

Box 126 RR2

Dugald MB ROE OKO

March 19, 2018

Elise Dagdick

Environmental Approvals

160-123 Main St.

Wpg MB R3C 1A5

Dear Ms Dagdick:

Re: Public Registry 3893.10

Louisiana-Pacific Canada (LP)

I have reviewed the "Draft Guidelines for the Preparation of an Effects Assessment" for LP's Forest Management License Area 3. My comments follow the published, numbered format:

1.0 INTRODUCTION

There is no provision in the Environment Act for an "Effects Assessment" (note the capitalization). It is your office's duty to enforce the Act, not yield to a foreign corporation's claims of "duplication". You represent the Manitoba public, not LP's management and shareholders. Public review is likely to be compromised by the inclusion of an ersatz Environmental Impact Assessment within a Forest Management Plan as an "Effects Assessment". Please let me know if this is a precedent, and if you will be allowing this nonsense in the future. I resent the cheapening of due process that should have been subjected to public comment. This is unprofessional.

There are numerous references to "Area 3". How many "areas" are under LP's control? How much is included in Duck Mountain Provincial Park?

What fees will LP pay to the province to pursue their environmental approvals?

2.0 INTENT AND SCOPE OF THE EFFECTS ASSESSMENT

This section includes the comment that "to the extent possible, apply an ecosystem-based approach to forest management". Why the qualifier "to the extent possible"? This is a giant loophole through which LP will drive its logging trucks.

3.0 EXISTING ENVIRONMENT

Direction is made for the "Use of maps or graphical representation". Kindly extend this to the publication of photographs which accurately depict the effects of LP's previous impact on the land. The photographs must be displayed so as to convey the full spacial impact on Duck Mountain Provincial Park.

LP must be required to acknowledge, in writing, that it is conducting forestry within Duck Mountain Provincial Park.

If LP has been in violation of its previous licenses for any reason these should be listed in the current proposal. The penalties suffered by LP should also be described.

What noise and light pollution will be caused by this proposal?

4.0 PROJECT DESCRIPTION

The use of pesticides should be prohibited. The forest has grown just fine in the 10,000 years since the glaciers withdrew.

A calculation should be made of LP's total carbon footprint, even though forestry is exempt from the "Botched-in-Manitoba Climate and Green Plan" by virtue of special provisions for large emitters. This calculation should be done every year and publicly reported.

The maintenance of vehicles (trucks, loaders, tractors, caterpillars, etc.) including fueling, oil changes and repairs must be subject to protocols. Fuel storage sites must also be addressed.

Steps taken to prevent the transmission of zebra mussels should be explained. There is evidence, apparently, that one lake in Duck Mountain is infested.

5.0 ENVIRONMENTAL ASSESSMENT

It is curious that this section actually uses the words "environmental assessment" when LP has demanded, and you have agreed, that such a traditional assessment will be abandoned in favour of an "Effects Assessment".

7.0 MITIGATION

What is the difference between "road construction" and "access management"?

10.0 MONITORING AND RESEARCH

It appears that LP is responsible for “monitoring”, the results of which will be reported to Manitoba Sustainable Development. So, the fox is guarding the henhouse?

11.0 PUBLIC INPUT

Public meetings must not be restricted to LP’s friends in Swan River. Such consultations should be held in Brandon and Winnipeg. Why? Because Duck Mountain is a provincial park, not a municipal industrial park.

This proposal has a magnitude such that the Clean Environment Commission should be engaged.

I recommend that the 20 year Forest Management License be subjected to annual reviews and surprise inspections by independent experts from outside of Manitoba.

Please note the several questions that I have asked. Your responses would be appreciated.

Yours truly,

C. Hugh Arklie, CA, BA (Env.St.)

Dagdick, Elise (SD)

From: chuck karney <chuckkarney@hotmail.com>
Sent: February-21-18 7:17 PM
To: Dagdick, Elise (SD)
Subject: L P twenty year plan for area 3

hi Elise... Just read over the guidelines for L P 's filing for a 20 year plan. I have spent almost every weekend since 1994 in the duck mountain forest reserve in an area where LP has been cutting since 1996. They are great guidelines but they mean absolutely nothing when LP gives the government what they want to hear and continues to destroy a very diverse part of the province. Its been a very sad 20 years so far. LP's track record is horrible in other provinces. Looking forward to reviewing and commenting on their application when it comes out.....CHUCK KARNEY...Roblin , MB.



WUSKWI SIPIHK FIRST NATION

April 3, 2018

Ms Elise Dagdick

Environmental Approvals

160-123 Main St.

Wpg MB R3C 1A5

Dear Ms Dagdick:

Wuskwi Sipihk First Nation (WSFN) has quickly reviewed the "Draft Guidelines for the Preparation of an Effects Assessment" for Louisiana-Pacific Canada Ltd's (LP's) Twenty Year Management Plan for Forest Management Licence Area No. 3. Comments are as follows.

INTRODUCTION

- "... proposing to develop a new Twenty Year Forest Management Plan ...". As written, this suggests that LP had previously developed a Twenty Year Plan. In fact, LP's first and only long-term plan was its Ten Year Plan, from 1996 to 2005. Manitoba Sustainable Development (and its various predecessor Departments) allowed LP to operate in the absence of a long-term plan since December 31, 2005, or for more than twelve (12) years. Did Environmental Approvals explicitly write this in an attempt to 'snooker' the public? Provide the full context to the Introduction so that all members of the public are appropriately and transparently informed of the background respecting government managing and licencing of the LP development. This full disclosure should include the fact that, since 2006, Environmental Approvals has licenced the LP forestry development on an annual basis and most recently on a multi-year basis, in the absence of a long-term plan.
- A separate environmental impact assessment, containing the Effects Assessment, is required. The previous Ten Year Plan and associated environmental impact assessment was incestuous enough that one would expect at least some semblance of independence. Far more important, those who conduct the Effects Assessment must be completely independent of those who

develop the Plan. For example, it is now understood that LP's growth and yield assumptions for aspen, black poplar, and white birch in its 1996-2005 Ten Year Plan were absurd. WSNF Elder Buddy Brass, Canadian Forest Service Forester Jim Ball, and members of the environmental community all recognized the absurdity of the assumptions at the time, as did at least some staff of the Manitoba government. During the Clean Environment Commission hearings on the impact of LP's forestry development on the environment, it was the LP staff person ultimately responsible for those grossly flawed growth and yield assumptions who was defending the overestimates. And the 'independent' technicians directly responsible for development of the assumptions were not available to answer the hard questions. Clearly, based on the history of LP's first and only long-term plan and environmental assessment thereof, by far the best outcome of environmental assessment on forestry development in Manitoba can only come about where those who conduct the assessment are fully independent of those who promote the forestry development within a long-term plan. There is a need for a 'fire wall'.

INTENT AND SCOPE OF THE EFFECTS ASSESSMENT

- "... to the extent possible, apply an ecosystem-based approach to forest management at the landscape level ..."
 - Why the qualifier "to the extent possible". Simply put, one takes such an approach or one does not. If the currently accepted progressive scientific evidence-based sustainability paradigm is the "ecosystem-based approach", then this approach should be a given in the absence of a reasonable argument to the contrary. With the qualifier, the sentence is effectively meaningless (e.g., will Environmental Approvals also require LP to indicate where it does not take an ecosystem-based approach, and to provide rationale as to why it diverges from such an approach?).
 - Environmental Approvals must provide a definition of what it means by ecosystem-based forest management. For example, the definition(s) emanating from the forestry industry are quite different from broad definitions from the scientific community. This might be comparable to the time of the Clean Environment Commission hearings, where it was apparent that the Manitoba Forestry Branch 'sustainable' annual allowable cut basis/definitions, and arguments by Manitoba Forestry Branch foresters on forest 'sustainability', were narrowly focused on sustainable fibre supply. This narrow focus of the definition of 'forest sustainability' at the time ignored the sustainability of the many other values of the forest (e.g., stable water yield, moose, ovenbirds, medicines, etc.).
- "... employ adaptive management strategies". The Effects Assessment should document what adaptive management strategies have been deployed since initiation of LP's Ten Year Plan (and earlier if possible; i.e., from the time that local forestry companies began to log for LP to supply its mill, prior to licensing of its Ten Year Plan).
- "... describe the ... indigenous community engagement programs ...". Due to funding and capacity constraints, Wuskwi Sipiik First Nation, like many other First Nation and indigenous peoples, requires funding from LP in order to engage in a meaningful manner. The Effects

Assessment should indicate the global amount provided by LP to indigenous peoples so as to allow for engagement in a meaningful manner (i.e., none, \$10,000, etc.).

- “... environmental effects on designated protected areas ...”. This must include analysis of the adequacy of Manitoba’s protected areas program in terms of meeting the Manitoba goals, for Forest Management Licence Area No. 3. For example, an environmental impact assessment of a cutblock proposed for Wuskwi Sipihk First Nation’s Kettle Hills Reserve found at least some enduring features within LP’s FMLA to not be adequately protected at the time of the assessment (Soprovich 2008). That is,
 - “The T1/M enduring feature landunit of Natural Region 5b is protected within the 2.59 km² Kettle Stones Provincial Park to the northeast of the proposed cutblock, and within a much larger area south of Chitek Lake to the east of Lake Winnipegosis. Some 4.75% of the landunit is protected within Manitoba, and 0.09% of the landunit is protected within the Kettle Stones Provincial Park (Ms Yvonne Beaubien, Manager, Protected Areas Initiative, Manitoba Conservation, pers. commun., November 20, 2007). However, the Chitek Lake area is protected on an interim basis (i.e., the area is not designated as permanently protected). The landunit has a ‘partially captured’ representation status per Manitoba Parks and Protected Areas.”, and
 - “Although Manitoba Parks and Natural Areas’ ecological land classification treats the cutblock area as ecologically equivalent to lands within the two protected areas, there are a number of sources of information to suggest that this is not true. The area south of Chitek Lake is within the Waterhen Ecodistrict (Smith et al. 1998). This Ecodistrict is characterized by a north-south trending drumlinoid or ridge and swale topographic pattern, which differs considerably from the cutblock area (Figure 1). While detailed soil data are not available for the cutblock area, the soils of the Waterhen Ecodistrict are primarily dark gray chernozems and eutric brunisols whereas those of the Swan Lake Ecodistrict are primarily gleyed rego black and gleyed dark gray chernozems (Smith et al. 1998). The surficial geology of the cutblock area is principally ‘till – silt-rich’ and includes an ‘organic’ component, whereas the surficial geology of Kettle Stones Provincial Park is primarily ‘rock – Paleozoic’) per Manitoba Science, Technology, Energy and Mines (2007). This differs from the designation of ‘glacial till derived from Paleozoic rocks’ for both areas per Manitoba Parks and Protected Areas. The discrepancies respecting surficial geology are likely a function of the 1:1,000,000 scale used to derive Parks and Natural Areas landscape units (Watkins and Hernandez 1996).”.
- “... describe proposed measures intended to mitigate and/or compensate for any adverse effects to the environment ...”. Under ‘lessons learned’ to date, after operating for more than 20 years, presumably LP should have some understanding of the efficacy of the mitigation measures that were proposed for its Ten Year Plan. LP should report on all of those measures, including changes made as a result of monitoring and ‘new’ information (i.e., adaptive management), and new measures that were implemented along the way. This reporting would include the basis for change or no change, and provide all data and other information to demonstrate why LP concluded that there was no need to change, or that there was a need to

change. All monitoring programs related to mitigation measures, since initiation of the Ten Year Plan, must be outlined.

