CCR50%. For example, we have pointed out that we believe softwood sawlog costs will rise, even under the 'Base Case' status quo. What needs to be determined for this, and several other key expense items, is the **increase in costs involved which would be attributable to implementation of the CCR50% policy.**

Benchmark cost data for operating firms were obtained from a number of sources. In order to provide data for Nova Scotia, rather than generalized regional data, firms were surveyed and asked to complete a confidential questionnaire about their operations and operating costs. This was voluntary, and firms (who were concerned about potential disclosure of data affecting their competitive positioning) were assured of confidentiality. In the event, the response rate from the industry was very high and firms cooperated fully with the initiative. In order to avoid disclosure of confidential information, the benchmark data were expressed on an indexed basis (i.e. 2010 =100) rather than in absolute dollars.

In addition to identifying future cost increases attributable to the CCR50% initiative, based on operating and market assumptions described later, we also identified how these costs could be mitigated through a variety of measures. For example, we assessed whether some of the incremental costs attributable to CCR50% could be "offset" by, for example, rising product prices. The full methodology used is described later. As a result, we projected two sets of costs attributable to implementing the CCR50% initiative. These are:

1. Incremental costs 'without mitigation'
2. Incremental costs 'with mitigation'

In the following pages, we present these cost impact assessments in parallel. In Section 7, we describe in greater depth what the mitigation measure could be, and how they would benefit the situation by improving (a) operating costs and conditions for industry firms (b) revenues and incomes for industry stakeholders (e.g. higher incomes and stumpage values for private woodlot owners and (c) the Province of Nova Scotia (including rising levels of stumpage payments by the industry for Crown timber).

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Identification and Estimation of Economic Impacts of CCR50%

Cost Impacts: Harvest Outlook

Clearly, one of the major considerations of any cost increases attributable to CCR50%, and its wider economic impacts, is how the CCR50% would impact on the future volume and components of Nova Scotia's timber harvest. It already has been noted, from the DNR modeling, that the province's softwood lumber harvest, for example, is likely to decline by around 15% from its previous peak level. DNR modeling calculations also show that, under CCR50% policies, this decline would rise to around a 25% softwood harvest decline. Thus, arithmetically at least the 'incremental cost' of CCR50% would be an additional 10 percentage points (10%) decline in the timber supply. Not all forests are equal. The 15% volume decline and the 25% volume decline affect different forests and different locations. This affects the management unit analysis. The '25% decline impacts' could have very different (and more serious) impacts on forestland owners, mills and plants in specific parts of the province, compared with the '15% decline impacts'. It very much depends of the nature of the reductions, and where these would occur – in terms of location within Nova Scotia.

Another consideration regarding the harvest outlook concerns the nature of the DNR modeling calculations. The DNR timber harvest projections are theoretical maximums based on modeling of the long run sustainable harvest volumes under varying assumptions.

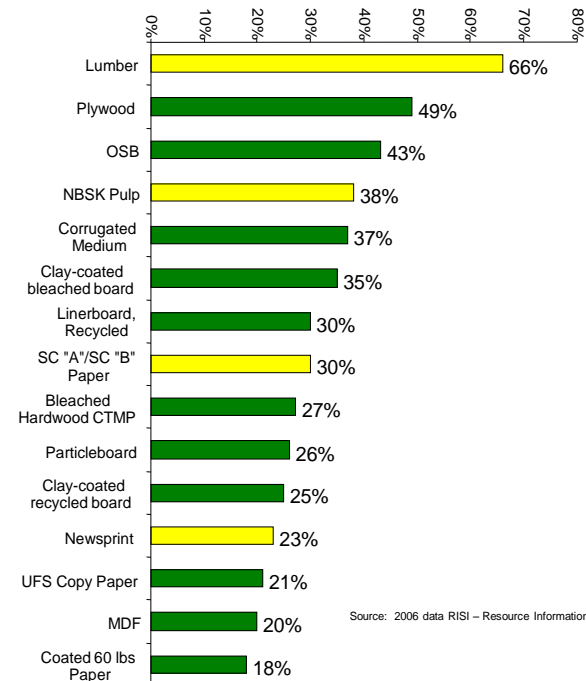
As theoretical maximums, they do not seek to predict what the actual harvest will be. This will depend on a variety of factors but, primarily, will be driven by forces including (1) market factors (2) processing capacity utilization levels at mills and plants and (3) government regulations (notably the province's *Code of Forest Practices* and the details of the emerging *Natural Resources Strategy*).

Forest products vary in their degree of sensitivity to fibre cost changes. Figure 33 provides a representative comparison for some major products. Those produced in Nova Scotia are highlighted. Lumber production, for example, is very sensitive to wood costs which typically can account for around 66% of mill gate operating costs. NBSK pulp wood costs are around 38% of the total. Publication papers (SCA/SCB and newsprint) are very sensitive to electricity costs (a function of the TMP pulping process). Wood costs for this group are around 23% to 30% of total costs.

The significance of these observations is that the juxtaposition of (a) producing mills' costs in Nova Scotia to (b) market demand and product prices help define what the actual timber harvest will be in the future. Simply put, if costs are too high, companies will cease to produce and the harvest level will decline accordingly. Other operators may absorb some of the 'falldown' in fibre demand. In this report, we have defined various predicted harvest levels (vs. DNR theoretical maximums) based on these factors.

Fiber as Percentage of Mill Gate Operating Cost, By Product

Figure 33



Source: 2006 data RISI – Resource Information Systems Inc., CIBC World Markets Corp.

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Identification and Estimation of Economic Impacts of CCR50%

Cost Impacts: Key Operating Cost Categories

The economic impacts of CCR50% would have long-lasting and permanent economic impacts, for both the 'without mitigation and 'with mitigation' cases. For the purposes of presenting our assessment of these impacts, our cost projections are shown for four 'blocks' of time periods. They are:

- 2010** = Benchmark Year
- 2011 to 2015** = 1st 5-year projection period. Cost data are annual averages for this period.
- 2016-2020** = 2nd 5-year projection period. Cost data are annual averages for this period.
- 2021 Onwards** = The longer term outlook

Nova Scotia: Pulp and Paper Industry

Key components of cost increases are shown in Table 3 and 4, for the 'without' and 'with' mitigation cases respectively. Principal assumptions are discussed on the next several pages. All data are indexed averages (which provide the percentage changes referred to in our analyses below).

Table 3

**Nova Scotia Pulpmills: Net Impacts of CCR50% on Operating Costs
Without Mitigation Measures**

Notes	Operating Cost Category	2010 benchmark	2011 to 2015 annual average	2016 to 2020 annual average	2021 annual average
a.	Harvesting Costs at roadside (sawlogs)	100	110	135	145
b.	Inbound Freight (from sawmills: fuel only)	100	110	110	110
c.	Wood costs at pulpmill - 'within NS' sources	100	110	130	138
d.	Wood costs at pulpmill - 'Imports'	100	130	160	175
	AVERAGE WOOD COSTS	100	114	138	147

Dollar data indexed to 2010=100

- Notes:
- a. Includes incremental costs for: forest management planning; woods operating management; forestry crews/woods operations labour; stumpage/stumpage equivalent; roads; capital costs of equipment amortized; operator training; loss of yield; silviculture expense; incremental silviculture (where appropriate).
 - b. Fuel cost increment only.
 - c. Based on sawmill and wood product plant residuals (whitewood chips; sawdust; shavings) and chipped roundwood from pulplogs
 - d. Primarily whitewood chips imported from other provinces & states.

Table 4

**Nova Scotia Pulpmills: Net Impacts of CCR50% on Operating Costs
WITH Mitigation Measures**

Notes	Operating Cost Category	2010 benchmark	2011 to 2015 annual average	2016 to 2020 annual average	2021 annual average
a.	Harvesting Costs at roadside (sawlogs)	100	109	119	122
b.	Inbound Freight (from sawmills: fuel only)	100	110	110	110
c.	Wood costs at pulpmill - 'within NS' sources	100	110	114	115
d.	Wood costs at pulpmill - 'Imports'	100	130	160	175
	AVERAGE WOOD COSTS	100	112	116	115

Dollar data indexed to 2010=100

- Notes:
- a. Includes incremental costs for: forest management planning; woods operating management; forestry crews/woods operations labour; stumpage/stumpage equivalent; roads; capital costs of equipment amortized; operator training; loss of yield; silviculture expense; incremental silviculture (where appropriate).
 - b. Fuel cost increment only.
 - c. Based on sawmill and wood product plant residuals (whitewood chips; sawdust; shavings) and chipped roundwood from pulplogs
 - d. Primarily whitewood chips imported from other provinces & states.

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Identification and Estimation of Economic Impacts of CCR50%

Cost Impacts: Key Operating Cost Categories

Nova Scotia: Sawmilling Industry

Key components of cost increases at Nova Scotia sawmills are shown in Table 5 and 6, for the 'without' and 'with' mitigation cases respectively. Principal assumptions are discussed on the next several pages. All data are indexed averages (which provide the percentage changes referred to in our analyses below).

