Ecological implications of increasing the wood supply from New Brunswick's public forests: the need for a broader vision

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Introduction

We thank the Select Committee on Wood Supply for giving us the opportunity to publicly address this important issue. Because Crown lands are actually owned by all New Brunswickers, we will refer to "public lands" in the remainder of this presentation.
This presentation reflects work conducted by my students and myself in northern New Brunswick since 1997, and especially our recent research in J.D. Irving Ltd's Black Brook District, between Saint-Léonard and Saint-Quentin. The goal of this research is to study the response of the native fauna to intensive forest management, with the ultimate goal of ensuring that this activity is sustainable from an ecological perspective. Our focus has long been on small forest birds (woodpeckers and songbirds), but more recently we have also examined the response of some species of lichens, wood beetles, and birds of prey.

The Black Brook District is considered to be among the most intensively managed forest land in Canada[2]. Having conducted research there over the last four years, we believe that we are in an excellent position to comment on the pertinence of the changes proposed to Crown land management by the Jaakko Pöyry report (hereafter referred to as "the Report").

The presentation is structured as follows: first, we review key concepts and tradeoffs relevant to this discussion. Then, we identify the specific statements and recommendations from the Report which pertain to forest biodiversity. Finally, we make recommendations based on our own research conducted in northern New Brunswick.

1. Relevant concepts and issues

1.1 Sustainability

In the context of natural resource management, most jurisdictions and third-party certification schemes emphasize the *sustainability* of management actions as the ultimate criterion to assess their pertinence. What does this mean exactly, in the context of forest

management? There may be some variations on the definition of sustainability but most people would agree to say that forest management is sustainable when (1) it allows maintaining the same timber yield over the long-term, (2) it maintains viable populations of native plant and animal species, (3) it provides other forest values, including economically, culturally and spiritually healthy human communities.

It is debatable whether current forest harvesting is sustainable on New Brunswick Crown lands. As a whole, New Brunswick's forests still host a wide variety of native plants and animals, including species with large area requirements (e.g. birds of prey, moose, black bear) and species with relatively specific habitat requirements (eastern white cedar, Atlantic salmon, pileated woodpecker, northern goshawk, etc.). The extirpation of the wolf and caribou from New Brunswick at the turn of the 20th century probably owe more to direct persecution by hunters and trappers than to changes in their habitat through forest harvesting. That being said, we know very little about the longer-term effects of the current and proposed intensification of forest management on New Brunswick's forest flora and fauna. As a matter of fact, we know very little about taxa other than birds, mammals, and perhaps vascular plants. For example, our work in the Black Brook District led to the identification of three new carabid beetle species for the province, even though we only surveyed a relatively small area[3].

1.2 Biodiversity

Another important concept to consider is biological diversity, or *biodiversity*. Here, we use the broader definition, which pertains not only to the diversity of species present, but also to the structural and functional components of an ecosystem. For example, by providing nestboxes, forest managers could help maintain populations of certain bird species, but if management is designed to maintain dead and dying trees of sufficient size (a structural component), these populations could also be maintained. Hence, this subtle difference in terminology has major practical implications for the way we manage forests.

We often refer to the conservation of native forest biodiversity when in fact it is impossible to measure all its components. Nonetheless, if we can capture some elements of this biodiversity in our studies and we can assume that these elements represent reasonable indicators of biodiversity as a whole, the use of the term can be justified.

1.3 The Fennoscandian model

This document does not pretend to hold THE answer to the question implicit in the title. We hope to shed some light on the debate based on our findings and our knowledge of the issues. However, only time can tell the outcome of our actions on complex ecosystems such as New Brunswick's public forests. Nonetheless, as was done in the Report, we would be wise to use the Fennoscandian experience as an example. Of course, there are differences between New Brunswick's context and those of countries like Sweden or Finland. However, the type of forestry intensification proposed in the Report should have similar effects, in particular:

(1) a large increase in the proportion of the land-base devoted to intensive timber production, at the expense of mixedwood stands and areas currently devoted to non-timber values (see Report, p.51);

(2) a simplification of forest composition and age structure: fewer plant species present, especially deciduous trees and shrubs, and fewer age classes;

(3) a reduction in the amount of dead and dying trees with shorter harvest rotations and commercial thinning.

This "quick and dirty" assessment is broadly endorsed in the Report, which states that "there are practically no natural forests in southern Finland and few (...) old forests with dead wood" (p.31).