- "... evaluate whether forest ecosystems will be sustainable ...". At the time of the Clean Environment Commission hearings on LP's Ten Year Plan, forest 'sustainability' was effectively defined by Manitoba Forestry Branch as maximum sustained yield short-rotation forestry with the goal to optimize the production of fibre and income for the forestry industry. And at least some foresters of the day, if not most, thought in those terms when the word 'sustainable' was applied to forests, with their attendant 'crop' of trees. Environmental Approvals needs to clearly define what it means by sustainable forest ecosystems. For example, does it mean meeting the principles of the Ecological Society of America for ecosystem sustainability, or does it mean some definition by some group of foresters?
- "... mechanisms to involve the affected ... Indigenous communities ... in the effect assessment of site specific activities ...". Again, funding is required for Indigenous communities given their lack of capacity. For some time, and to no avail, WSFN has requested support from the Manitoba government and the forestry industry to, among other matters,
 - allow WSFN to document sensitive areas via GPS so that the forestry industry can be informed, at the minimum, of the location of such areas (e.g., areas where sweetgrass, medicines, and other traditional plants are found), and
 - employ a WSFN community member in the development of operating plans so as to ensure that Nation interests might be identified and, hopefully, protected.

EXISTING ENVIRONMENT

The existing environment represents the collective contributions of various drivers over time, and there has been considerable change since Louisiana-Pacific Canada Ltd. arrived in the Swan River Valley. To understand the existing environment, and LP's long-term impact on the environment, one must understand what has changed since LP arrived on the scene. This is true for the social and economic environments. Required are the following.

- Maps showing all the logged areas within LP's Forest Management Licence Area (FMLA) since the Company arrived in the Swan River Valley, including those areas cut by other forestry companies for LP's mill prior to the Company receiving its first Environmental Licence and allocation.
- LP made a number of promises when it arrived in the Swan River Valley more than two decades ago. The Effects Assessment must provide an understanding of the extent to which indigenous peoples have, or have not, benefitted economically from the forestry development since LP's arrival on the scene. That is, the economic contribution of LP's operation to the Region since it received its Licence and allocation. This includes the following.
 - Economic contribution
 - in total,
 - for First Nation people, and
 - for other indigenous people.

- Mill-related jobs/employment and forest-related jobs/employment
 - in total,
 - for First Nation people, and
 - for other indigenous people.
 - Other economic activity (e.g., purchases from stores, employment of contractors to work on the mill, etc.)
 - in total,
 - for First Nation people, and
 - for other indigenous people.
- The Effects Assessment must provide an understanding of how much money left the Region (e.g., to businesses within Canada, to the USA).
- The existing socio-economic environment, vis-a-vis the fair treatment of First Nations by governments and companies involved in forestry development, has changed considerably since the Manitoba government granted LP tenure over a huge landbase. For other kinds of developments, it is not uncommon for companies to enter into Impact Benefit Agreements (IBAs) with First Nations, and for governments to share revenues with First Nations (e.g., water revenues for run-of-river hydroelectric developments in BC). Indeed, this is where the world is going. Given this, and in the context of the broader existing environment (e.g., current practice across Canada), the Effects Assessment must describe, for existing forest tenures within Canada,
 - Impact Benefit Agreements between forestry companies and First Nations, and
 - Resource revenue sharing between governments and First Nations (e.g., stumpage),
- Old seral stages of forest. The Effects Assessment must compare the amount of old seral stages of the different forest types for the existing environment to that which existed when LP's only long-term plan began on January 1, 1996.
- Since LP arrived on the scene, Manitoba has considerably reduced the number of staff supervising what is happening on the land, and in the office. It is Wuskwi Sipiik First Nation's view that government supervision of LP's forestry development is lacking. The current government staff resources allocated to the management of forestry development within LP's FMLA must be shown, as well as the staff resources that were allocated when LP received its Licence and allocation.
- Accountability has changed since LP arrived on the scene. The Effects Assessment must indicate how accountability has changed since that time (e.g., how the roles of LP and government have changed, e.g., respecting the supervision of logging, regeneration, regeneration surveys).
- "If information on specific components is not available, indicate how and when the required data will be gathered.". LP should also indicate why it has not gathered such data, some 20 plus years since its Ten Year Plan and Environmental Licence on the Plan.
- "Sensitive information such as the location of sensitive habitats and heritage/cultural resources should be kept confidential and addressed outside of the Effects Assessment document.". LP should describe how confidentiality will be maintained for such information, e.g., to demonstrate that it will implement appropriate processes.
- 3.1 Biophysical Environment.

- b) "enduring features ... for the sites.". LP must include the percentage of each enduring feature that is protected and the protection status (e.g., permanent, temporary five-year, etc.). LP must include what mechanisms are in place to maintain the ecological integrity of the sites (e.g., minimum size, buffering of sites from logging and other forestry development).
- d) "wetlands". Include by "wetland classification" (i.e., no different from streams, there are different types of wetlands).
- f) Vegetation.
 - "use ecological land classification where feasible". Environmental Approvals should specify specific ecological land classifications, as a minimum.
 - "threatened or endangered plant species or plant communities". Include species of Special Concern (COSEWIC).
 - "plant species at the extent of their range". Include, as a separate category, species that have recently shown up in the FMLA or may have expanded within the FMLA (e.g., big bluestem grass) since initiation of the Ten Year Plan (i.e., changes). Include, as a separate category, species that have been lost from the FMLA since initiation of the Ten Year Plan (i.e., changes).
- g) Wildlife.
 - "plus available data for micro-organisms, insects". This should be arthropods, as opposed to insects. For example, insects would not include spiders. Arthropods is a broader scientific category that includes, among others, insects and spiders. Better yet might be "invertebrates", which includes, for example, nematodes which are common within forest soils and which fulfill important roles and have symbiotic relationships with forest trees, plants, and other animals.
 - "threatened or endangered animal species". Include species of Special Concern (COSEWIC).
 - "Species of conservation concern or cultural importance". LP must list the species of cultural importance to Wuskwi Sipihk First Nation and other indigenous peoples. It will be necessary for LP to determine this list via consultation with WSNF and other indigenous peoples; i.e., the "Wildlife and Fisheries Branch and Regional Wildlife staff" are not knowledgeable, nor qualified, to provide such a list.
 - "animal species at the extent of their range". Include, as a separate category, species that have recently shown up in the FMLA or may have expanded within the FMLA since initiation of the Ten Year Plan (i.e., changes). Include, as a separate category, species that have been lost from the FMLA since initiation of the Ten Year Plan (i.e., changes).
 - "habitat features including but not limited to ...". Some of these features may already be public knowledge (e.g., 'Moose Meadows' for the FMLA to the north), and should be listed if that is the case.
- h) Aquatic species.

- "specifying non-native species". Specify the species that have shown up/been recorded within the FMLA since initiation of the Ten Year Plan (i.e., changes).
- "threatened or endangered species". Include species of Special Concern (COSEWIC).
- "species at the extent of their range". Include, as a separate category, species that have recently shown up in the FMLA or may have expanded within the FMLA since initiation of the Ten Year Plan (i.e., changes). Include, as a separate category, species that have been lost from the FMLA since initiation of the Ten Year Plan (i.e., changes).
- 3.2 Socioeconomic Environment.
 - a) Traditional land and resource use. Generally, information on traditional land use and occupancy is owned by those who share the information, is sensitive information, and must be treated in a confidential manner.
 - "traditional hunting ...". Trails are important measures of occupancy, past use, and current use.
 - There are a number of occupancy types (e.g., cabins).
 - "sacred, ceremonial, and burial sites". These types of locations are particularly sensitive and would almost always, if not always, only be shared subject to strict confidentiality criteria and processes. For a sensitive wildlife site like a bear den, the Guidelines indicate "the locations of these sensitive sites should be kept confidential to protect sensitive resources ... effectiveness will be monitored.". The fact that Environmental Approvals would direct LP to keep the location of a bear den confidential, but not require the same for indigenous sacred, ceremonial and burial sites, speaks volumes to the importance that Manitoba places on addressing fundamentally critical issues for indigenous peoples (i.e., by appearing to value a bear den more than a burial site). Environmental Approvals should also understand that, with respect to discovery of a burial site, there exists Manitoba legislation to address the course of action.
 - b) "Local economies". LP must provide an indication of the value (economic, nutritional, other) of food and other resources for Wuskwi Sipiik First Nation and other indigenous peoples (e.g., deer, moose, blueberries, medicines).
 - c) "Local and regional infrastructure". Include Reserves, TLE Selections, and TLE acquisitions.
 - d) "Community values ...". For Wuskwi Sipiik First Nation and other indigenous peoples, see a).
 - r) "other non-harvesting forest uses.". Does this mean 'non-timber forest products' or is it meant to be broader? Please define.
 - s) "Heritage and cultural resources ... burial sites.". For Wuskwi Sipiik First Nation and other indigenous peoples, see a).
 - w) Demographics. "population measures and trends". This should be provided specific to indigenous peoples.
- 3.3 Past and Existing Forest Management Activities.

- a) "former road decommissioning success". Define success. I.e., success should include, among other elements, the extent to which hunting was curtailed, the extent to which regeneration of trees and other vegetation was increased, and the extent to which non-native plants were introduced.
- c) Harvesting practices and associated activities.
 - "past and current harvest areas ... buffers". Retained stand structure must be included (e.g., snags and trees, coarse woody debris).
 - "Annual Allowable Cut". Context must be provided for this to be meaningful. I.e., the Annual Allowable Cut must be defined, including the assumptions (e.g., for retained structure, old-growth forest, etc.).
- d) "regeneration success". This should include not only tree species, but data on all of the species, native and non-native, that colonize the logged areas.
- e) "fire, insects". Include blowdown (i.e., due to large wind events, like that which occurred on the north slope of the Duck Mountain, in particular).
- f) Forestry and ecological research. Include all of the graduate work completed within the FMLA, e.g., through the University of Winnipeg during the Ten Year Plan.