Wood Costs: Without Mitigation

Wood costs for pulp mills (previous page) in the province are driven by the volume and price of chip received from sawmills plus the volume and cost of chips received from the mills' own chipping facilities or from outsourced chip mills. In addition, the average price is influenced by the volume and price of chips and pulpwood received from 'import' sources. For domestic supplies of sawmill chips, the pulp & paper industry has an influence over these costs – because many sawlogs are sold to sawmills (from pulp and paper companies' private timberlands) on a 'trade' basis involving a ratio of sawlogs for chips. Other sawmill sawlog sources include Crown and woodlots.

Table 5

Table 6

**Nova Scotia Sawmills: Net Impacts of CCR50% on Operating Costs
Without Mitigation Measures**

Notes	Operating Cost Category	2010 benchmark	2011 to 2015 annual average	2016 to 2020 annual average	2021 annual average
a.	Harvesting Costs at roadside (sawlogs)	100	110	135	145
b.	Deduct Chip Revenue (Net of Freight)	100	110	110	110
c.	Wood Costs at Sawmill - with NS chip income	100	107	122	130
d.	Wood Costs at Sawmill - With mix of NS and export market chip income	100	110	135	145

Dollar data indexed to 2010=100

- Notes:
- Includes incremental costs for: forest management planning; woods operating management; forestry crews/woods operations labour; stumpage/stumpage equivalent; roads; capital costs of equipment amortized; operator training; loss of yield; silviculture expense; incremental silviculture (where appropriate).
 - Chip revenues represent the equivalent of a reduction in wood costs for the sawmill.
 - Chip income from NS pulpmills based on full volume of woodchips produced being sold during the calendar year
 - Chip income from NS + export sales, based on partial sales within NS of volumes produced by sawmill. Volumes unsold at chip prices sold at lower rates for other uses.

**Nova Scotia Sawmills: Net Impacts of CCR50% on Operating Costs
WITH Mitigation Measures**

Notes	Operating Cost Category	2010 benchmark	2011 to 2015 annual average	2016 to 2020 annual average	2021 annual average
a.	Harvesting Costs at roadside (sawlogs)	100	109	119	122
b.	Deduct Chip Revenue (Net of Freight)	100	110	112	112
c.	Wood Costs at Sawmill - with NS chip income	100	106	114	115
d.	Wood Costs at Sawmill - with mix of NS and export market chip income	100	109	119	122

Dollar data indexed to 2010=100

- Notes:
- Includes incremental costs for: forest management planning; woods operating management; forestry crews/woods operations labour; stumpage/stumpage equivalent; roads; capital costs of equipment amortized; operator training; loss of yield; silviculture expense; incremental silviculture (where appropriate).
 - Chip revenues represent the equivalent of a reduction in wood costs for the sawmill.
 - Chip income from NS pulpmills based on full volume of woodchips produced being sold during the calendar year
 - Chip income from NS + export sales, based on partial sales within NS of volumes produced by sawmill. Volumes unsold at chip prices sold at lower rates for other uses.

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Identification and Estimation of Economic Impacts of CCR50%

Wood Costs: Without Mitigation

Although the pulp and paper mills can influence their own wood costs, the overall driver clearly is at the sawmill. This is why the schedules shown on previous pages 'drive' the projected wood costs for the pulp and paper mills. Correspondingly, the sawmill's wood costs (for making lumber) are shown net of chip revenues received from pulp mills. As noted both in the 'with' and 'without' mitigation cases, the ability of sawmills to sell their pulp chips to pulpmills within Nova Scotia is vital to their financial viability. This revenue represents a significant part of their net wood costs.

In the very adverse situation that one of the pulp and paper mills were to close permanently, it should be clear that many of the province's sawmills would not have a natural outlet for their woodchips. Pulp companies pay the highest dollar of all end uses for pulp chips. Other whitewood users, much as wood pellet mills, pay substantially less. There would be an opportunity to sell some of these chips to other pulp mills in the province but, on a province-wide basis, the volume involved would not be large. Many of the sawmills would be faced with trying to create export markets for their chips, or to sell them at perhaps substantially lower prices. This is a very adverse scenario for the province's sawmills.

One of the major CCR50% impacts on sawmills would be to drive up their softwood sawlog costs from the various sources noted. Among the key cost increases would be:

1. Loss of harvest volume under CCR50% + reduced harvest below DNR's AAC due to declining participation rates of woodlot sector.
2. Loss of area yield (m3/ha)
3. Increases in road costs (due to the larger area required for harvesting the same volume of timber)
4. Additional forest management planning, operating labour and (in the early years of transition) training costs in selection logging and other forest management and harvesting practices.
5. Increases in road haulage costs, due to more extensive travel relating to the wider harvesting area.
6. Some marginally higher equipment costs, but significantly higher stump-to-roadside haulage costs, relating to the switch away from larger, more efficient logging on clearcut sites.

Offsetting some of these costs in the woodlands would be:

7. Some reductions in 'log sort' costs at the roadside or landing (relating to a greater variety of stem sizes harvested under clearcut)
8. Some cost reductions in the shift from cut-to-length to a higher proportion of full tree length logging.

We estimate that the increase in wood costs, in the 'without mitigation case' to be as follows:

Table 7

	Woodcosts: Percentage Higher vs. 2010 Benchmark Costs		
	2011-2015	2016-2020	2021+
Sawmills	+7%	+22%	+30%
Pulpmills	+14%	+38%	+47%

Assumption: The period 2011-2015 would be transition years into the new policy, in full effect by 2016.

A significant part of the rise in sawmills' wood costs would be the reduction in softwood sawlog volumes, and ensuing competition between the surviving sawmills to obtain the available volume of sawlogs. With a high probability of significant additional sawmill closures, and further loss of critical mass, pulpmills would have to adjust to a reduced supply of sawmills chips. This would force them to harvest more hardwood pulplogs for chipping. But the costs of this procurement strategy would be high. In order to make selection logging economic, loggers would have to harvest a volume of hardwood sawlogs at the same time. There is only a limited domestic market for these logs. Many would have to be sold at low net-to-mill prices in export markets. Overall wood costs for chipped roundwood at pulpmills would rise very sharply with CCR50%.

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Identification and Estimation of Economic Impacts of CCR50%

Wood Costs: Without Mitigation

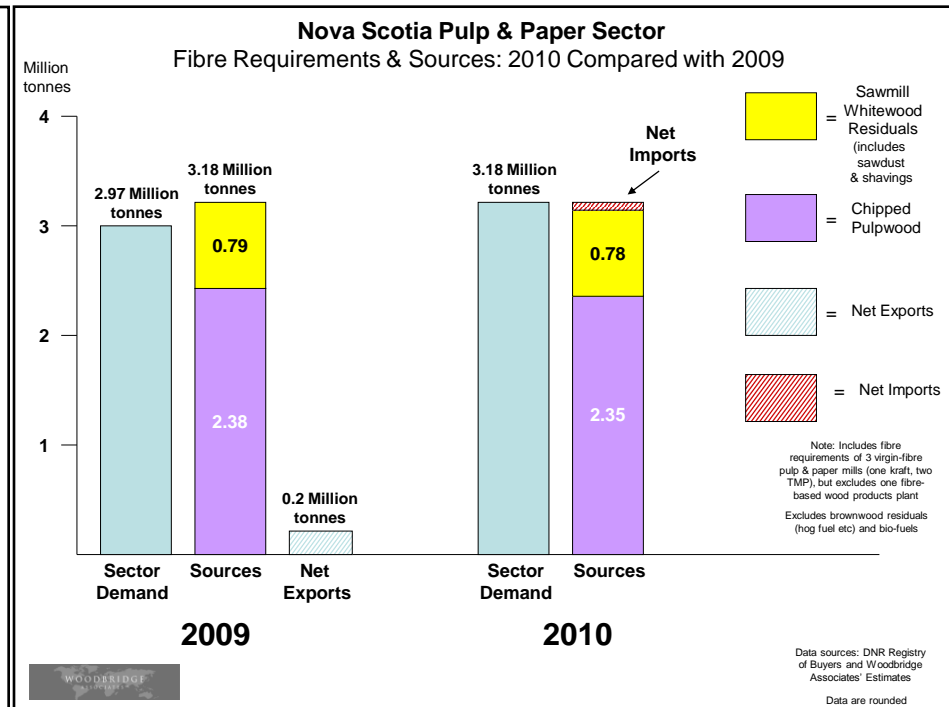
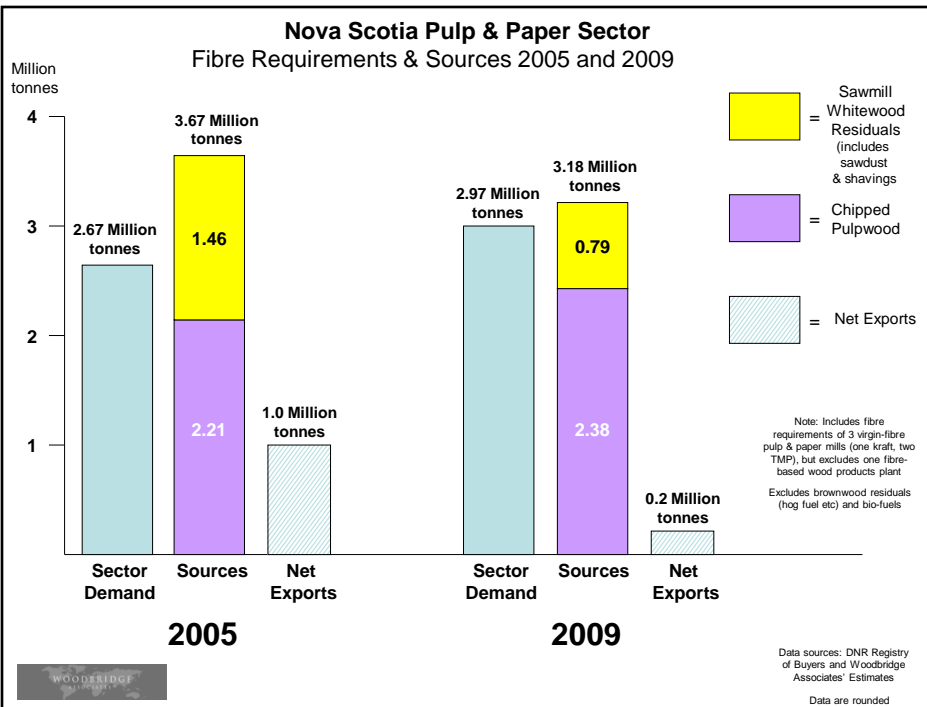
As part of our analysis of the impacts of CCR50% on the province's pulp and paper sector, we carried out a fibre demand-supply balance, by source. The basis for the initial calculations are detailed in Section 3, Table 1. The results are shown in the Figures below. Data are in green tonnes.