The main effects of intensive silviculture on forest biodiversity are the rarefaction or extinction of species, especially:

(a) tree species with low commercial value or animals and plants associated with old forest or dead wood;
(b) species with a low mobility, or with a low tolerance for human activities, increased road density, and the resulting access to remote sites by hunters and trappers;

Organisms responding negatively to intensive forestry range from fungi and lichens to woodpeckers and large mammals[5,6].

We cannot possibly adopt conservation strategies for every species, assuming that we could identify all of them in the first place. That being said, we must start with the premise that we cannot knowingly cause the extirpation or global extinction of a given species through excessive harvesting and silviculture. We also cannot assume that existing parks and reserves can "do the job" over the long run. For example, telemetry studies conducted on black bears in Fundy National Park showed that only one individual had its entire home range encompassed within the Park[7]. It follows that in order to manage our forests sustainably, we need to successfully meet conservation objectives outside protected areas.

1.4 Socio-economic considerations

Because we chose to focus on ecological issues does not mean that we ignore the socio-economic dimension of forest management. On the contrary, we view these issues as tightly interlaced and we refuse to reduce them to the simple equation of "increased wood supply = more jobs". As a matter of fact, the Report fails to provide meaningful indicators of the comparative economic performance of various "uses" of the forest (pulp production, sawtimber production, transformation into various wood products, recreation/tourism, etc.). The Report is also vague about the nature and duration of the employment created associated with intensive forestry, and it does not address alternative scenarios of employment (e.g. allocating portions of the land-base towards

conservation/tourism or high-quality forest products in addition to intensive sawtimber production).

Restoring biodiversity into intensively managed forests is a costly business. Swedish forest companies along with the Swedish government are now spending an estimated 2 billion crowns per year (ca. 330 million CAN$) to address biodiversity conservation issues on their forest lands[8]. This money is mainly directed towards research, as well as subsidies, educational tools and training of forest land owners. Therefore, we would be wise to ensure that we do not follow the same path, or even a similar one. Although harvesting has a relatively long history in our province, we still have large blocks of forest and considerable areas (mainly in the hardwoods) that were naturally regenerated and have maintained a more complex structure and hold more dead wood than plantations.

2. Focal statements and recommendations from the Jaakko Pöyry report

The Report's key statements with regards to ecologically-sustainable forest management can be summarized as follows:

· New Brunswick's forest lands could be managed more intensively, given our forest-growing conditions. As a matter of fact, softwood supply could be doubled while maintaining hardwood supply.

· The intensification of forest management could be done while meeting DNR's wildlife habitat targets and other non-timber objectives.

· The wood supply objectives set by the New Brunswick government should be binding, both on the Government and licensee.

3. Research findings relevant to the report's key statements

3.1 Productivity of New Brunswick's forest lands

Our research does not address forest productivity from a timber yield perspective; we will let forest engineers and forest ecologists determine whether New Brunswick's public lands can indeed produce twice as much softwood over the long-term. Nonetheless, our research provides insight into the potential effects of the increased use of softwood plantation as a way to increase timber yields. In the Black Brook District, softwood plantations currently cover 30-35% of the area. This is much higher than the provincial average on public lands (ca. 20%), but lower than what is proposed in the Report (ca. 42%, p.47).

Research in managed forest landscapes of Sweden and Finland has shown that many species of ground-dwelling and saproxylic (wood-boring) insects (among other species) are severely threatened by intensive forestry. This has become increasingly clear as researchers have compared the results of insect surveys conducted in mature managed vs old-growth spruce stands[9]. One might argue that such negative effects on the forest fauna would go unnoticed to any but the most specialized forest entomologists. However, repeating past mistakes, especially well-documented ones, would not only be morally unacceptable, it would put the entire ecosystem upon which forestry is based at risk. Although there is a certain degree of redundancy in ecosystems (i.e. several species can disappear without affecting the "whole"), we cannot afford to risk losing species upon which forest productivity is largely based (e.g. mycorrhiza1 fungi, certain nitrogen-fixing bacteria) or species at the base of the food chain (e.g. certain plants and insects). The report is amazingly succinct with regards to the long-term effects of the species losses caused by the intensification of Finnish forestry, apparently assuming that current high timber yields are sustainable. Finnish forest ecologists are prudent on this issue[10], but their data speak for themselves[9,11,12].