Project Description

- c) Harvesting practices and associated activities.
 - "operating/cutting area ...". LP must include retained structure (e.g., snags and trees, coarse woody debris).
- d) Silvicultural practices.
 - "methods to maintain and protect biodiversity". LP must indicate what non-native species will be introduced, changes to ecosystems, etc. (i.e., the known residual effects of its practices).
- e) Climate Change.
 - The Effects Assessment must include how species, habitats, and ecosystems will be altered (e.g., species richness, specific species changes).
 - The Effects Assessment must provide analysis of the impact of climate change on the ability of protected areas to protect biodiversity, and the extent to which the integrity of protected areas will be compromised.
 - The Effects Assessment must provide how carbon (CO₂equivalents) will increase as a result of the Twenty Year Plan (i.e., vs no forestry development).
 - The Effects Assessment must provide its predictions respecting changes under standard climate change scenarios (e.g., 'Business as Usual', 'Meet the Paris Commitment', etc.).
 - The Effects Assessment must provide the probabilities of the various scenarios coming to pass.
 - The Effects Assessment must provide Manitoba emissions changes (CO₂equivalents) since initiation of the Ten Year Plan, and recent Manitoba emissions and challenges (e.g., like the information found in the March 2018 report by Manitoba's Auditor General and other auditor generals – Perspectives on Climate Change Action in Canada).

A Collaborative Report From Auditors General.), which suggest, for example, little or no progress on emissions control over the past two years of the new Manitoba government.

Environmental Assessment

- The Twenty Year Plan will result in adverse effects on resources and values important to Wuskwi Sipiik First Nation, i.e., losses to the Nation. The Effects Assessment must identify and quantify the resources and values that will be lost to Wuskwi Sipiik First Nation and other indigenous peoples as a result of the Twenty Year Plan.
- Moose are a very important species to First Nations and other indigenous peoples, and continue to be a key resource for members of Wuskwi Sipiik First Nation. Since LP arrived on the scene, the moose population of the Duck Mountain (and other areas) declined substantively, necessitating the closure of the area to hunting by indigenous people and those without Treaty rights to the resource. The population has been very slow to recover despite wolf control and other management actions, and it is only now that a limited hunt is being discussed. It is well known that increased access to hunters can adversely impact moose populations, and this concern/prediction was raised during the Clean Environment Commission hearings on LP's 1996-2005 Ten Year Plan. In BC, respecting grizzly bear, environmental assessments require examination of bear vulnerability in relation to roading (e.g., due to collisions with vehicles, being killed by hunters and others) using a road density index. The Effects Assessment must
 - Examine population changes since the 1993 survey (Soprovich 1994) to address the following. I note that the population was relatively high in 1993 prior to the arrival of LP on the scene, and may have been as high as 5,000 or more moose prior to the mortality event of 1995/96.
 - Why the population declined since LP arrived on the scene (i.e., what factors have been most responsible for the demise and the relative importance of the factors).
 - Why the population has been so slow to recover under conditions of years of closure of hunting to all, wolf control, and other measures (i.e., what factors are most responsible for the slow recovery and their relative importance)
 - What role has access, in particular, had on the moose population? Quantify its impact (and relative impact).
 - Is there a relationship between moose vulnerability and road density for moose in the Duck Mountain, as is the case for grizzly bear in BC?
 - Fully and honestly assess the effect of the forestry development on moose.
- White-tailed deer are a very important species to First Nations and other indigenous peoples, and continue to be a key resource for members of Wuskwi Sipiik First Nation. The Effects Assessment must fully and honestly assess the effect of the forestry development on white-tailed deer.
- Moose habitat. LP's consultants on the environmental impacts of its Ten Year Plan utilized a 'habitat suitability index' model to assess the impact of the development on moose habitat. The

veracity of this type of model was questioned at the time. Since then, an examination of the scientific literature to approximately 2004, and tests of some of the models used by LP's consultants (e.g., American marten, black and white warbler), found them to fail miserably (Soprovich 2004). Recently, I conducted analyses of the 2006 moose habitat suitability index model for the Duck Mountain and Porcupine Mountain (KBM Forestry Consultants Inc.), and found the model to make such obvious gross errors that one could only conclude that the model is a bust (see Appendix A). Should the Effects Assessment make use of a moose habitat model, as is anticipated, it must

- Provide a complete examination of findings of the current scientific literature (i.e., including the last 20 years) respecting tests of the type of model being applied, as justification for use of the model (i.e., so that one can understand the degree to which we might expect the model to perform, be a bust, or otherwise).
 - Provide tests of the model using existing data for the moose of the Duck Mountain, as possible (e.g., moose winter survey data, including analysis of how visibility bias would impact on the use of such data).
 - Provide an assessment of the extent to which the model is based on current literature (e.g., vs relatively outdated literature), and the applicability of the literature to the FMLA (i.e., in relation to ecosystem differences for the cited literature).
- Proponents of forestry development often point to the value of logging in providing food resources to moose when cutover are young. However, for the Duck Mountain (and other areas within the FMLA), upland almost homogenous old aspen-dominant ecosystems can develop a dense hazel-dominant understorey, which provides significant food resources to moose, and will demonstrate a browse line when populations are high (e.g., the 'Moose Hill' area prior to the arrival of LP on the scene). Further to this, when such ecosystems are 'immature' to 'mature' (forestry terminology), there may be virtually no to little browse in the understorey (e.g., aspen-dominant ecosystems in the 1980 burn near the Whitefish Lake road in the Porcupine Mountain). If LP and/or its consultants wishes to make any kind of claims about the positive attributes of logging in terms of food resources, it must
 - Provide the data that the Company has on browse production in relation to age since disturbance (presumably LP has collected some data over the course of the 20+ years since its initial Licence and allocation), and
 - Provide analysis/modelling of browse production through the full cycle of aspen-dominant and other ecosystems, including for the industrial 'forests' produced as a result of logging and other forestry development, and the base condition naturally-originated forest (i.e., for stand initiation due to fire or some other natural event through to stand breakup, and beyond as required). I note that an ecosystem-based approach, like that advocated by the draft Guidelines, requires an understanding of the base condition to determine the ways and extent by which the forestry development ecosystems differ from the natural ecosystems (e.g., the kind of data collected by Dr. Brad Stelfox and his colleagues in the seminal study of the aspen mixedwoods in Alberta in the 1990's – Stelfox (1995)).

- It is Wuskwi Sipiik First Nation's view that the number of moose affected by ticks has increased over time (e.g., since the closure to moose hunting). Some local people believe that forestry development has led to increased tick populations. The Effects Assessment should review the scientific literature to determine the impact of forestry development on moose ticks, and on the infestation of moose by ticks.
- Habitat models for other species. Wuskwi Sipiik First Nation values all species of plants and animals, and many of these species continue to be important to members of the Nation as food, for medicines, and for many other reasons. As previously noted, Soprovich (2004) demonstrated the general failure of a number of the habitat suitability index models developed by the Manitoba government and the forestry industry. Should the Effects Assessment make use of any habitat model, as is anticipated, it must
 - Provide a complete examination of findings of the current scientific literature (i.e., including the last 20 years) respecting tests of the type of models being applied, as justification for use of the models (i.e., so that one can understand the degree to which we might expect the models to perform, be a bust, or otherwise).
 - Provide tests of the models using existing species data for the FMLA (i.e., provide the scientific evidence to justify the model's use, tests of the models using independent data).
 - Provide an assessment of the extent to which the models are based on current literature (e.g., vs relatively outdated literature), and the applicability of the literature to the FMLA (i.e., in relation to ecosystem differences for the cited literature; e.g., for marten, if the literature is from the mountains where snow may be 4 m thick).
- Pesticides and herbicides. Wuskwi Sipiik First Nation and other indigenous peoples continue to use the land in traditional ways, including to accept fish, animals and plants for nourishment, and medicines for healing.
 - For those pesticides that LP will use, the Effects Assessment must provide
 - the types, frequency, magnitudes, and extent of applications of pesticides since the initiation of LP's Ten Year Plan,
 - the current scientific understanding of adverse impacts on human health, with a focus on children given that they are most vulnerable to the toxic effects of pesticides, and
 - the current scientific understanding of the adverse impacts on the aquatic and and terrestrial ecosystems (including animals), including indirect effects (e.g., alteration of an ecosystem from what would otherwise occur under natural conditions, e.g., towards a monotypic tree species).
 - For those herbicides that LP will use, the Effects assessment must provide
 - the types, frequency, magnitudes, and extent of applications of herbicides since the initiation of LP's Ten Year Plan,
 - the current scientific understanding of adverse impacts on human health, with a focus on children given that they are most vulnerable to the toxic effects of pesticides, and

- the current scientific understanding of the adverse impacts on the aquatic and and terrestrial ecosystems (including animals), including indirect effects (e.g., alteration of an ecosystem from what would otherwise occur under natural conditions, e.g., towards a monotypic tree species).
- Water. Water is critical to First Nations. Wuskwi Sipiik First Nation and other indigenous peoples travel on water, drink water when travelling on the land, harvest medicines from areas of water, trap furs within aquatic ecosystems and obtain considerable protein (e.g., fish) from aquatic ecosystems, among the uses and values of water and aquatic ecosystems. At the same time, Wuskwi Sipiik First Nation, like many other Nations, finds its lands and some buildings located near the bottom of a watershed, and is subject to flooding. Wuskwi Sipiik First Nation has observed that the water now "comes quicker", which is consistent with the known effect that logging leads to relatively fast runoff from cutovers. Within the Kettle Hills of the FMLA, members of Wuskwi Sipiik First Nation have observed changes to area water resources. The Effects Assessment must
 - Provide the available flow and water quality data for streams and rivers, and hydrographs, pre-LP and since-LP, and analysis of the reasons for observed changes,
 - Provide a comparison of flooding and droughtiness, pre-LP and since-LP (e.g., for the streams running off the escarpment of the Duck Mountain), and analysis for observed changes,
 - Provide a comparison of lake levels and water quality, pre-LP and since-LP (e.g., for West Blue Lake), and analysis for observed changes, and
 - Provide a comparison of anticipated flows, water quality, hydrographs, and hydrologic recovery for logged 'forests' and naturally-originated forests, including flooding and droughtiness.
- Old forests ('old growth'). For many decades, it has been well understood that some species are only found in relatively old forest, or achieve by far their highest density in old forest. That is, some species require old forest. At the time of the Clean Environment Commission hearings on LP's Ten Year Plan, the seminal work of Brad Stelfox and his colleagues for the aspen mixedwood forests (Stelfox 1995) was provided to the Commission during arguments advocating for the necessity of requiring LP to provide old-growth across the forest landscape. The Stelfox (1995) work was provided to the Commission because, among other matters, LP's Ten Year Plan and environmental assessment ignored the need to maintain old-growth across the forest landscape. The Effects Assessment must provide
 - For the forest ecosystems within the FMLA (i.e., for those within the Mid-Boreal Uplands Ecoregion ('Duck Mountain') and for those within the other Ecoregions), comparison of old-growth landscape requirements and/or standards for other jurisdictions and forestry companies within Canada. For example, on the Saskatchewan side of the Porcupine Mountain, Weyerhaeuser Ltd.'s long-term Forest Plan incorporates landscape levels of post-rotation (older) forest ecosystems.
 - The amounts of old forest (post-rotation), by ecosystem and age, that LP will manage for at the landscape. And the impact of fragmentation in adversely impacting on the positive benefits of old forests, including edge effects.