The pulp and paper industry's demand was for 2.67 million tonnes of wood chips in 2005 (Figure 34). Within the province, a buoyant sawmilling industry at the time along with chipping of pulpwood, yielded a total of 3.67 million tonnes of fibre. This was enough to meet the needs of the pulp and paper industry – with a provincial surplus available for export. By 2009, the fibre supply situation had changed dramatically. Lower cost sawmill residual supply had shrunk dramatically and the pulp and paper industry was forced to chip a much higher percentage of pulpwood. In essence, some of the critical mass of integrated operations already had broken down. Average purchased chip prices rose in 2009 and increased sharply in 2010.

By 2010, compared with 2009, a small net export volume had changed into a net import requirement (Figure 35). Sawmill residual volumes (normally the cheapest source of whitewood fibre) remained constrained by limited activity in softwood lumber production.

Figure 34

Figure 35



Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Identification and Estimation of Economic Impacts of CCR50%

Wood Costs: Without Mitigation

Then, we projected what the situation likely would for Nova Scotia's pulp and paper industry by the year 2015 (Figure 36).

Figure 36

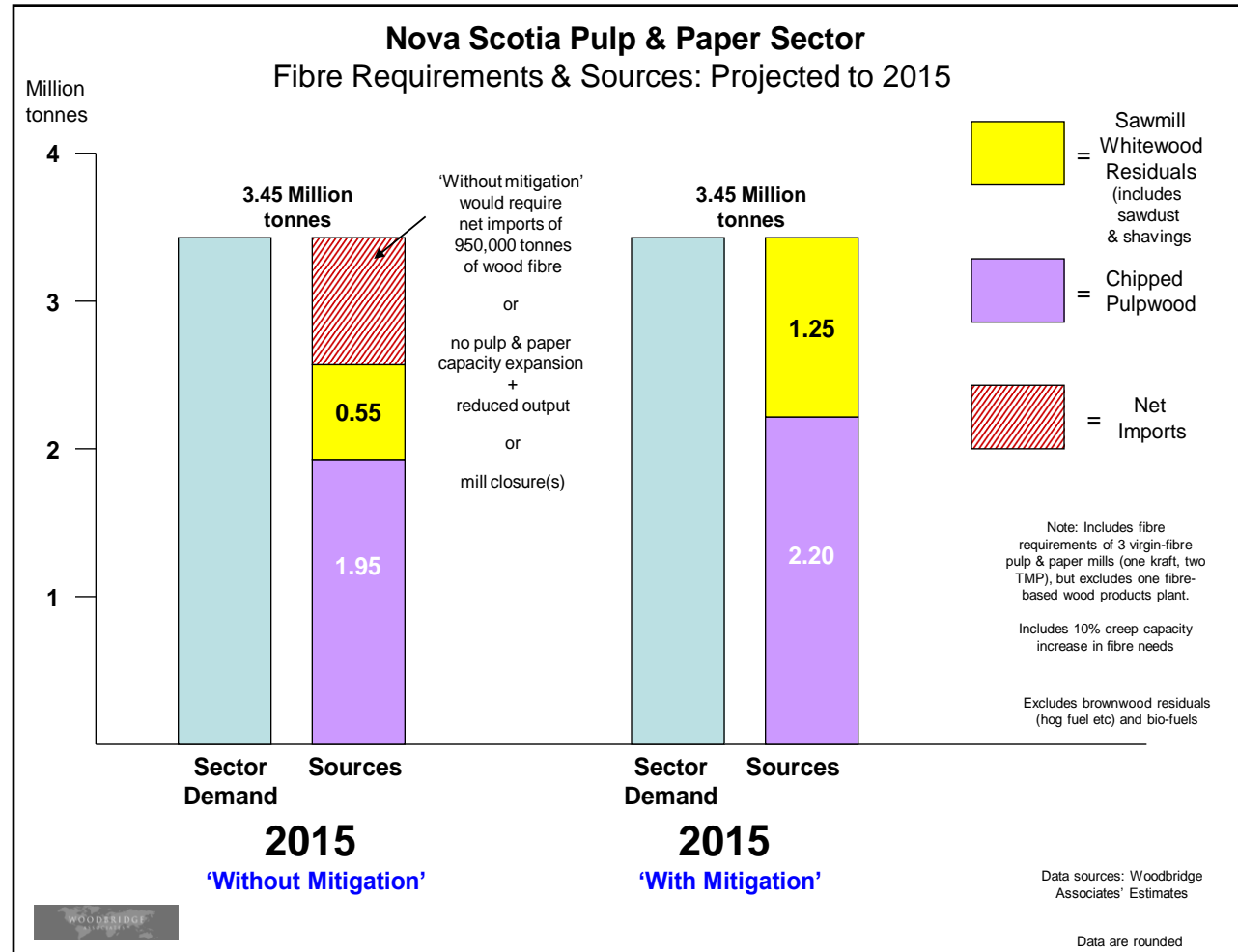
Based on our estimates of the 'falldown' of volume from the DNR maximum theoretical projections, for the reasons already explained, we estimated that, under the 'without mitigation' outlook, there would be a substantial fibre deficit in Nova Scotia's pulp and paper sector by 2015.

Some explanatory notes are required. We have increased the total fibre requirement of the mills to 3.45 million tonnes (compared with 2.97 tonnes in 2010) based on the addition of 'creep capacity' to optimize the mills' manufacturing operations and to minimize unit costs of production. This is a normal process.

We also assume that, without mitigation, the volume of softwood sawlogs available to the province's sawmilling industry will decline, along the basis described earlier. The result would be a sharp further decline in lower-cost sawmill residuals available for the pulp mills. We estimate this volume at 550,000 green tonnes of residual chips in 2015 compared with 780,000 tonnes in 2010. See also Section 1, Table 1 for details.

Without mitigation, the mills would have to import a huge –and likely unobtainable volume of chips. We estimate this volume at around 950,000 tonnes of wood fibre. More likely, one or more of Nova Scotia's pulp and paper mills would close before this critical shortage of fibre supply happens.

Mitigation, on the other hand, shows a much higher level of sawmilling activity – and lower-cost wood chip generation. The details are explained on the following pages. The key strategic question is: "can this level of mitigation be achieved?"



Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Identification and Estimation of Economic Impacts of CCR50%

** = 'A Policy Framework for the Future of Nova Scotia's Forests'.

What Were The Cost Trends in Nova Scotia's Forest Sector Prior to the December 2010 Policy Framework**?

Faced with the need for industrial re-structuring, one of the key concerns of governments almost everywhere in the world is to determine an appropriate set of mitigation measures to help this process be effective for already established industries. With regard to the significant level of re-structuring that now appears to be in prospect for Nova Scotia's forest economy, these measures are of acute concern today to the Government of Nova Scotia – and obviously to many other stakeholders.

In this report, we have estimated as far as possible what we believe to be the incremental costs that the industry is likely incur as a result of implementing CCR50% policies. In other words, our calculations seek to show the costs attributable only to this change in government policy and its impacts on the industry's operating cost environment.

This raises the context questions of "what have been the cost trends in the industry prior to 2010?" and "what would be the likely operating costs of the industry assuming that CCR50% policies had not been developed and were not planned for imminent implementation?".

Industry Operating Cost Trends Prior to 2010, and After 2010

The general impacts of the global economic recession over the past several years are well known to everyone. Moreover, it is readily evident that many aspects of the recession (a) are still not over and (b) are still unfolding in many key areas and sectors (e.g. foreclosures in the U.S. housing industry) which normally lead the economic recovery in most countries. A significant part of the global economic recession involves a substantial reduction in the utilization of manufacturing and service sector capacity, and associated levels of unemployment and under-employment (e.g. loss of full-time jobs to part-time status). Although most of Canada has fared comparatively well throughout this period, Nova Scotia's forest sector is largely export oriented – and has felt the full brunt of declining global demand and declining product prices.