3.2 Intensifying forestry while meeting conservation objectives

With regards to forest biodiversity, one of the key statements in the Report is that the proposed doubling of softwood supply from public lands could be achieved while meeting the province's objectives outlined by DNR (Dept. of Natural Resources). Our findings clearly indicate that DNR's wildlife habitat objectives do not ensure the sustainable management of our forests. As a matter of fact, DNR's proposed quantitative targets for the density of large trees and crown closure are respectively about 8 times and 2 times too low, based on our detailed analyses of forest bird distribution in the Black Brook District[13]. Our research was conducted in the Black Brook District; thus, we do not pretend that our results are applicable to all of New Brunswick's forests; the key message is that the proposed guidelines are highly unlikely to meet the conservation objectives for which they were developed.

3.3 Wood supply objectives binding on both the government and licensee

Although this does not sound like an ecological issue, the establishment of legally-binding wood supply objectives could quickly become one. The rationale for establishing binding objectives, according to the Report, is to justify investments by the industry into intensive silviculture (p.46). DNR would presumably increase the licensees wood-supply in proportion to its share of silvicultural costs. However, who will be ultimately responsible for projecting gains in timber yields obtained through intensive silviculture? Will the industry and government share the responsibilities if projected yields do not materialize, or will the government be legally bound to find wood elsewhere to make up the difference? Will DNR have to relax its non-timber objectives to make up for that difference?

The Report clearly conveys the perception that current "special management areas" do not achieve their non-timber objectives. Although the economic rationale behind the

proposed reassessment of these areas is clearly outlined, the assessment of their performance is surprisingly sloppy, to say the least. For example, the current "yields" of deer are compared directly between New Brunswick, Sweden and Finland, in spite of the fact that New Brunswick's forests host not only a different species of deer, but a deer from a different genus (white-tailed deer, *Odocoileus virginianus* vs roe deer, *Capreolus capreolus*)!! This is no mere taxonomical detail: our white-tailed deer weigh ca. 5 to 6 times as much as Fennoscandian roe deer! Elementary biology indicates that white-tails cannot reach the high densities recorded in roe deer, simply because they are bigger and require more food...

This example nicely illustrate the insufficient attention paid to ecological issues in the Report. This is surprising, given the fact that Finnish ecologists are among the best in the world. A quick look at recent studies reveals a very interesting fact: in Finnish nature reserves, researchers found a gradual decline in the abundance of forest birds as one moves west of the extensive forests of russian Karelia[11,12]. This decline indicates that populations in these reserves may either be maintained through immigration from russian populations[11], or that there is an increasing amount of forest as one moves eastward within Finland[12].

Recommendations for integrating biodiversity conservation into forest management

1. Our research in the Black Brook District indicates that forest songbirds sensitive to timber harvesting require a canopy closure of at least 70% as well as a density of at least 80 large trees (>30-cm dhp) per hectare. Forestry practices should also be designed to maintain standing dead wood and logs, although we are currently examining the quantative requirements of various taxa in this regard (mainly ground beetles and woodpeckers)[3,4].

2. Target proportions of each stand type (softwood, mixedwood, hardwood) should be set based on those found for the relevant areas prior to large-scale, industrial forestry (i.e. before the 1950s). Old air photos can provide useful information for this purpose[14].

3. Areas devoted to biodiversity conservation should be clumped rather than scattered over the land-base. There are already spatial requirements for old spruce-fir habitat (blocks >375 ha). Such requirements should be set for mixedwood and hardwood stands as well to ensure that species with large home ranges (e.g. Northern Goshawk, Barred Owl, etc.) can persist in managed forest landscapes. Such blocks need not to be made up of unbroken old, pristine forest, nor do they need to be set aside permanently. However, they should represent relatively compact blocks of mature/old forest large enough to accomodate at least one home range, and they should be replaced by similar blocks when harvested. Our current research addresses this issue so that we can provide quantative targets to back up this recommendation.

The need for a broader vision

In closing, I would like to extend a call to men and women of vision: can we find creative ways to make use of our public forests to the benefit of all New Brunswickers? Intensive forestry has been tried before, with mixed results. Over the short-term, timber yields increase, but what are the longer-term ecological and economic costs? There are already more than 2000 red-listed species in finnish forests[11]. Some of these species may hold the key for efficient decomposition of dead wood or for fixing nutrients and making them available to trees. A number of alternatives to the Report's scenario exist, including the production of high-quality sawtimber, the development of innovative wood products, and various uses of the forest and its species that do not require harvesting the forest. It is up to us to determine the combination of forest uses that will result in the highest number of good-quality jobs and, ultimately, the highest quality of life for all New Brunswickers.

Notes in the text

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