- A summary of all of the important attributes of old forests (e.g., for the maintenance of biodiversity, stabilization of flows in creeks and rivers, carbon sequestration).
- A summary of those species that require old forests for their existence, and those found at their greatest density in old forests (e.g., see Schieck and Nietfeld in Stelfox (1995) for birds in Alberta's aspen mixedwood forests).
- The scientific basis, using current scientific literature, for LP's landscape-level old forest goals. This basis must demonstrate that the goals are adequate to meet the needs of those species dependent on old forest.
- Intact forests. Intact forests (e.g., not forests that are highly fragmented due to forestry development) are ecosystems that support "an exceptional confluence of globally significant environmental values relative to degraded forests, including imperilled biodiversity, carbon sequestration and storage, water provision, indigenous culture and the maintenance of human health." (Watson et al. 2018).
 - The Effects Assessment must indicate where intact forest remains within the FMLA (e.g., east of Swan Lake).
 - The Effects Assessment must indicate which values have been impacted for the degraded forests of the FMLA, and the extent to which these values have been impacted.
- The Effects Assessment must provide a calculation, in detail and with clear text respecting all assumptions, of the total carbon footprint of the proposed forestry development (i.e., including the logging and other activities conducted by or on behalf of companies that log conifers).
 - The calculation must be a life cycle analysis, unlike some of the calculations being made wherein positive contributions of forestry are being suggested by ignoring final fates.
 - It must be a complete and honest calculation that is scientifically defensible. I.e., as a life cycle analysis, it must include the ultimate fate of the carbon that is temporarily tied up in, for example, 2 x 4's or paper. This is so because, for example, when a 2 x 4 is burned at a landfill, as is the practice in Swan River, it sends the carbon back into the environment.
 - Carbon footprints must be provided by forest ecosystem type, e.g., for low volume black spruce systems vs high volume aspen systems. This will help us to understand where forestry development is most carbon-intensive, and which ecosystems are most negative in terms of greenhouse gas production, in support of decision-making around how best to combat global warming.
- The Effects Assessment must provide a list of all research, studies, etc. that have taken place in the FMLA relative to 'forest sustainability' since LP arrived on the scene (e.g., the research by the University of Winnipeg that was conducted during the first few years of LP's tenure).
- Environmental assessment of viewscape is conducted in other areas, and certainly is a consideration in British Columbia where tourism is a significant industry and regulators strive to minimize the impact of cutting trees for a range of developments (e.g., forestry, small hydroelectric). The Effects Assessment should assess the effect of the Twenty Year Plan on susceptible viewscales (e.g., the western slopes of the Duck Mountain).

- Duck Mountain Provincial Park. One of the critical roles of Duck Mountain Provincial Park is to protect the biological diversity of Manitoba (e.g., including enduring features like the ancient glacial spillway of the Shell River Valley). Limiting development is fundamental to this goal.
 - The Effects Assessment must accurately depict the logging and other forestry development that has occurred within Duck Mountain Provincial Park since initiation of LP's Ten Year Plan.
 - The Effects Assessment must accurately depict the logging and other forestry development that will occur within Duck Mountain Provincial Park over the course of the Twenty Year Plan.
 - The Effects Assessment must indicate the effects of the past forestry development on biodiversity and other important Park values, and predict the effects of the forestry development proposed in LP's Twenty Year Plan on biodiversity and other important Park values.
- Violations and Failures.
 - The Effects Assessment should report all violations of Acts and Regulations, and penalties, related to forestry development within LP's FMLA since initiation of the Ten Year Plan.
 - The Effects Assessment should report all instances where forestry development within LP's FMLA has been contrary to expectations of the regulator, since initiation of the Ten Year Plan.
- Monitoring. Since LP arrived on the scene, Manitoba Forestry Branch has withdrawn/'evolved' from active forestry management to, among other aspects, a role of reviewing and checking the data now being collected by the forestry industry (e.g., respecting the regeneration of tree species on LP's cutovers). The Effects Assessment should provide assessment respecting the pros and cons of the current system, and how it could be improved.
- Forestry companies often assess the 'sustainability' of their developments via purported independent audits of 'forest sustainability' standards (e.g., CSA, FSC, and the United States of America SFI standard that is applied by LP). The auditors of these types of audits are typically foresters. The costs of these types of audits are borne by LP.
 - The Effects Assessment must provide the full history and details of LP's standard, including how it has changed and reasons for the changes, since initiation of the Ten Year Plan.
 - The Effects Assessment must provide full details of all audits that have been conducted within LP's FMLA since initiation of the Ten Year Plan, so that we can examine whether methods are valid (e.g., surprise audits vs scheduled exercises). This includes the means applied to address competence and/or independence of the auditors. For example, the Effects Assessment must provide details as to the basis and how cutblocks were selected for audit (e.g., were they selected by LP?, was it the auditor that selected them?, were they randomly selected and how?").

- The Effects Assessment should address process alterations to ensure transparency (e.g., the provision of funds to an environmental non-profit, or to an academic, to conduct audits as a means to address concerns over independence).
- The Effects Assessment should assess the benefits of having an independent expert (e.g., an academic scientist) review and report on LP's 'sustainability' data on an annual basis (e.g., as a matter of transparency).
- Cumulative effects. Comprehensive regional cumulative effects assessment is necessary given the increasing and ongoing development (e.g., forestry, Manitoba Hydro Bipole III Transmission Line, agricultural clearing of lands/deforestation (stimulated to some extent by the purchase of logs by LP), mineral exploration, gravel pits, etc.) across a very large area (e.g., forestry in the Mid-Boreal Upland Ecoregion of the Porcupine Mountain and to the north of LP's FMLA).

Sustainability Assessment

- a) "produce a forest that will support ongoing harvesting at the proposed rate, in perpetuity". This is a somewhat absurd expectation. The assessment is on a twenty year plan, not in perpetuity. For example, unless one understands the extent to which climate change will occur and its effects, one cannot begin to address this. Therefore, if one does need to address this for "in perpetuity", a very large number of assumptions will be required. These assumptions will have to be provided within the Effects Assessment, and some probability of likelihood and magnitude provided for each. There also will have to be a list of the 'known unknowns' and recognition of the existence of 'unknown unknowns'.
- b) "Evaluate whether ...". Include protected areas/an ecologically defensible system of protected areas to protect biodiversity.
- c) "influence of climate change". Again, it will be necessary to provide this for the different climate change scenarios, and ascribe probabilities of realization to each of the scenarios.

Mitigation

'Lessons learned' (or not). Louisiana-Pacific Canada Ltd. received its Licence at the beginning of 1996 and was operating in its FMLA prior to that via the purchase of logs from local forestry companies. Presumably, over the course of 20 plus years since its arrival on the scene, the Company has evaluated the success/failure of the various mitigation measures it proffered or was required to implement at the 'start', and those which have been added since. The Effects Assessment must provide the evidence to demonstrate why LP's mitigation measures are working, or not working. I note that monitoring is fundamental to adaptive management and any EMS (Environmental Management System), e.g., ISO 14001. The Effects Assessment must provide

- Overview.
 - A complete history of all the mitigation measures that LP has implemented since it arrived on the scene (e.g., including changes to measures along the way, measures added, etc.).
 - A summary of all the data collected in relation to each mitigation measure.

- The basis for maintaining the measure as is, modifying it, dropping it, etc.
- Water.
 - Mitigation: Buffers on wetlands, lakes, creeks and rivers, and road development. Within the Traditional Territory, members of Wuskwi Sipiik First Nation have observed land use impacts to fish spawning areas, including where creeks have been dried out and fish were no longer protected. Since the arrival of LP on the scene, Wuskwi Sipiik First Nation believes that there has been a liberalization of riparian buffers within its Traditional Territory.
 - Provide an accounting of the width/types of buffers and/or no buffers, by wetlands, lakes, and creeks and rivers (in relation to wetland or lake size/type, and creek or river size/type) since LP arrived on the scene. And how that has changed over time, e.g., narrower buffers/more no buffers now? And how the government standard has changed since LP arrived on the scene.
 - Changes to standard descriptors of the aquatic ecosystems (e.g., nutrients (e.g., leaf litter inputs), insects, and other biota). That is, provide the evidence to demonstrate that the buffers are achieving their objectives.
 - Water quality. That is, provide the evidence to demonstrate that the buffers are achieving their objectives.
 - Provide the scientific evidence to justify the proposed riparian buffers. For example, Saskatchewan requires a 90 meter buffer zone along the Woody River to protect fish habitat; however, as soon as the River crosses into Manitoba, the buffer shrinks to 30 meters under the Manitoba Guideline. Why is there such disparity between these numbers? Whose 'science' is sound? As WSFN noted in its 2014 consultation report to Manitoba Sustainable Development, with respect to Manitoba's 2008 'Forest Management Guidelines for Riparian Management Areas', "This example demonstrates a lack of understanding and/or application of the science on riparian structure and function, and management in relation to mitigating the impacts of forestry development, for Manitoba and/or Saskatchewan. It also demonstrates a relatively risky approach on the part of Manitoba, in terms of the potential to damage aquatic ecosystems.". Wuskwi Sipiik First Nation's 35 page report further indicated, relative to its assessment of the Manitoba Guidelines, that "the literature was generally rather dated", "there was a lack of primary literature", "It is important to note that the primary scientific literature, including relevant current literature for the boreal forest at the time the Guidelines were developed, was ignored by Manitoba Conservation and Manitoba Water Stewardship. For example, Croke and Hairsine (2006), Luke et al. (2007), and Rosen et al. (1996) could have been quite relevant. The next iteration of the Guidelines must do a serious job of integrating relevant current scientific literature.", and "A number of the references are for the US, eastern US forests, and BC headwaters. The relevance of some of the cited literature is highly questionable, e.g., respecting eastern US forests and BC headwaters. ... the eastern US forests being very