What would have been the cost trends facing the Nova Scotia forest sector under 'normalized' conditions over the period prior to 2010? Our assessment deals only with the critical elements of costs, and is as follows.

Wood Costs

- There would have been some offsetting trends (e.g. a higher volume of residual wood chips from sawmills operating at higher rates of capacity utilization) but, overall, the province's pulp & paper sector would have experienced a rising trend in its wood costs through the year 2010, and beyond.
- This may (under 'normalized' operating conditions) have precipitated a fibre supply 'crunch' and rising fibre prices earlier than actually has occurred. Correspondingly, the sector would have had a rising financial incentive, much earlier, to re-engage formerly active woodlot owners and access their significant log supply potential.
- The pulp & paper sector itself is partially responsible for the underlying trend in wood costs, primarily because it has chosen a fibre procurement model which, whether intended or not, isolates and marginalizes the very significant timber volume that could have come from formerly active private woodlot owners. However, a major part of the disengagement of formerly active woodlot owners also can be attributed to other factors (outside the control of the manufacturing industry) including previous government actions to 'champion' improved financial returns for woodlot owners. After the province's lumber industry declined sharply, the pulp and paper sector paid the price of significantly higher chip costs. CCR50% adds a further significant wood cost burden. The wood cost outlook beyond 2010 thus would reflect both 'policy' causes.

Energy Costs

- Energy costs, and energy cost policies, also are a key factor determining the competitiveness of many parts of the province's forest sector. But they are a double edged sword for some players. Rising purchased energy costs penalize the province's papermakers, but they are a potential net benefit (1) to Northern Pulp (one-time black liquor credits) and (2) offer some possible opportunities to offset part of their rapidly rising purchased electricity costs to firms, such as NewPage, which has proposed to install combined heat-and-power facilities economically (and feed into the provincial grid). The trend beyond 2010 is towards higher energy costs, globally and in Nova Scotia. Because the province has two pulp and paper firms operating highly energy-intensive manufacturing technologies, ongoing opportunities to offset these rising costs (e.g. biomass availability) will be a key factor in helping these firms achieve a sustainable cost competitive position.

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Identification and Estimation of Economic Impacts of CCR50%

*** Different modeling assumptions by DNR (e.g. higher participation rates) could help close the supply gap.

Wood Costs: With Mitigation

One of the key drivers of the 'without mitigation' wood cost outlook is the assumption that DNR's projected AAC volumes will not be achieved because of declining participation rates within the woodlot sector. The AAC numbers assume that the total theoretical harvest will be harvested. Another key driver is the reduced rates of operability on un-even aged stands. Many of these are located within the woodlot sector.

Not surprisingly, our proposed mitigation measures would involve a rejuvenation of the province's woodlot sector, plus a focus on ensuring that the potential flow of softwood sawlogs, from woodlots and other ownerships, is maximized. In turn, we believe these measures will help drive down the increase in wood costs, which would result from CCR50% implementation, to much more manageable levels.

Where is the 'Trapped Volume' of Softwoods Located?

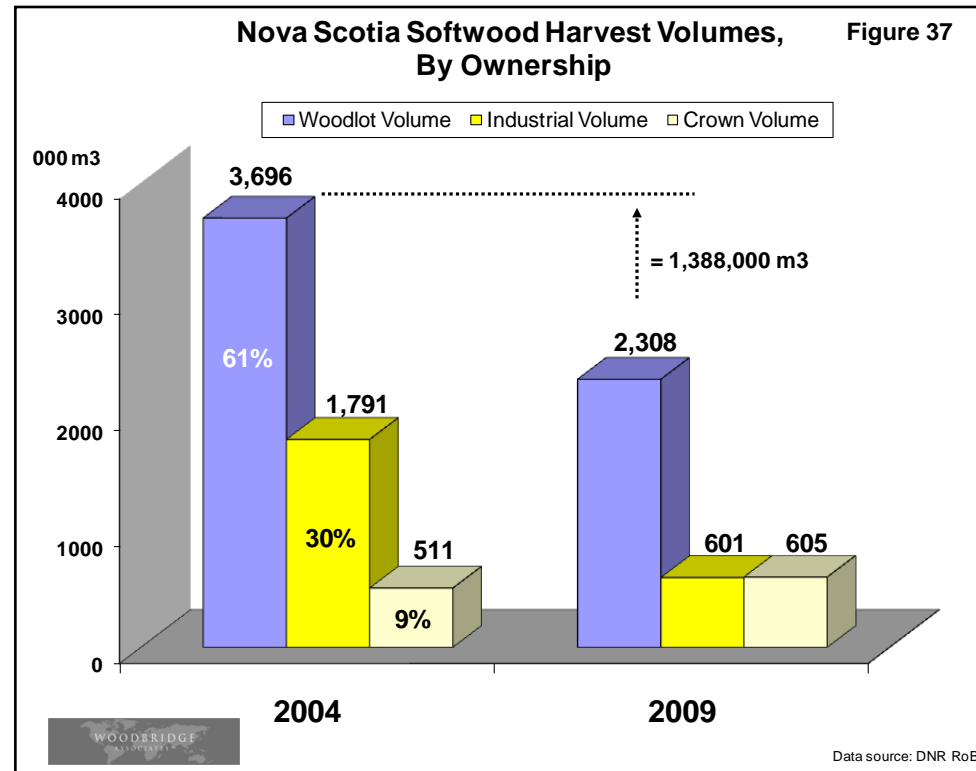
At the recent harvest peak in 2004 (Figure 37), woodlot owners accounted for 61% of the province's softwood timber harvest. Much of this was in sawlogs and studlogs. Industrial owners provided a further 30% of the softwood harvest. Crown sources made up only 9%.

Due to lumber market demand declines, and lower participation rates among formerly active woodlot owners (despite relatively high prices being offered recently), the province's total softwood harvest declined by a total of nearly 2.5 million m3 between 2004 and 2009. Among these woodlot owners, the volume decline was nearly 1.4 million m3.

With participation rates among formerly active woodlot owners currently around a record low point of 64% -- this is measured by those who participated in commercial timber sales in 1995 to 1997 -- it seems likely that DNR's theoretical maximum harvest volumes from woodlots owners will fall far short of their potential over the next decade or so ***. Mitigation measures, however, most likely can improve this participation rate -- perhaps substantially.

If the 'without mitigation' scenarios that we have outlined hold true, we assume that increased harvest volumes also could be expected from industrial owners, depending (on both cases) upon the level of mature inventory and merchantable timber available.

The 'with mitigation' case further assumes that, as the total harvest volume and harvest area rises under these projections, the areas of land regarded as inoperable from the point of view of economic accessibility, will be recaptured into the working forest. Critical mass volume flows also are predicted to improve and would help lower the industry's average wood costs.



Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Identification and Estimation of Economic Impacts of CCR50%

Wood Costs: With Mitigation

We estimate that the increase in wood costs, in the 'with mitigation case', to be as follows:

Table 8

Woodcosts: Percentage Higher vs. 2010 Benchmark Costs

	2011-2015	2016-2020	2012+
Sawmills	+6%	+14%	+15%
Pulpmills	+12%	+16%	+15%

With higher participation rates among woodlot owners, and among industrial owners, enabling the provincial softwood harvest to approach its theoretical potential, the improved levels of fibre flows vs. the 'without mitigation' case could help position Nova Scotia favourably within, we believe, the 2nd quartile of global regions with regard to softwood sawlog and pulpwood costs.

Nova Scotia's Wood Costs: Global Comparisons

Wood costs globally are dynamic and move with a varying range of levels depending on market demand, supply and other factors. Even though Nova Scotia's wood costs are predicted to increase – even in the 'with mitigation' scenario – wood costs in other areas also are changing. Most are increasing.

