Future Forest Ecosystems of BC Symposium
Working Group Report: Biotic Disturbance Agents

Preamble

During our discussions, the working group agreed that the impact of disturbances is most commonly described in an economic context (e.g. an increase in costs of forest management, or a decrease in revenues from timber harvesting). Within this context, disturbance is viewed as an event that frustrates some management objectives. What is missing from this view is a consideration of the forest management practices and objectives themselves that are not aimed at economic-based productivity targets, but that result in ecosystems that have a greater susceptibility to biotic disturbance agents. We agreed that a more holistic, ecosystem-based view of disturbance and ecosystem function is necessary for sustainable management of healthy forest ecosystems.

General Findings

There is excellent long-term, landscape level information of large-scale catastrophic disturbance events in our forests caused primarily by insects and fire. However, there is a definite lack of reliable or in-depth information on the occurrence, frequency, periodicity and impact of intermediate and fine-scale disturbances caused by agents such as root disease and decay fungi or endemic beetle populations. Forest Health Plans, containing area-specific bark beetle strategies among other things, exist at the Provincial and TSA levels and attempt to plan for and address these catastrophic events. These plans also acknowledge and account for issues in parks that fall within plan boundaries.

As the policy reforms of the revitalization plan and core services review came into existence, government downsizing resulted in the loss of dedicated forest health staff in the Ministry of Forests and Range. As well, these policy reforms resulted in (1) less legal planning and practice requirements for forest health under the FRPA and other acts, and (2) less policy governing monitoring and maintenance of forest health. Given these changes, the Biotic Agents Working Group is very concerned about the future forest condition, particularly in light of uncertainties around the impact of global warming on ecosystem function. The MOFR and other agencies must re-build their forest health expertise and research capacity to adequately address future issues that will surely arise due to insect, disease and climate factors. Any forest health program must be built on the principles of “best-science” and accommodate knowledge of the primary agents of change into the future forest management paradigm. Only then will ecosystem resiliency be built into the management process.

This natural disturbance-based approach differs substantially from the current ‘timber’ focused approach. While managing public forests using a ‘dynamic systems’ approach would affect some of the opportunity costs of forest management in BC in the immediate term, it would improve the overall integrity on the landscape in the long term and likely reduce the costs of disturbance and its impact on fibre flow.

We must maintain and enhance the forest health survey and monitoring network. This network must function across spatial and temporal scales, from the very fine filter, organism approach to the broad scale overview. Integral to the monitoring and survey program in forest health is the timely, scientifically sound interpretation and extension of findings. Communication of current and projected forest health issues and risks must be a priority. Information and communication must flow in numerous directions and at a multitude of levels from industry and government, to First Nations, communities and others.

Future planning and management depends on scientists, forest health experts and policy-makers working together to capture and synthesize risk assessments of biotic agents and apply them in the context of climatic change to all aspects of management, planning and policy.

Working Group 3 Summary:

1. **How can we manage at stand, forest and landscape levels to minimize the potential for catastrophic disturbance?**
    - **(a) Does a disturbance have to be catastrophic before we consider it in our management plans?**
    - **(b) Threshold for disturbance?**

<u>Ecosystem Resilience</u>

The overriding message from the Biotic Disturbances Working Group was that forest management must seek to maintain an appropriate level of ecosystem resilience and integrity. 'Resilience' can be defined many ways and interpreted on many different scales. However, despite the fact that the definition of resilience was debated at length, most agreed that a coarse filter approach to biodiversity conservation was one of the best preventative measures against catastrophic disturbance.

Are we, and could we manage for disturbances and thus build resiliency into our forest ecosystems? We are managing to a limited extent with disturbances in mind but we could incorporate natural disturbance regimes into our planning process much more rigorously than is being done currently. While large-scale disturbances, particularly fire, are being considered and accounted for in multiple levels of planning, intermediate and fine-scale disturbances are not (e.g. root disease and western balsam bark beetle).

To manage for resilience, forest managers should not prescribe or implement the same activity everywhere. Even BEC-based guidelines should have flexibility for planning outside the current limitations – thus building in resilience. At the provincial policy level a number of tools have been developed that could improve the level of ecosystem resiliency but have yet to see full implementation. While FRPA maintains some of the measures set out in the Biodiversity Guidebook of 1995 and the Landscape Unit Planning Guide of 1998, which intend to maintain appropriate levels of ecosystem representation across the regions and landscapes, currently they do so at low levels (i.e. A-Spatial Old Growth Order set a low biodiversity emphasis in all areas that hadn't had landscape unit plans completed as a default). While the group recognized that enhancing the current

coarse filter approach to biodiversity (i.e. seral stage targets and regional and landscape level retention) will not magically create more ecosystem resiliency, it is an appropriate strategy given both the current MPB infestation and the uncertainty created by the changing climate.

Recommendation: In areas that have had AAC uplifts due to MPB, landscape level biodiversity objectives should default to the high emphasis or low risk thresholds.

Current Approaches to Disturbance Management

Impacts of forest health factors at the site, stand and tree (e.g. growth loss, mortality) level have been well-defined, but policy makers have not produced or changed legislation or regulations to proactively deal with these impacts. Having measures in place that would recognize or anticipate various magnitudes of impact and realign our management practices accordingly would go a long way to reducing the impact of catastrophic events. This re-alignment requires that forests are viewed from an ecosystem function perspective as well as a timber productivity perspective. There are numerous pro-active measures contained within the province's Forest Health (Bark Beetle) Strategy but these are long-term and often difficult to implement under the current tenure system.

Intermediate and small-scale disturbances are often difficult to detect, monitor or assess in terms of impact, therefore even more difficult to address in management plans and prescriptions. Large-scale disturbances such as mountain pine beetle and fire are managed very directly, although frequently after-the-fact. Models should be implemented to anticipate and manage our forests to mitigate the extent and severity of these events.