different ecologically (e.g., respecting the role of fire).". The Nation's report concluded that "The Guidelines are clearly deficient and must be updated to incorporate the extensive relevant current scientific literature. Failure of Manitoba Conservation and Water Stewardship to do so would represent abdication of its responsibility to apply science to its 'management' of forest riparian ecosystems. If required, a technical specialist should be contracted. Given the substantive disconnect between Manitoba's and Saskatchewan's riparian buffers, Manitoba Conservation and Water Stewardship must provide Wuskwi Sipihk First Nation with scientific analysis to demonstrate how Manitoba's buffer widths are supported by the scientific literature, and why Saskatchewan's buffer widths are not valid, if the scientific literature supports that conclusion.". A review of the literature in the most recent iteration of the Guidelines (2016?) reveals that not one new piece of scientific literature has been added to the Guidelines document since the 2008 Guidelines document. Manitoba Sustainable Development did exactly nothing to remedy the clear deficiency of its Guidelines document with respect to scientific credibility. This is likely a function, at least in part, of the never relenting budget and staff cuts to Sustainable Development and its predecessor Departments over the last several decades, as it is obvious that at least some Branches are no longer capable of fulfilling their mandates.

- Mitigation: Constraint on amount of forestry development within a watershed. Required are
 - By watershed, areal changes over time by ecosystem, in the context of hydrologic recovery.
 - Demonstration that the outcomes of the mitigation measure have met, or not met, the predicted outcomes.
- Fish.
 - Mitigation: Buffers on wetlands, lakes, creeks and rivers, and road development. Within the Nation's Traditional Territory, members of Wuskwi Sipihk First Nation have observed land use impacts to fish spawning areas where creeks have dried out and fish were no longer protected.
 - Demonstrate that areas where fish spawn have not been adversely impacted by LP's forestry practices/that LP's mitigation measures have worked (been successful).
 - Demonstrate that LP's mitigation measures have been successful respecting fish populations and species. For example, in the past, LP has collected information on fish species prior to logging an area. The post-logging data should be provided to demonstrate the efficacy of the mitigation measures.
- Nation-Specific Mitigation Measures. There are a number of gifts that are of particular importance to First Nation and other indigenous peoples (e.g., sweetgrass, seneca, weegus, blueberries).

- Indicate what mitigation measures are currently in place, or were in place in the past, to minimize damage to important Wuskwi Sipiik First Nation resources and values. For example, for logging in proximity to areas of sweetgrass.
- Indicate what mitigation measures are presently in place, or were in place in the past, to minimize damage to medicines and other culturally important plants (e.g., weegus, sweetgrass).
- Indicate what mitigation measures are presently in place, or were in place in the past, to minimize damage to plants important as food (e.g., blueberries).
- Demonstrate that LP has an understanding of the plants that are of importance to members of Wuskwi Sipiik First Nation. For example, does LP teach identification of sweetgrass for the staff who conduct its pre-harvest surveys?
- As needed, develop mitigation measures to address Nation resources and values, and train staff conducting pre-harvest surveys appropriately.
- Erosion.
 - Mitigation: Buffers on wetlands, lakes, creeks and rivers, road development, and forestry development on slopes.
 - Demonstrate the extent to which LP's mitigation measures have been successful in mitigating the erosion of soils, and inputs of sediments, organic matter, and contaminants to waterbodies. For example, it is well known that roads, particularly on slopes, are prone to erosion.
- Soil.
 - Mitigation: Mitigation to reduce impacts on soil as a result of road construction (e.g., on slopes), logging (e.g., rutting and compaction during summer logging), and other forestry development.
 - Provide an accounting (i.e., the data) of the nature (e.g., rutting, compaction) and extent (e.g., % of logged forest soil degraded due to road building, frequency and areal extent of compaction and rutting) of soil degradation since LP arrived on the scene.
 - Demonstrate the extent to which LP's mitigation measures have been successful in mitigating the adverse effects of forestry development on soils.
- Non-native species. Non-native species represent a significant threat to biological diversity and the integrity of ecosystems.
 - Mitigation: Mitigation to reduce the impact of non-native species on forest ecosystems and other ecosystems within the landscape.
 - Provide an accounting (i.e., data) of the nature (e.g., list of non-native species found on areas where forestry development has taken place (such as dandelion on roads and in cutovers), persistence of impact, source of species (e.g., as seeds associated with trucks or erosion mats)) and extent (e.g., percentage and area of roads impacted by non-native species, frequency of occurrence of non-native species (e.g., by cutblock, road, etc.)) of the introduction of non-native species since LP arrived on the scene.

- Demonstrate the extent to which LP's measures have been successful in mitigating the adverse effects of introduced non-native species.
- Salt licks and other important terrestrial resources. Salt licks and some other important terrestrial resources are to be buffered according to Manitoba's 'Forest Management Guidelines for Terrestrial Buffers' (2017), and LP may implement additional mitigation measures for such sites. On one occasion in the past, a Wuskwi Sipiik First Nation member made the forestry industry aware of the location of two salt licks so that they could be protected. On returning to the sites, he found the trees to be cut right to the edge of the salt licks, contrary to the Guidelines. I am also aware of a case where a local trapper informed the forestry industry of a heron rookery, and where the trees were subsequently cut down.
 - Mitigation: Buffers for important terrestrial resources like salt licks and raptor nests.
 - Provide documentation of the number of occurrences where, for whatever reason, guidelines to mitigate forestry effects on licks and other important terrestrial resources were not adhered to. Provide the reasons for the failures.
 - Demonstrate the extent to which LP's mitigation measures have been successful in mitigating adverse impacts of forestry development on salt licks and other important terrestrial resources.
 - Provide current scientific evidence to demonstrate that LP's mitigation practices for salt licks and other important terrestrial resources are adequate. For example, the current Manitoba Guidelines specify a 50 m buffer for an active bear den. It is almost certain that the Literature Cited in the current 2017 Guideline has not been updated since the 2010 version (e.g., the date of the most recent citation is 2008 and the citation was for Manitoba's own 'Forest Management Guidelines for Riparian Management Areas'. The Literature Cited for the current Manitoba Guidelines includes 13 mostly Manitoba and other government citations, not one of which is from the primary scientific literature, and where one is from the Encyclopedia Britannica. Consequently, for example, as noted in Wuskwi Sipiik First Nation's draft report on the Bipole III Transmission Line, "For example, for bear dens ('Occupied Mammal Dens'), Table F-1 indicates a frozen ground and non-frozen ground setback of 50 m. When Bluestem Wildlife attempted to obtain the basis for the 50 m setback distance, it became evident that Manitoba Hydro simply accepted Manitoba Conservation's and Manitoba Water Stewardship's 'Forest Management Guidelines for Terrestrial Buffers' (2010). Further investigation by Bluestem Wildlife revealed that the Guidelines had been developed by the Forestry Branch and the forestry industry (i.e., wildlife biologists from Wildlife and Ecosystem Protection Branch had not been involved in their development). Not surprisingly, the Guidelines document does not cite any scientific literature respecting setback distance for bear dens (e.g., Linnell et al.'s (2000) review paper that concluded, among other matters, that activity within 200 m, in particular, could impact denning bears). Consequently, Manitoba Hydro lacked a scientific basis for its 50 m setback distance, which was arbitrary."

- Stand-level mitigation via retained structure (snags, live trees) for wildlife and other values.
 - Mitigation: Retention of snags and live trees within cutovers.
 - Provide the data collected since LP arrived on the scene respecting the number, size, and other attributes (e.g., decay stage for snags) of snags and trees retained on cutovers, by forest ecosystem (e.g., aspen-dominant vs black spruce-dominant). This includes spatial aspects of retention (e.g., 4-tree clumps, intact 2+ acre patches, etc.). For example, a study by Mixedwood Forest Research and Advisory Committee (now Mixedwood Forest Society) in the 1990's found that yellow-bellied sapsucker did not nest within recent cutovers, excepting where a large intact undisturbed patch had been retained on one cutover (my recollection is that the patch was approximately 2 acres in size).
 - Provide the data collected since LP arrived on the scene with respect to the number, size, and other attributes (e.g., decay stage for snags) of snags and trees within naturally originated (e.g., pyrogenic) forests, by forest ecosystem (e.g., aspen-dominant vs black spruce-dominant). This includes spatial aspects. These kinds of data are critical as the ecological benchmarks necessary to applying the concept of ecosystem-based management.
 - For the forest ecosystems within the FMLA (i.e., for those within the Mid-Boreal Uplands Ecoregion ('Duck Mountain') and for those within the other Ecoregions), comparison of stand-level retention requirements and/or standards for other jurisdictions and forestry companies within Canada. For example, on the Saskatchewan side of the Porcupine Mountain, Weyerhaeuser Ltd.'s stand-level retention goals, which far exceed those of LP for its Manitoba FMLA.
 - The scientific basis, using current scientific literature, for LP's stand-level retained structure guidelines. This basis must clearly indicate the anticipated outcomes of LP's guidelines.
 - Provide the data collected since LP arrived on the scene with respect to the species of wildlife making use of retained structure on cutovers (e.g., species of birds, nature of use, attributes of nest trees for cavity-dependent wildlife).
 - The Mixedwood Forest Research and Advisory Committee (now Mixedwood Forest Society) conducted a study focused on cavity-dependent wildlife in the late 1990's, and has data on cavity-dependent species for the FMLA (e.g., descriptors of the snags and trees used by species like hairy woodpecker, northern flicker, and common goldeneye). Provide all of the data available for the FMLA on these species, indicating what data have been collected by LP over the years. Contact Mixedwood Forest Society relative to accessing its data. Provide the scientific evidence to demonstrate that LP's standards for snag and tree retention adequately provides for these and other species.
- Stand-level mitigation via retained coarse woody debris (e.g., logs) for biodiversity and other values.