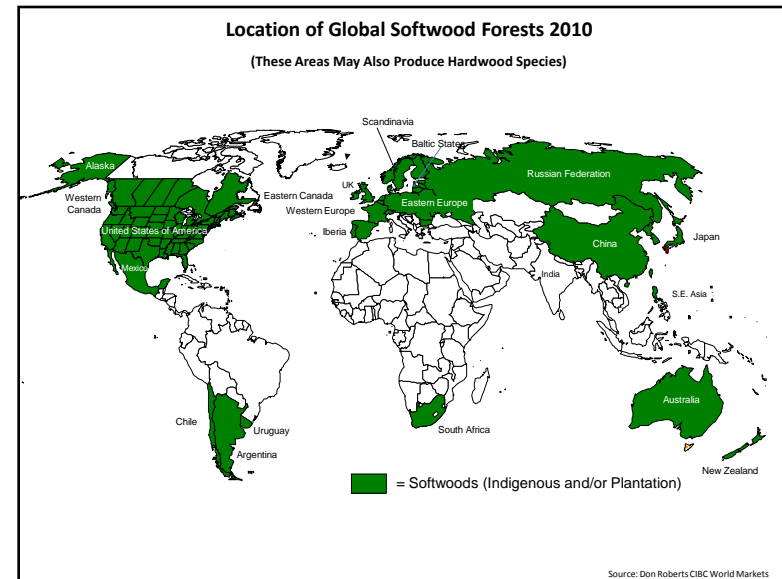
Figure 38

Several analyses carried out by Don Roberts of CIBC World Markets indicate a sharply tightening global fibre supplies (Figure 38), notably in softwoods and particularly in softwood sawlogs. Key supply-side drivers include the following:

- The prospect of reduced softwood sawlog volumes from beetle-killed BC Interior SPF forests.
- Reduced AAC's in Quebec, and on Crown lands elsewhere.
- Log export restrictions from Russia (recently relaxed, but only temporarily) **
- A widening timber deficit in east Asia, notably in China (with rapidly growing demand)
- Withdrawals of commercial forestlands under REDD programs
- Boreal Forest conservation agreements within Canada
- Loss of forest lands in S. America due to native land claims, and recent restrictions on investors

We believe that, in a well-developed forest economy, such as Nova Scotia, even with strong ecological values influencing policy, the province could have a significant role as a long term sustainable supply area. Financially-viable opportunities for investors to invest in greenfield manufacturing capacity are very limited.

** Russia's share of total world trade in logs declined from 40% in 2006 to less than 28% by Q1 2010.



Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Identification and Estimation of Economic Impacts of CCR50%

Nova Scotia's Wood Costs: Global Comparisons

Often, it is claimed that Nova Scotia is a high wood cost area, and/or that the province suffers from some of the highest wood costs among its natural competitors. Historically this is not true. It is the case today that prices being paid, for example, for increasingly large volumes of wood chips imported from New Brunswick are high cost sources on a regional comparative basis.

Moreover, late-2009 and 2010 wood costs in Nova Scotia are substantially above previous years' levels because of special factors explained elsewhere in this report. Setting aside these abnormally high years for wood costs, the weighted average of wood costs from all sources at most of the province's pulp mills have not been prohibitive, on a global average, over the past five years – in our estimation.

To be valid as measures of competitiveness, comparisons should be made between individual firms and their natural competitors. For some Nova Scotia firms, these include both North American and European (EU-27) competitors. In publication papers, for example, competition is extremely tough and many owners of paper machines are fighting to be the 'among the last men standing' in a niche market where operating losses are very high. Any cost increases can precipitate a negative turn of events. Even so, on a wood cost basis comparison with European producers in a similar predicament, Nova Scotia's wood costs are low. Compared with North American benchmarks, they are moderate to high.

Frequently, Nova Scotia and Maritime wood price comparisons are 'lumped-in' with those of other regions as an 'Eastern Canada' average. This can be very misleading. Provinces, such as Quebec and Ontario, have chronically high wood costs and these tend to skew the averages for the region. RISI, a widely-followed international consultancy, states (for example) that Eastern Canadian aggregated softwood and hardwood roundwood costs averaged US\$35 to 36 per green tonne in Q3 2010 – which was about mid-range for all North American regions being compared (*RISI International Woodfibre Report*).

For hardwood chips, 'Eastern Canada' was about mid-range at US\$40 per green tonne in Q3 2010. In softwood chips, however, 'Eastern Canada', at US\$ 57 per green tonne in Q3 2010, was by far the highest cost North American region. Tightness of softwood chip supply, and very high current prices in 'Eastern Canada' and Nova Scotia, already has been acknowledged and explained in our report.

Market and price conditions in pulpwood are different. *Wood Resources Inc.* ('WRI') a widely respected international consultancy estimates that, as of Q3 2010, the Maritime region's roundwood prices, for both softwood and hardwoods, are the lowest of all Canadian provinces – by significant margins.

"Maritime roundwood prices, both hardwood and softwood, are the lowest of all Canadian provinces by significant margins"

Source: WRI September 2010 NAWFR page 17.

7.

CCR50% Policy Risks

Economic Impact Mitigation

– Market Based and/or Policy Based

With implementation of CCR50%, the province's softwood timber harvest is projected to decline by a staggering 25%. This contrasts with a less harsh, but still very substantial, projected 15% decline if CCR50% were not implemented.

We are not aware of any jurisdictions in Canada or worldwide where declines of this magnitude have occurred without significant mill closures.

7. CCR50% Policy Risks: Economic Impact Mitigation – Market Based and/or Policy Based

CCR50% Risks

The terms of reference for this report are aimed at determining the economic impacts of the CCR50% policy. The risks for Nova Scotia's forest sector associated with the policy have been identified extensively in previous sections. Principal risks are related to (1) the volume and other aspects of wood harvested and (2) a variety of cost impacts. Of critical importance, one of the key risks identified is that the harvest potential of the province will not be realized.

Specifically, DNR's extensive modeling analyses indicate the total volume of wood projected to be available under the status quo ('Base Case') and the four CCR50% scenarios. Even so, there is ample evidence that, in reality, this theoretical maximum harvest will not be achieved (e.g. low rates of participation by woodlot owners). Moreover, in effect, DNR's modeling has identified the declining proportion of softwood timber as a significant risk for the province's forest sector. This is due, we believe, to past over-cutting. Whatever the reason, it appears evident that Nova Scotia's future softwood harvest volumes will decline sharply regardless of any CCR50% policy decisions. With implementation of CCR50%, however, the province's softwood timber harvest is projected to decline by a staggering 25% (compared with recent past peak levels in 2004). This contrasts with a less harsh, but still very substantial, projected 15% decline if CCR50% were not implemented and the status quo ('Base Case') were to be retained. We are not aware of any jurisdictions in Canada or worldwide where declines of this magnitude have occurred without significant levels of mill closures.

The significant, and inevitable, shift to much greater use of hardwoods, from around 15% of the total harvest, at present, to 30% under all scenarios including the status quo, implies substantial shifts in the province's species mix. The industry faces risks from this shift. The ability of individual firms and their manufacturing facilities to cope with this sharp change varies widely. Papermakers have some scope to adapt to a higher percentage diet of hardwoods – but this scope ultimately is both market and technically limited. In particular, the province's market pulp producer (**Northern Pulp**) has limited scope, over the short term, to adapt to a shift in fibre species diet without a significant change in its business model. The softwood sawmilling industry has almost no scope to adapt to the change in fibre species diet. It depends on softwood sawlogs. However, as noted elsewhere in this report, the production of fuel pellets and hardboard, and even the province's important chip export business, could benefit.

Within the parameters of the province's long run sustainable yield (LRSY) wood supply projections, there is scope for the industry to adapt to this evolving situation. This scope is greater under the status quo ('Base Case') but various mitigation possibilities exist also under CCR50% policies.

Mitigation Measures: Possibilities for Nova Scotia

The province has a number of mitigation possibilities. They include the following:

- #1. Rely on market-based mitigation responses** (i.e. rely on higher prices to attract more woodlot and industrial wood supply into the provincial supply chain + rely on higher product prices to offset some of the industry's higher wood costs).
- #2. Undertake a 'pro-active' role and initiate a series of 'mitigation programs'** (details of this option are recommended later in our report).
- #3. Accept the level of industry-downsizing implied by DNR data and our analysis** (including, in our opinion, closure of one or more pulp and paper mills) and aim to develop a balanced and hopefully sustainable forest industry at a lower level of overall harvesting activity.

#1. Market-Based Mitigation Responses

Essentially, this option is a 'leave it to the marketplace to sort out' approach. What are the opportunities for this to work, and resolve the considerable challenges that face the industry under either the status quo and/or CCR50% scenarios?

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

CCR50% Policy Risks: Economic Impact Mitigation – Market Based and/or Policy Based

Market-Based Mitigation Responses (continued)

Under favourable conditions, market-based responses can help the industry mitigate some of the various additional costs associated with CCR50%. Under un-favourable market conditions, there is limited or no scope for this to occur. Market-based mitigations, however, can address the fundamental issue of the province's declining harvest volume only in a limited way – through higher wood prices offered to private forestland owners. As already noted, for example, the response of woodlot owners to the offer of higher stumpage prices has not achieved a significant supply response in recent times.

Market demand levels and product price rises are potentially powerful influences relating to mitigation, but market prices and operating costs are driven by different factors. Market prices for most forest products are highly cyclical. As noted, wood costs vary over time, but generally for softwoods and hardwoods are on a rising trend. Thus, whereas costs tend to 'ratchet-up', product prices can rise and fall sharply on a seasonal and cyclical basis.

Product Price Declines and Rises

Our view of the current recovery cycle is that prices of softwood lumber are rising –and could reach significantly higher levels over the next several years. This conclusion is supported by a wide range of industry analysts, although their views differ widely about the timing and magnitude of the predicted price rises. Market pulp prices are at a high point in their market cycle but, for NBSK pulp, these prices have become established at a higher trend level than prevailed a decade ago. Within the timetable for CCR50% policy implementation (2011-2015), we expect seasonal and cyclical price declines and rises for NBSK – with an overall trend gradually rising from today's levels. Standard grade newsprint and specialty demand remains in chronic over-supply. As with other publication papers produced within the province, some stabilization of industry capacity is occurring – which could lead to firmer prices over the next year and beyond. Even so, the demand and price fundamentals for these grades involves a high degree of risk.