- Mitigation: Retention of coarse woody debris within cutovers.
 - Provide the data collected since LP arrived on the scene with respect to the number, size, and other attributes (e.g., decay stage) of coarse woody debris retained on cutovers, by forest ecosystem (e.g., aspen-dominant vs black spruce-dominant). This includes spatial aspects (e.g., differences of retention near roads vs within cutovers).
 - Provide the data collected since LP arrived on the scene with respect to the number, size, and other attributes (e.g., decay stage) of coarse woody debris within naturally originated (e.g., pyrogenic) forests, by forest ecosystem (e.g., aspen-dominant vs black spruce-dominant). This includes spatial aspects. These kinds of data are critical as the ecological benchmarks necessary to applying the concept of ecosystem-based management.
 - For the forest ecosystems within the FMLA (i.e., for those within the Mid-Boreal Uplands Ecoregion ('Duck Mountain') and for those within the other Ecoregions), comparison of stand-level retention requirements and/or standards for other jurisdictions and forestry companies within Canada. For example, LP's mitigation standard compared to Weyerhaeuser Ltd.'s stand-level retention goals for the Saskatchewan side of the Porcupine Mountain.
 - The scientific basis, using current scientific literature, for LP's stand-level retained coarse woody debris guidelines. This basis must clearly indicate the anticipated outcomes of LP's guidelines.
 - Provide the data collected since LP arrived on the scene with respect to the species of wildlife and plants making use of the retained structure on cutovers (e.g., species of plants, details of use (e.g., only found on decay class 4 coarse woody debris)).
 - Mixedwood Forest Research and Advisory Committee (Mixedwood Forest Society) conducted a study focused on cavity-dependent wildlife in the late 1990's, and has data on coarse woody debris from, e.g., old pyrogenic aspen-dominant forest ecosystems and cutovers. Contact Mixedwood Forest Society relative to accessing its data.
 - Indicate which, if any, of the coarse woody debris data available for the FMLA were collected by LP over the years.
 - Provide the scientific evidence to demonstrate that LP's standards for coarse woody debris adequately provides for those species for which the ecological resource is important.
- Oil and other contaminants. Oil and other contaminants sometimes find their way onto cutovers, and into streams or lakes. For example, several years ago during Wuskwi Sipiik First Nation's Family Camp at Bell Lake, a logging truck overturned on the main road and petrochemicals made their way into Bell Lake near its exit.
 - Mitigation: Measures to limit the extent to which oil and other contaminants enter terrestrial and aquatic ecosystems.

- Provide all instances, and all details, of spills of oil and other contaminants onto/into terrestrial and aquatic ecosystems since LP arrived on the scene.
- Demonstrate why it is not feasible for the forestry industry within LP's FMLA to use plant-based lubricants.
- Mitigation specific to Wuskwi Sipiik First Nation.
 - Consider what constitutes appropriate compensation, including monetary, as recompense for needless damage, and general damage, to Nation resources, values, and member's ability to access areas for traditional practices.
 - Specifically consider providing the following types of measures to mitigate, and compensate for, the adverse effects of the proposed forestry development on the Nation's resources, values, and member's ability to access areas for traditional practices. For example
 - Recommendation 1 of the Nation's 2014 report – "Create a position that will bring a Traditional Knowledge holder into the planning process (e.g., the examination of pre-harvest and other surveys). This individual would help to incorporate local Traditional Knowledge into the planning stages of all logging activities. Through this mechanism, industry would achieve their goals of finding what is important to First Nations way of life and take steps to ensure that any Traditional practise areas are not impacted or affected in any way."
 - Recommendation 2 of the Nation's 2014 report – "The Wuskwi Sipiik First Nation recommends that Industry start developing strategies to employ First Nations people in all stages of resource extraction, from planning to the actual extraction. This would include training and employment of First Nation people."
 - Recommendation 3 of the Nation's 2014 report – "The Wuskwi Sipiik First Nation recommends that students from the Nation be given opportunity to get involved in summer programs that offer employment and training (e.g., by industry for pre-harvest and regeneration surveys, by Conservation and Water Stewardship for forestry management). By developing this type of strategy of utilizing First Nation youth, Industry and Government can start using our country's greatest asset, people."
 - Recommendation 6 of the Nation's 2014 report – "Recommendations were made to do a ground based assessment to determine and map which plants (medicinal and food staples) are important to First Nations traditional way of life (e.g., mapping where members of the Nation harvest sweetgrass). Other sensitive sites and areas of critical importance to the Nation could be mapped as part of the project. This endeavour would be a joint operation by Industry, Government, and First Nations."
 - Recommendation 7 of the Nation's 2014 report – "Manitoba Conservation and Water Stewardship, in collaboration with industry and as a matter of respect, must develop a process to communicate the discovery of heritage resources and burial sites to Wuskwi Sipiik First Nation."

- Recommendation 8 of the Nation's 2014 report – "Manitoba Conservation and Water Stewardship must inform the Nation when guidelines are being developed so that the Nation has the opportunity to provide input. This includes the update and review of existing guidelines, and the development of new guidelines."
- With respect to providing funding to the Nation to locate sensitive sites via GPS, so that the locations would be accurately documented, these kinds of data would be far more valuable to mitigating the adverse effects of forestry development than LP's typical process of meeting with Nation members and using GIS maps in an attempt to identify conflicts. GIS maps are generally extremely poor for identifying location, and it is ridiculous to expect that First Nation Elders and other land users, who may intimately 'know' the land, can identify sensitive and other important areas from the type of GIS maps presented by the forestry industry.
- Cultural and heritage resources management plan. I assume that this would include archaeological resources, and would address the finding of sensitive cultural resources (e.g., a burial site), such as informing the appropriate First Nation. E.g., like the plans produced for environmental assessments in BC.

Public Input

- "concerns will be addressed". Define what this means. E.g., does it mean that a concern will be listened to and then no action taken, as can be the practice?

Clean Environment Commission Hearings

Recommendation 12 of the Nation's 2014 Report – "Environmental assessment must be conducted on long-term forest management plans by Louisiana-Pacific Canada Ltd. and the Mountain Quota Holders Association, and these assessments must be subject to Clean Environment Commission hearings."

- LP's Twenty Year Plan proposal is of such a magnitude that the Clean Environment Commission must be engaged to examine the environmental effects of the forestry development. This is particularly so because it is now recognized that the last Ten Year Plan and environmental assessment of that Plan were fatally flawed (i.e., the Forestry Branch/Environmental Approvals/'government' fiasco). Further to this, the last process of government review and intervention acted to suppress truth in relation to the environmental effects, and the current government is also tainted by virtue of common 'actors'. A transparent Clean Environment Commission hearing must be held given that the hearing on LP's Ten Year Plan was based on a fatally flawed Plan and environmental assessment of the Plan. This is necessary for indigenous peoples and the public to have any confidence whatsoever that government will direct a process that will assess the Twenty Year Plan in a comprehensive and honest manner. For example

- LP's growth and yield estimates/assumptions. In 1995, WSN Elder Buddy Brass, Canadian Forest Services Forester Jim Ball, members of Manitoba's environmental community, and others questioned LP's growth and yield assumptions (i.e., the growth of the forest and the amount of fibre that the forest would yield for LP's product). For example, "Mr. Jim Ball, a Canadian Forest Service forester who sat on the Technical Advisory Committee (TAC) on the development, in his letter of October 17, 1995 as posted to the Public Registry, wrote "... the AAC calculations--and the assumptions on which they are based--should be clearly explained e.g. Is the company really planning to cut 150-170 m³ha⁻¹ now and to grow 325-435 m³ha⁻¹ (p. 7-16) or 256-484 m³ha⁻¹ (p. 11-26)?" Mr. Ball had previously raised this concern in his letter of August 17, 1995 to Forestry TAC Chairman Dr. Floyd Phillips, wherein he wrote "... the company should explain this apparent incongruity and reconcile the yield values of 150-170 m³•ha⁻¹ to be cut in the first three years with volumes of 300-400 m³•ha⁻¹ for well stocked stands used in the HSG simulation (7-17) to project future stands.". Mr. Ball continued to document his concerns following the CEC hearings (e.g., in his December 15, 1995 letter to Manitoba Environment Director Mr. Larry Strachan)." (Soprovich 2006). Some 9 years later, Manitoba Forestry Branch published a report (Manitoba Forestry Branch 2004), presumably based on scientifically-defensible sampling methods, which demonstrated that LP's growth and yield assumptions were massive overestimates of the true values. Soprovich (2006), in his comparison of the Manitoba Forestry Branch (2004) estimates to LP's Ten Year Plan growth and yield assumptions, found that, for a 60 year old post-disturbance logged forest, LP's assumptions were 2.07 times greater than those of Manitoba Forestry Branch for aspen forests, and 2.53 times greater for black poplar and white birch forests. Soprovich (2006) pointed out that "The use of inflated yield assumptions is a primary reason, and likely the primary reason, for Manitoba Conservation's recent 36.1% decrease in the hardwood Annual Allowable Cut (AAC) of the Duck Mountain to 348,823 m³ per year (Manitoba Forestry Branch 2004, Soprovich 2005)." and "The reduction by Manitoba Conservation came some nine years after Louisiana-Pacific's consultant wrote "... the hardwood timber supply contemplated by the FMP is sustainable over the next 100 years." (September 15, 1995 letter from Mr. J.M. McKernan of TetrES to Mr. Barry Walto of Louisiana-Pacific Canada Ltd.). These same consultants had concluded that a hardwood cut of 597,125 m³ per year was 'sustainable' over a 100-year period (HSG Sustainable Crown Land AAC, Table 8-1; TetrES 1995). This 'sustainable' harvest was 1.71 times greater than Manitoba Conservation's recent allocation, made on the basis of the 'correct' yield assumptions.". The upshot of all of this is that, based on its grossly inflated growth and yield estimates, the impact of LP's forestry development on the environment was significantly understated. For example, at an overestimate of 2.0 times yield, where LP indicated that it would cut 10 ha to achieve its volume, it really had to cut 20 ha, and at an overestimate of 2.5 times yield, LP would actually have to cut 25 ha to achieve its volume. This has huge

huge implications to LP's environmental assessment, and effectively rendered it fatally flawed and therefore irrelevant. For example, Soprovich (2006) wrote "The growth and yield assumptions are fundamental and critical to modeling forest 'sustainability'. For example, if one assumes that a forest will yield twice the volume per unit area than it really does (i.e., a case where a modeling assumption confronts the 'real world'), then one will have to cut twice the area predicted on the basis of the faulty assumptions to achieve the same total volume (e.g., cut an area of 200 km² vs 100 km²). An error of this magnitude has huge implications to the real-world impact of such a forestry development on biological diversity, the number of ovenbirds in the forest, the number of moose in the forest, protected areas, water yield, soils, etc., etc., etc.". Under 'lessons learned', and so that errors of similar magnitude do not occur in the future, to the extent possible, LP should be required to provide explanations as to how and why its assumptions were so wrong, and how and why its consultants on its environmental assessment chose the risky approach of modelling forest 'sustainability' using the grossly inflated assumptions (e.g., why its consultants chose to ignore independent experts like Jim Ball, and why its consultants did not use conservative estimates given the obvious problems with LP's sampling methodology, and the inconsistencies with the independent scientific literature (e.g., as identified by Mr. Ball)). LP should provide these explanations because, among other reasons, the inflated growth and yield estimates fundamentally misled the public, perhaps some Manitoba government bureaucrats, perhaps some of the Progressive Conservative politicians championing the development at the time, and likely at least one 'academic' who was effectively a cheerleader on behalf of LP's forestry development.