Other market-based potential mitigating factors (which can be positive or negative) include the following:

- Exchange rate changes in export markets
- Changes in freight rates to export markets
- Relative competitive positioning of competitors
- Existing products and manufacturing technologies becoming obsolete

All three pulp and paper mills are a vital outlet for residual chips, the revenue from which is vital income for the province's sawmills. We conclude that the province should work hard to keep these investors. They will be hard to replace.

It is speculative to guess how these various factors could either help mitigate, or worsen, the competitive position of Nova Scotia's forest industry beyond the comments already made in this report.

Possible New Products

Two of the significant risks of any public policy change are operating and investment uncertainty. Absolute certainty does not exist, but actions can be taken to address unnecessary uncertainties about the 'rules' of operation. Related to this is the view that firms may be able to adapt to cost changes in the operating environment by moving up the value chain. In our view, Nova Scotia's pulp and paper sector is at a 'steady-state' in terms of where it can be positioned in the range of products that can be produced based on existing technologies and the equipment in place.

Figure 39, on the next page, illustrates our assessment. It shows that Nova Scotia pulp and paper producers are close to the top of the value chain for their existing technologies and equipment. These are highly capital intensive businesses, which requires continuous flow manufacturing conditions. In economic impact terms, they have a 'large footprint' within Nova Scotia. Moreover, all three pulp and paper mills are a vital outlet for residual chips, the revenue from which is essential income for the province's sawmills. We conclude that the province should work hard to keep these investors. They will be hard to replace.

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

Despite its small size compared with provincial 'giants' in wood products (such as Quebec), we believe very strongly that the future growth in Nova Scotia's forest sector's value can come from its wood products sector.

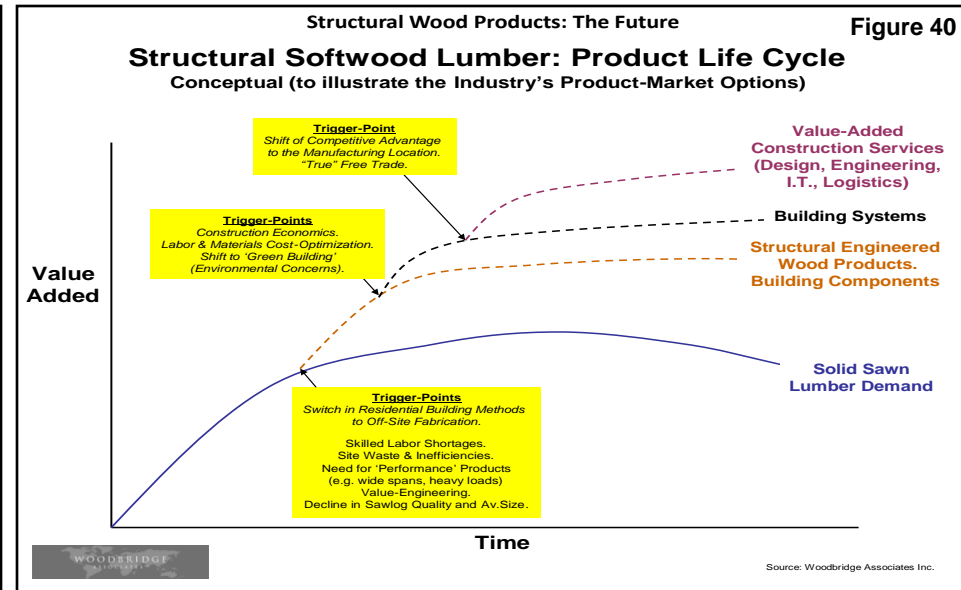
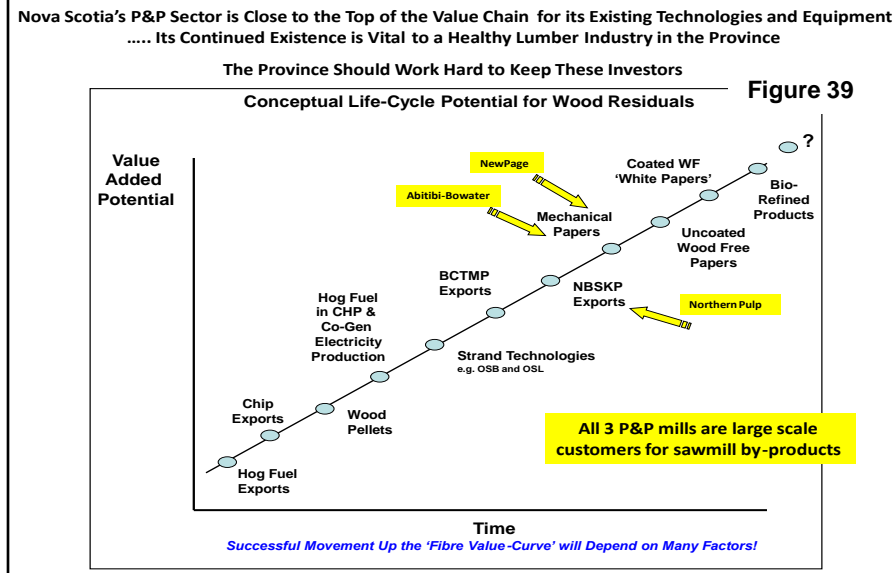
See Recommendation #4.

CCR50% Policy Risks: Economic Impact Mitigation – Market Based and/or Policy Based

Possible New Products

The potential for Nova Scotia's pulp and paper sector to move up the value chain (Figure 34) is limited. This is not a criticism of the industry. The reality is that the value of the fibre and its associated converting facilities (i.e. mills) already is close to being optimized. The value added produced already is significant. The types of bio-refined products identified in, for example, the Bio-Pathways Project (see www.canadaforests.nrcan.gc.ca/rpt/biopathwaysproject) might offer some potential. In our view, however, it would be a poor policy decision for the Government of Nova Scotia to expect that the province's existing pulp and paper mills could move towards these goals in the foreseeable future. The Bio-Pathways Project has, however, identified several wood products growth opportunities. The potential for the softwood lumber industry to move up the value chain is significant. In order to capitalize on market potential, owners and investors will require a much more stable sawmilling industry than has been the case recently – and which seems to be in prospect, from a softwood sawlog supply perspective.

Of direct interest to government and other policy-makers in Nova Scotia, two particular 'wood-product' linked industries are undergoing fundamental changes within North America, and in many other parts of the world. They are the residential construction industry, and the softwood sawmilling industry. Site-building of new housing is shifting rapidly towards the off-site production of building components (Figure 39). Longer term, many engineered wood products (Figure 40) will displace solid sawn lumber in a range of applications. Years ago, just as Nova Scotia is today, the sawmilling industries of Quebec and Ontario were confined to the production of 'narrow' sizes and shorter lengths of lumber. By adopting technologies, such as I-Joist manufacturing and various types of building components, these provinces have been able to move up the product life-cycle curve. Nova Scotia's forest products manufacturing sector is dominated by three pulp and paper firms. This dominates the overall production "culture" of the sector. Yet, despite its small size compared with provincial 'giants' in wood products (such as Quebec), we believe very strongly that the future growth in Nova Scotia's forest sector's value can come from its wood products sector. Demonstrating this potential in any detail, regrettably, is beyond the scope of our terms of reference.



Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

CCR50% Policy Risks: Economic Impact Mitigation – Market Based and/or Policy Based

#2. Undertake a 'Pro-Active' Role and Initiate a Series of 'Mitigation Programs'

In addition to the need to send positive messages to industry investors, the province has the option of initiating a series of transition and mitigation measures that, we conclude, can help offset a substantial part of the potential economic impacts of CCR50%. Examples are provided in Figure 41. Other initiatives may be identified.

Figure 41

Our analysis assumes a transition period of 5-years before full implementation of CCR50%. Several of the initiatives shown in Figure 36 could be undertaken early in the transition, with the potential result of increasing the effectiveness of related programs identified.

Some of these are structural in nature, and will take some time to achieve results. Others may have a more immediate payback. Several are low-cost but high-impact initiatives.

There are three groups of potential actions. Importantly, there are various actions that could be taken to 'close the gap' between DNR projected wood supply under the four CCR50% scenarios and probable volume 'fall down' if this policy is left to develop on its own.

For instance, to achieve this, it would be necessary to develop various objectives to close this gap, such as targeting higher participation rates among woodlot owners (previously active + previously inactive).

Most of these items, and the identification of other mitigating solutions, will involve the need for close consultations between the various players. Clearly, Nova Scotia's woodlot owners will be key stakeholders in this process.

Examples of Transition and Mitigation Measure Options			
Assumes a 5-Year Transition Period for CCR50%: 2011 to 2015			
Ownership/Tenure	#1. Volume & Forestland Productivity Gains	#2. Woodlot Sector Re-Structuring Program	#3. Industry Re-Structuring: Supporting Infrastructure (Note 2)
Crown Lands	Actions to 'close the gap' between DNR projected wood supply under the four CCR50% scenarios and probable volume 'fall down' if this policy is left to develop on its own (e.g. develop various objectives to close this gap, such as targeting higher participation rates among woodlot owners).	Involve industry and trade associations (e.g. FPANS) in, for example, programs to facilitate fibre procurement and wood-flows, woodlot sector re-structuring	Crown + Licensees' Initiatives. Participation in Provincial Programs
Private Industrial			Owners' Initiatives. Participation in Provincial Programs
Woodlots (Private Non-Industrial)		Develop and implement detailed plans and incentive programs for high participation rates of owners in commercial activities (Note 1)	Woodlot owners' and Association Initiatives. GoNS Appointment of 'Access to Credit Facilities' and 'Forest Investment Management' ADM + field experts working with owners

Note 1: Includes a range of commercial activities, including timber-harvesting (where desired by owner); hunting and fishing; demonstration and model forests.

Note 2: Includes operator training (transition to new forest management practices); other woods skills training focused on best practices; markets and trade development; business planning and business management skills enhancement; identification of added-value initiatives; development of knowledge-based youth skills in woodlot operation.

*Some of these are structural in nature, and will take some time to achieve results.
Others may have a more immediate payback.
Several are low-cost but high-impact initiatives.*

All operators will have to adjust to a more 'extensive' vs. 'intensive' cutting regime per hectare of timberlands harvested.

CCR50% Policy Risks: Economic Impact Mitigation – Market Based and/or Policy Based

Undertake a 'Pro-Active' Role and Initiate a Series of 'Mitigation Programs' (continued).

#1. Volume & Forestland Productivity Gains

Assuming CCR50% policy implementation, the prospect of a significant and immediate loss of commercial harvest volume within Nova Scotia has been identified in this report. Moreover, a comparatively rapid rate of transition from softwoods to hardwoods (as a percentage of the total commercial harvest) also has been identified. Simply put, many of the province's existing forest products manufacturing companies face a future in which wood supply will become progressively more difficult –and significantly more expensive – to procure.

Many of them will have to adjust to a species shift – and, most likely, to other associated changes in their historical sources of supply and the nature and composition of that supply. All operators will have to adjust to a more 'extensive' vs. 'intensive' cutting regime per hectare of timberlands harvested.

The impacts will be different, however, for the various types of timberland ownership. On Crown lands, the normal approach in Nova Scotia – and throughout all provinces of Canada – is that licensees are required to 'cut the profile of the forest'. With CCR50% policies, this approach seems likely to create challenges – in terms of management planning. Also, it will incur incremental costs in harvesting (i.e. attributable to the CCR50% policy). Within CCR50% policies, private timberland owners (industrial and woodlots), operators have more flexibility – especially as an increased proportion of plantation even-aged timber harvesting occurs over time. Even so, there will be incremental costs involved.

Among the mitigation options that potentially can help offset some part of the predicted 'harvest volume falldown' (in terms both of the aggregate falldown provincially, and the volume falldown on a per hectare basis) are the following. The list is illustrative only. A complete list of all options should be prepared in collaboration with stakeholders.

1. Defining the size of clearcuts and CCR50% implementation in a flexible way. This should directly reflect the spirit and intent of the *Natural Resources Strategy*, as well as governing legislation expressed in the *Environmental Goals and Sustainable Prosperity Act*. At the same time, it should recognize that not all of Nova Scotia's forests are identical, and that – on some lands (e.g. some even-aged plantations) – it may be possible simultaneously to achieve regulatory and commercial harvesting goals.
2. Adoption of silvicultural approaches and investments focused on merchantable timber productivity gains (essentially, more harvestable trees on a smaller area of land). This will not be economic in all cases, nor necessarily across all ownerships. As noted already, we expect the area of inoperable land to rise sharply under CCR50%.
3. Stumpage payments accrue to the respective owners of harvested lands. Relating to its international trade obligations, Nova Scotia will not consider any mitigation measures which might involve Crown timber pricing other than at full market rates. To its credit, the province has held true to this principle in its Crown land policies.

We estimate that the cost "savings" from items #1 and #2 could be significant, and could help offset, to some extent, the projected increases in costs attributable to implementation of CCR50% policies.

#2. Woodlot Sector Re-Structuring Program and
#3 Industry re-Structuring: Support Infrastructure

These are proposed 'facilitating' measures that would help the province achieve a smoother and more effective level of re-structuring than if the province's forest industry were left to fend for itself (see Option #1, page 47).

We have assumed in our estimates of the cost increases attributable to CCR50% that the province will undertake these mitigation measures. They relate to economic restructuring costs for the province but, without them, the costs to the forest sector could be much higher than we have projected.

It will be important for the Government of Nova Scotia to undertake a public communications program to explain to Nova Scotians that a significant re-structuring of the province's forest economy will occur as a result of CCR50% implementation –and that (with appropriate mitigation measures to assist this re-structuring) there will be net benefits to the forests, environment and people of Nova Scotia.

Estimates of the costs of these potential mitigation measures were not part of the terms of reference and, accordingly, have not been provided.

Economic Impact Analysis of Timber Management & Supply Changes on Nova Scotia's Forest Industry

CCR50% Policy Risks: Economic Impact Mitigation – Market Based and/or Policy Based

#3. Accept Industry-Downsizing

The third strategic option, which is not recommended, is to accept the level of industry-downsizing implied by DNR data and our analysis. The aim of this strategy would be to develop a balanced, and hopefully sustainable, forest industry within Nova Scotia at a lower level of overall harvesting activity. The potential for this outcome to occur, by default, is quite high in our view. As already noted, the critical mass of the province's forest industry already is at, or below, a sustainable level. Industry downsizing most likely would be precipitated by the closure of one or more of the province's pulp and paper operations. It is hard to predict the eventual outcome of this process. A key question related to this scenario is this: "would industry downsizing achieve the province's ecological goals under CCR50% and the goal of good, sustainable forest management?"

We don't believe so. Moreover, the province would miss the opportunity to develop its forest sector into a modest-scale, but healthy and potentially prosperous globally competitive player. From the perspective of the province's economic growth prospects (Figure 42), a more positive outcome could provide not just well-managed sustainable forests, but also contribute towards higher levels of provincial economic growth.

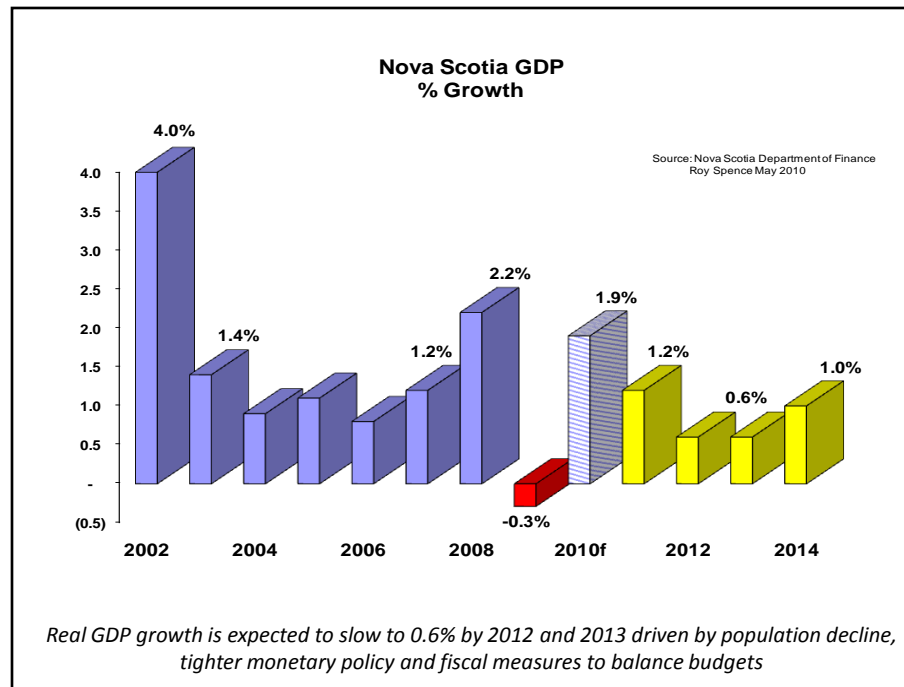


Figure 42

8.