- Towards the end of the Clean Environment Commission hearing on LP's Ten Year Plan, a special session was held to address concerns of the federal government (e.g., Canadian Wildlife Service, Canadian Forest Service). Forester Jim Ball "... was to appear as an expert witness before the Manitoba Clean Environment Commission, but was told not to do so ~20 minutes before he was to appear (e.g., see Mr. Ball's December 15, 1995 letter to Mr. Strachan – "... I received instructions that Thursday morning not to appear.")." It seems apparent that the Manitoba government of the day, perhaps at LP's behest, successfully leaned on the federal government so that the Clean Environment Commission (and the public) would not witness Mr. Ball's rigorous expertise disagreement with LP, complete with reference to the available scientific literature. And with this 'dirty deal', the truth became a prisoner to reckless economic development.
- Manitoba's current Premier Brian Pallister was also a Minister of the Progressive Conservative government led by former Premier Gary Filmon, at the time of the government's fast-track fiasco of LP's Ten Year Plan and its environmental assessment. That was a time during which political operatives worked aggressively to circumvent review mechanisms and other internal government checks and balances, worked so as to conceal 'inconvenient truths' and environmental effects,

devalued the environment, constrained 'sustainable' forestry management (e.g., respecting the maintenance of old growth forest across the landscape), and created a threatening atmosphere such that many civil servants were afraid to speak truth to power. There is an old adage along the lines of "Those who ignore history are doomed to repeat it". If one subscribes to the adage, and given the past fiasco, one can only be skeptical of an environmental assessment process under a Brian Pallister-led government and the possibility of LP and its consultants producing a comprehensive and honest assessment of the environmental effects of LP's Twenty Year Plan. It remains for Brian Pallister's government and LP to, we hope, demonstrate otherwise. We will be happy if this is the case.

- o Clean Environment Commission hearings must be held in Winnipeg, in addition to Swan River, as occurred for the hearings on LP's Ten Year Plan. Given the fiasco respecting LP's Ten Year Plan and its environmental assessment of the Plan, full transparency must be a critical goal of the hearings. Some Wuskwi Sipihk First Nation's members live in Winnipeg. Manitobans from across the province spend time within LP's FMLA, and have varied concerns about the activities that take place within the FMLA.

Technical Reference

- c) "studies performed by qualified scientists or engineer". The Guidelines should define 'qualified'. For example, is the expectation of 'qualified' simply being certified as a 'Registered Professional Biologist' (which has fairly low requirements), or is Environmental Approvals meaning a highly trained scientist (e.g., one with a significant track record publishing in peer-reviewed journals)?

This response to your Draft Guidelines is not complete. As indicated to you in a number of email communications (beginning on February 18, 2018), as a result of the timing of your notice given prior commitments and due to capacity challenges of Wuskwi Sipihk First Nation (e.g., the lack of funding from Manitoba to support a thorough examination of the Draft Guidelines), which constraints are generally well understood by government regulators, I have been unable to provide my full attention to examination of the Draft Guidelines.

As indicated to you in the prior email communications, it is my view that Environmental Approvals duty of notice process for informing Wuskwi Sipihk First Nation, and other First Nations and indigenous peoples, of the opportunity to comment on the Effects Assessment of LP's Twenty Year Plan is flawed. It is my view that your process does not meet the minimum threshold under the duty to consult obligations of Section 35 of the Constitution. Wuskwi Sipihk First Nation may explore options and may seek remedies to ensure that its constitutionally-protected interests are not ignored or circumvented by Manitoba Sustainable Development and/or the Pallister government.

Original Signed by

Dan Soprovich, M.Sc (Zoology), Treaty Land Entitlement Coordinator/Lands Manager

cc. Chief Elwood Zastre, Councillor Seaford Kematch, Councillor Max Kematch, Councillor Francis Stevens, Band Manager Bev Ready

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Appendix A. Analysis of the Moose Habitat Suitability Model for the Duck Mountain and Porcupine Mountain, and January 31, 2018 email communication with Louisiana-Pacific Canada Ltd.

Mid-Boreal Uplands Ecoregion 2006 Moose habitat (HSI) model.

DS

Dan Soprovich <dsop@mymts.net>



Reply

Wed 01-31, 10:30 AM

You;

Todd.Yakielashek@lpcorp.com;

'Vern Bauman' (Vern.Bauman@lpcorp.com)

CavityDependentWildlife.StudySites.MooseHill.Photo.pdf 2 MB
ModelTest.xlsx 15 KB

3 attachments (6 MB) Download all
Save all to OneDrive - Personal

Hi Todd and Vern.

Todd ... the correspondence below relates to my comments on the report on the HSI model respecting species deemed to be food by the report author, my experience with HSI models, etc. One point ... Wade followed up (see below) relative to this and was told that the report author was the same, the problem being that the report does not specify who the author was (only the Company).

Attached are some simulations of habitats that differ very very substantively in quantity of browse for moose during the winter. Included is Moose Hill (I have also attached a copy of an aerial photo from around the time referenced in the Excel file) ... wherein you will observe that the area with black lines exhibits high crown closure and is aspen-dominant. As Vern indicated the other day, at one time "there were moose in the Mountain" ... when that was the case, this site demonstrated an obvious significant browse line where the moose were browsing on the substantive hazel-dominant understorey ... the site was very important as moose winter habitat (perhaps why it or a nearby location is noted to be "Moose Hill" on topo maps).

I have also attached a picture showing the significant hazel browse that can be found beneath an aspen overstorey ... this picture from the south portion of Elk Island Park (aspen parkland) where moose densities are extremely high, some 10 or so per square mile at times, to the extent that the browse has been adversely impacted. I took this picture several years ago. Significant browse lines and hazel browse production are not uncommon for the Mid-Boreal Uplands Ecoregion in the Duck Mountain and Riding Mountain, beneath intact or reasonably intact canopies, but also in older softwood or hardwood forests that have significantly broken up. I was going to take some pictures of the Moose Hill and Whitefish Lake sites to attach, but have not been able to make it out yet (unsure exactly what is left of the Moose Hill site).

A few observations with respect to the analysis in the attached Excel file.

- a. The food value SI for the Whitefish Lake 100% aspen 37-year old stand is almost equivalent to the mature Moose Hill stand and about 2/3rds the value of the 'overmature' Moose Hill stand. This is absurd. There is essentially no browse at the Whitefish Lake stand and was very significant browse at the Moose Hill site (I believe when 'mature'), recognizing that it would not have been that way over the entire course of the 'mature' phase (which is why one really needs to actually collect data and conduct the requisite modelling to look at long-term forestry effects). Respecting the Whitefish Lake site, it is the kind of habitat where former Manitoba Wildlife Branch moose biologist Vince Crichton would say that the moose "had to pack a lunch" before going through it.
- b. The Moose Hill 'overmature' numbers assumed 100% canopy closure, and would increase in relation to increasing gapiness due to trees dying.
- c. I put little value in the 'Overall Indices'; however, the near equivalency of the Whitefish Lake and Moose Hill sites for both the 'Early Winter' and 'Late Winter' models is absurd. The Whitefish Lake site being w/o food and not used other than for walking through and the Moose Hill site receiving significant use.
- d. While I calculated cover SIs, I do not put a whole lot of value in those given the lack of science (in the document) to support the numbers.
- e. For further interest, I calculated the values for a black spruce site that I pass every time I head up the road to Wellman Lake. The trees at the site significantly limit the amount of light reaching the forest floor and the site has essentially no browse. Yet the food value for early winter was similar to that for the mature aspen Moose Hill site and about 60% of that for the 'overmature' aspen Moose Hill site. Same thing for late winter. Again, absurd.

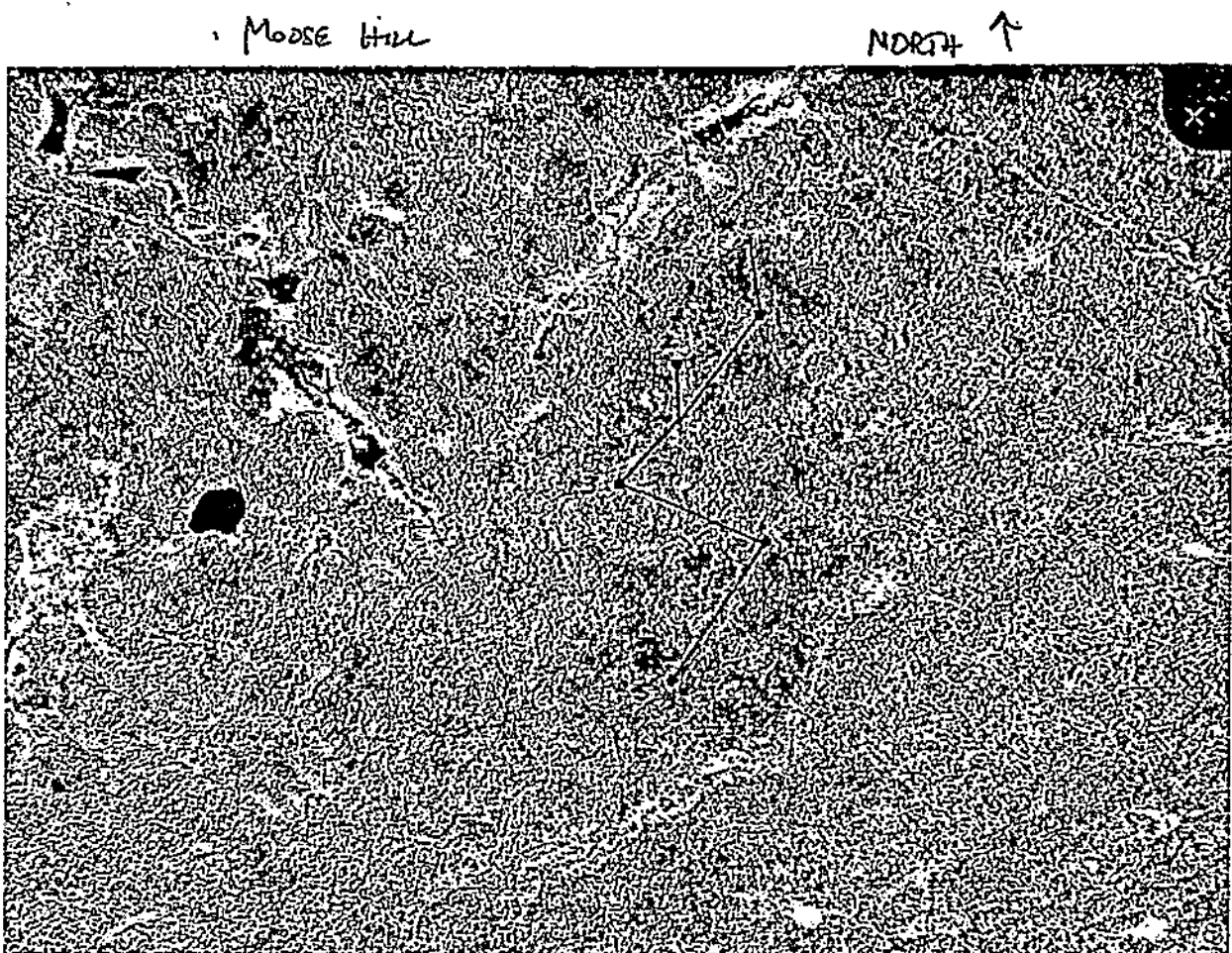
Respecting the late winter/early winter aspects of the HSI model, I won't get into that too much. However, significant movement into softwoods is primarily a function of thermoregulatory advantages (moose overheat at about -5 C in the winter, in a stable environment w/o solar input) and/or snow (and significant snow depth, not like deer). From the document it is unclear when 'late' winter occurs or exactly what it is ... when the drivers will not be the same each year (snow depth being a driver in the literature ... but one has to

remember that not all places are the same, the Upper Michigan peninsula sometimes gets 4 feet of snow as a function of the nearby Great Lake, where Manitoba is very different as I demonstrated when I conducted analysis of the data from the Verme Weather Severity Index that was once used by Manitoba for deer and rather ridiculously for moose).

Respecting the weighting of food and cover to arrive at the 'Overall HSI', and the different weighting for the early winter vs late, there is no cited evidence in the document in support of that. Indeed, page 10 states "Food and cover were given different arbitrary weightings in the equations ...". I am uncertain if this even reaches the threshold of SWAG (Scientific Wild Ass Guess). I believe the idea of integrating both food and cover to often be silly; e.g., why downgrade an extremely important food resource by integrating cover?

Cheers.

Dan



Analysis - Mid-Boreal Uplands Ecoregion Moose Habitat Suitability Index (HSI) Model - Porcupine Hills, Duck Mountain Examination of Model Ability to Separate Aspen Habitats of Extremely Different Quality (Whitefish Lake Road Burn, Moose Hill)

Early Winter Habitat Model

Whitefish Lake													
Cover Type (V1)	Seral Stage (V2)	Food			Cover			Moisture			'Overall Index'		
		Crown Closure (V3)	Moisture Regime (V11)	Food Index (SI)	Crown Closure (V6)	Seral Stage (V5)	Cover Type (V7)	Moisture Regime (V13)	Cover Index (SI)	'Overall Index' (HSI)			
		0.5	0.2	0.1	0.8	0.29907	0	1	1	1	0	0.224302	Moisture Regime Fresh.
0.5	0.2	0.1	1	0.316228	0	1	1	1	1	1	0	0.237171	Moisture Regime Moist.
Moose Hill													
Cover Type (V1)	Seral Stage (V2)	Food			Cover			Moisture			'Overall Index'		
		Crown Closure (V3)	Moisture Regime (V11)	Food Index (SI)	Crown Closure (V6)	Seral Stage (V5)	Cover Type (V7)	Moisture Regime (V13)	Cover Index (SI)	'Overall Index' (HSI)	Assumptions		
		0.5	0.3	0.1	0.8	0.330975	0	1	1	1	0	0.248231	Moisture Regime Fresh, Seral Stage Mature.
0.5	0.3	0.1	1	0.349964	0	1	1	1	1	1	0	0.262473	Moisture Regime Moist, Seral Stage Mature.
0.5	1	0.1	0.8	0.447214	0	1	1	1	1	1	0	0.33541	Moisture Regime Fresh, Seral Stage 'OverMature'.
0.5	1	0.1	1	0.472871	0	1	1	1	1	1	0	0.354653	Moisture Regime Moist, Seral Stage 'OverMature'.

NOTE: Crown closure in the 'Overmature' would decrease due to gappiness, the amount depending on age/site conditions. The food SI's

and 'Overall Indices' would thereby increase as a function of declining crown closure.
Late Winter Habitat Model

Whitefish Lake									
Food					Cover				
Cover	Seral	Closure	Moisture	Food	Crown	Moisture	Cover	'Overall	
Type (V1)	Stage (V2)	(V3)	Regime (V11)	Index (SI)	Closure (V6)	Regime (V13)	Index (SI)	Index' (HSI)	Assumptions
0.5	0.2	0.1	0.8	0.29907	0	1	1	0	0.104674 Moisture Regime
									Fresh.
0.5	0.2	0.1	1	0.316228	0	1	1	0	0.11068 Moisture Regime
									Moist.

Moose Hill									
Food					Cover				
Cover	Seral	Closure	Moisture	Food	Crown	Moisture	Cover	'Overall	
Type (V1)	Stage (V2)	(V3)	Regime (V11)	Index (SI)	Closure (V6)	Regime (V13)	Index (SI)	Index' (HSI)	Assumptions
0.5	0.3	0.1	0.8	0.330975	0	1	1	0	0.115841 Moisture Regime
									Fresh. Seral Stage
									Mature.
0.5	0.3	0.1	1	0.349964	0	1	1	0	0.122487 Moisture Regime
									Moist. Seral Stage
									Mature.
0.5	1	0.1	0.8	0.447214	0	1	1	0	0.156525 Moisture Regime
									Fresh. Seral Stage
									'OverMature'.
0.5	1	0.1	1	0.472871	0	1	1	0	0.165505 Moisture Regime
									Moist. Seral Stage
									'OverMature'.

NOTE: The Whitefish Lake site is pure aspen originating with the 1980 burn. The Moose Hill site was ~pure aspen, and exhibited high levels of hazel browse and utilization in 1991-95 (Soprovich was the Regional Wildlife Biologist) and 1997-99 (during Soprovich's research on cavity-dependent species).

Black Spruce Off Wellman Lake Road

Late Winter Habitat Model - Softwood

Black Spruce Off Wellman Lake Road																					
Food						Cover															
Cover Type (V1)	Seral Stage (V2)	Crown Closure (V3)	Moisture Regime (V11)	Food Index (SI)	Cover Type (V7)	Seral Stage (V5)	Crown Closure (V6)	Moisture Regime (V13)	Cover Index (SI)	'Overall Index' (HSI)											
												0.2	0.3	0.1	0.8	0.263	215	1	1	1	1
												0.742	125	High Crown Closure, Mature, Moisture Regime Fresh, ~Nil for Shrubs/Moose Food							

Analysis - Mid-Boreal Uplands Ecoregion Moose Habitat Suitability Index (HSI) Model - Porcupine Hills, Duck Mountain

Early Winter Habitat Model

Whitefish Lake													
Food							Cover						
Cover Type (V1)	Seral Stage (V2)	Crown Closure		Moisture Regime		Food Index (SI)	Cover Type (V7)	Seral Stage (V5)	Closure (V6)	Moisture Regime (V13)	Cover Index (SI)	'Overall Index' (HSI)	
		(V3)	(V3)	(V11)	(V11)								
0.5	0.5	0.2	0.1	0.1	0.8	0.29907	0	1	1	1	1	0	
Moisture Regime Fresh.													
0.5	0.5	0.2	0.1	0.1	1	0.316228	0	1	1	1	1	0	
Moisture Regime Moist.													
Moose Hill													

NOTE: Crown closure in the 'Overmature' would decrease due to gappiness, the amount depending on age/site conditions. The food SI's

and 'Overall Indices' would thereby increase as a function of declining crown closure.
Late Winter Habitat Model

Whitefish Lake									
Food					Cover				
Cover	Seral	Closure	Moisture	Food	Crown	Moisture	Cover	'Overall	
Type (V1)	Stage (V2)	(V3)	Regime (V1.1)	Index (SI)	Type (V7)	Seral	Closure (V6)	Regime (V1.3)	Index (SI)
0.5	0.2	0.1	0.8	0.29907	0	1	1	1	0 0.104674
									Fresh.
0.5	0.2	0.1	1	0.316228	0	1	1	1	0 0.11068
									Moist.

Moose Hill

Moose Hill									
Food					Cover				
Cover	Seral	Closure	Moisture	Food	Crown	Moisture	Cover	'Overall	
Type (V1)	Stage (V2)	(V3)	Regime (V1.1)	Index (SI)	Type (V7)	Seral	Closure (V6)	Regime (V1.3)	Index (SI)
0.5	0.3	0.1	0.8	0.330975	0	1	1	1	0 0.115841
									Fresh. Seral Stage
0.5	0.3	0.1	1	0.349964	0	1	1	1	0 0.122487
									Mature.
0.5	1	0.1	0.8	0.447214	0	1	1	1	0 0.156525
									Fresh. Seral Stage
0.5	1	0.1	1	0.472871	0	1	1	1	0 0.165505
									Moist. Seral Stage
									'OverMature'.

NOTE: The Whitefish Lake site is pure aspen originating with the 1980 burn. The Moose Hill site was ~pure aspen, and exhibited high levels of hazel browse and utilization in 1991-95 (Soprovich was the Regional Wildlife Biologist) and 1997-99 (during Soprovich's research on cavity-dependent species).

Black Spruce Off Wellman Lake Road

Late Winter Habitat Model - Softwood

Black Spruce Off Wellman Lake Road										
Food					Cover					
Cover Type (V1)	Serai Stage (V2)	Crown Closure (V3)	Moisture		Food Index (SI)	Cover Type (V7)	Serai Stage (V5)	Crown Closure (V6)	Moisture Regime (V13)	Cover Index (SI)
			(V11)	(V12)						
0.2	0.3	0.1	0.8	0.263215	1	1	1	1	1	1
High Crown Closure, Mature, Moisture Regime Fresh, ~Nil for Shrubs/Moose Food										
1 0.742125										
'Overall Index' (HSI)										