Conclusions

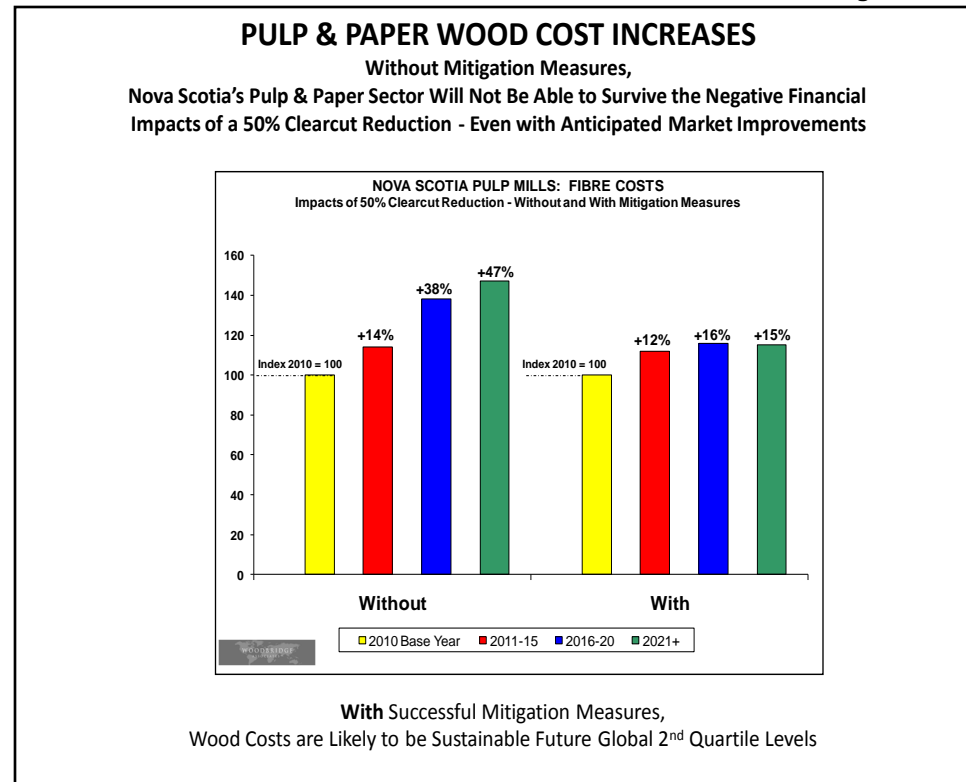
8. Conclusions

1. Provided that the appropriate transition and mitigation measures are put in place, and are successful, a policy shift by DNR to a 50% reduction in clear-cut volume harvest ('CCR50%) policy would not put Nova Scotia's forest products industry out-of-business.

Without Mitigation Measures

2. Without mitigation measures, however, wood costs to pulp mills would increase by 38% in the 1st five years (2016-2020) of full operation of the new policy (Figure 43). Even with anticipated rising product prices, and improved demand, this level of cost increase would be unsustainable. Nova Scotia has comparatively moderate wood costs. Rises of this magnitude would put the province's pulp and paper mills out of business, as well as most other sectors.
3. Regardless of any policy changes (i.e. with the status quo) the province's sawmilling sector faces a future of declining supplies of softwood sawlogs. A 15% decline in overall softwood volume is projected by DNR, based on past peak harvest levels. Sawlogs supply would be even tighter.
4. With CCR50%, softwood timber supply would decline by ~25%.
5. Overall activity within the province's forest industry already is well below the 'critical mass' required for its sustained operation. The twin impacts of potential loss of harvest volume, and CCR50% related cost increases, would push the industry further below the critical mass level – further contributing to adverse cost impacts.
6. Quite separate from CCR50%, a long term decline in **formerly active** woodlot owners' participation rate in commercial operations over more than a decade has led to a sharp decline in supply from this very important sector of the forest economy. Solutions exist.
7. Nova Scotia does not have any other sustaining competitive advantages in forest products manufacturing to offset a significant increase in its wood costs. Mills are located distant from growth markets. **Keeping these existing mills is vital for Nova Scotia!**
8. With successful mitigation measures of the type outlined in this report, the province's wood cost increases can be reduced substantially – to levels that would help sustain them close to globally competitive levels.

Figure 43

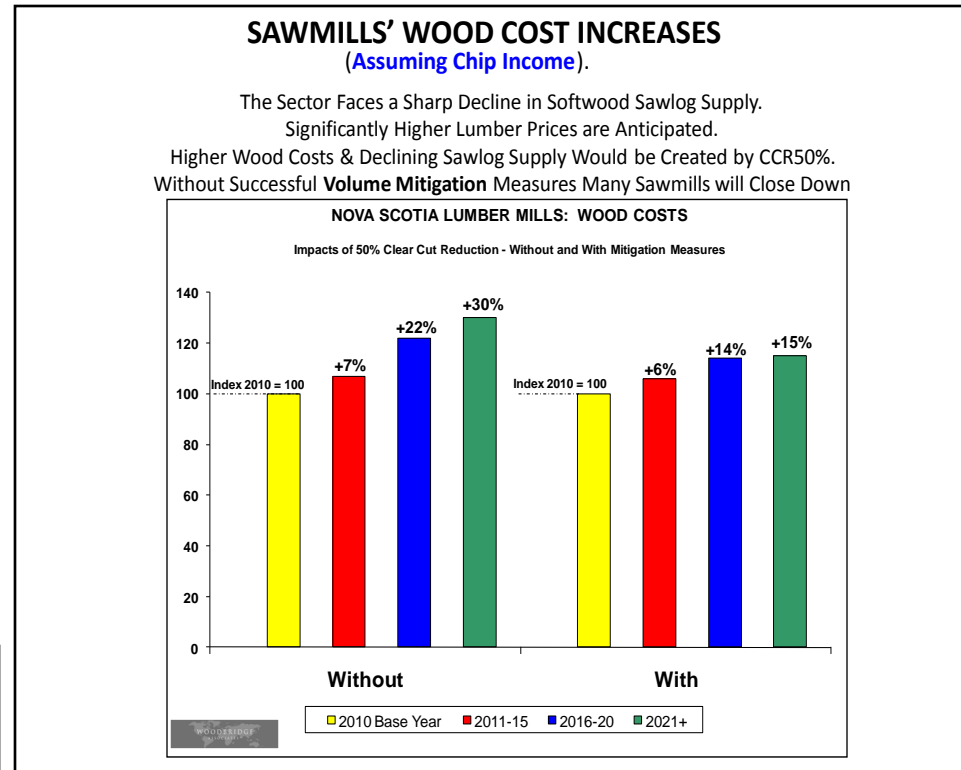


If key mitigation measures fail, there will be few alternative ways to offset the high incremental costs projected to be incurred by the province's forest sector.

With Mitigation Measures

9. DNR's projections of the province's future harvest potential are a key driver. Without any change in policy (i.e. the status quo or 'Base Case') DNR projects that the total timber harvest could increase by around 6% above previous peak levels. DNR also predicts that, under CCR50%, the province's total harvest could decline by around 6-7%. But, as noted, softwood supply will decline. The volume of hardwoods in the provincial harvest mix will rise from 15% today to around 30% -- very quickly.
10. A critical assumption we have made in the 'without' and 'with' mitigation scenarios is that, under prevailing conditions, the provincial harvest will fall well below the theoretical maximums projected by DNR. There are several reasons for this. Low participation rates among woodlot owners already has been identified as a key (but, we believe, potentially resolvable) causal factor. Importantly, with successful implementation of measures to resolve this, Nova Scotia's sawmilling sector could recover significantly.
11. The core of the mitigation strategy would be to close the gap between DNR's maximum theoretical harvest levels and the much lower levels of harvesting likely under prevailing conditions. Apart from the volume boost, this will bring down sawlog and wood chip costs substantially --as the historical integrated forest economy, and economies of scale, are restored.
12. For the province's sawmilling sector, the beneficial results of the 'with mitigation' case are shown in Figure 44. For the years 2011 to 2015, we calculate that wood costs at Nova Scotia sawmills on average will be only 6% above 2010 benchmark levels. This will be very competitive compared with sawlog costs elsewhere.
13. Under a fully-operating CCR50% policy after 2015, sawlog costs will rise at a higher level -- settling at average levels of around 14% above 2010 for the period 2016 to 2010. Over the 10-year period to 2020, significantly improved flows of sawmill chips will be available to help sustain the pulp and paper sector.

Figure 44



Risks

14. If key mitigation measures fail, there will be few alternative ways to offset the high incremental costs projected to be incurred by the province's forest sector. At a distant point in the future, it may be possible to attract new pulp and paper investment to take the place of current industry capacity. But the forest sector, and Canada in particular, are very low on the priorities of most investors.

Eventually, it may be possible to attract greenfield pulp and paper investment (as distinct from further changes in ownership) to take the place of current industry capacity in Nova Scotia. But investment in new greenfield capacity in the forest sector, and in Canada in particular, are very low on the priorities of most investors.

9.

Recommendations

9. Recommendations

1. Adopt a comprehensive transition and mitigation strategy, well in advance of the implementation of any CCR50% measures.
2. Engage fully with industry and all key stakeholders in developing and implementing this strategy
3. Appoint a senior level person within DNR or another ministry to (a) develop (b) direct and (c) take responsibility for the successful implementation of the mitigation strategy. Special focus should be placed on achieving a substantial increase in the participation rate of formerly active woodlot owners.
4. The Government of Nova Scotia, along with the province's wood products manufacturers and supporting associations, should undertake an independent analysis of the potential for expansion of the province's wood products sector – notably in the context of structural and non-structural products identified earlier in Figures 39 and 40. Subsequently, where specific potentially financially attractive opportunities are identified, wood products manufacturers and woodlot owners collectively should be encouraged to develop an action plan to pursue them. As noted, a key conclusion of this report is that the major increment of Nova Scotia's forest sector's potential future value and job growth gains can come from its wood products sector.

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**Prepared for DNR
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**by
Woodbridge Associates Inc.**