Intervention when bark beetle infestations are small or "incipient" is the best management practice. Because of the remoteness or cost associated with this type of action it is often difficult for industry to respond at this stage so it remains within the realm of the government. Additional work should be conducted on fine-tuning hazard and risk rating systems so that these "early warning" systems could be implemented in advance of outbreak situations. We must try to implement hazard rating, by pest, and the best way to accomplish this under the current regime would be through FSP linkages to the Forest Health Plans at the TSA and provincial level. However, fungi such as *Dothistroma septosporum* would not have been listed or considered a "pest" a few years ago, therefore, hazard rating systems, while they have some value, will not adequately address new problems that arise either from exotic introductions, unanticipated effects of climate change or forest management practices on susceptibility. Prescriptions can be improved with increased integration of science and incorporation of existing knowledge into practise on the ground.

We must try to reduce the impacts of biotic agents by incorporating an ecosystem management approach. Yet the B.C. paradigm is focused on the economic aspects of

forest management, with biodiversity, wildlife habitat and other forest attributes and values treated as separate entities that must be considered when planning forest harvest operations. Insects, disease and other biotic agents are a function of the system and therefore must be recognized and incorporated into our management planning and practice. To manage the forest as a functioning system (e.g. *Armillaria* and birch) we have to manage at many scales, from the microscopic and short-term to the landscape level and long-term (hundreds of years). B.C. manages primarily at the block level and despite the discussion of landscape level planning, there is little implementation of this at the working forest level. This is a very difficult concept and even more difficult to implement over such a large, diverse and complex landscape under demand for different land-uses (e.g. parks and protected areas) and subject to many issues such as wildlife conservation and the uncertainty of climatic changes. Catastrophic events, and more chronic disturbances, are part of the ecosystem and they will continue to happen at large and small scales and at irregular (or regular in the case of cyclic defoliators) intervals. In our management, we must incorporate these uncertainties and better educate the public, reduce our dependence on static conditions and accept a wide range of management practices across the landscape.

Recommendation: Regionally coordinated landscape level planning needs to occur on an on-going basis. The nature of these plans should not be subject to arbitrary policy caps rather should be driven by the best available science for the area. Plans need to be evaluated continuously against two main conditions. First, plans need to be evaluated against the changing landscape conditions and the presence of forest health agents (i.e. MPB). Second, evaluations against new information becoming available on ecosystem function and process need to occur in the context of what we determine to be the appropriate future state of forest structure (i.e. age class distribution in relation to better knowledge of disturbance pattern and rates, species composition based on increasing understanding of forest function). These plans and the individuals or group who administer them need to have the authority to override timber supply or other use needs to ensure science is leading decision making. In addition, the plans should always be legally binding for licensees operating under them.

Recommendation: Make Forest Health Plan elements legally binding either through government set objectives or through FSP requirements. This with the understanding that Forest Health Plans are ecosystem based and apply both course filter ecosystem resilience measures (i.e. biodiversity representation) and fine filter ecosystem process elements (i.e. silviculture system and species selection).

Recommendation: Constant monitoring of landscape, watershed and stand level disturbance agents should be a required component of Ministry responsibility. This should include reduced thresholds of response for reporting and action. Long term planning should then reflect new conditions, and any new information as a result of on-going study and monitoring.

Recommendation: Maintain and continuously update provincial, TSA and parks forest health strategies. Systems of extension and communication need to be supported between

multiple agencies (i.e. Federal, Educational and Provincial and Industry research bodies) through adequate and long term funding mechanisms. We need to capture and hold our good scientific institutional memory and integrate that into a long term political memory.

2. How robust is the current management paradigm in enabling the achievement of desired outcomes? What's working?

It is difficult to implement and achieve the governments' desired outcomes when management proceeds with a dominantly timber oriented focus. Not to say that currently applied tools (i.e. SRMP's and designations like OGMA's, WHA's) have tremendous utility, however they are ultimately constrained by timber supply requirements and other policy mechanisms. There is a lot of talk about landscape level ecosystem management but even though there are numerous landscape level plans in existence (e.g. CCLUP), prescribing foresters can move "around" objectives and the plans themselves are restricted in their scope. As recommended above, regionally coordinated landscape level plans that reflect both the changing conditions as a result of forest health (i.e. pest and disease) on short time scales, and changes in the future forest condition based on our increasing level of understanding need to be incorporated in to plans annually. Furthermore, these plans need to supersede any timber supply requirements if we are to sustain the processes that ensure the constant production of natural capital in our forests.

<u>FRPA</u>

FRPA may need to address more directly the concerns of forest health. For example section 13 of the OPR used to require a forest health assessment, which is no longer required under FRPA. In addition, the provincial forest health strategy is not reflected, nor required as an input into FSP's, despite many opinions to the contrary. Although some guidebooks can provide guidance on ecosystem management, much of which deals with forest health or biotic disturbance agents not the process in which they occur. If we were to focus on processes, some things are highly predictable. However, management is occurring site by site, block by block with no vision to landscape level patterns and nor systematic process over the whole landbase. The current management approach is similar to the old multiple use adage. Policy is being interpreted as legislation and as such is impacting areas where some flexibility based on science is necessary.

Recommendation: A combination of legally binding government set objectives specifically for forest health in FRPA and the appropriate use of incentives through the appraisal system could encourage planning to include and accommodate forest health to a more adequate degree. Regionally specific objectives and results that would deal with the factors affecting the presence of forest health factors could be used in certain cases (i.e. specific silvicultural system requirements, increasing deciduous component thresholds, changing free growing requirements and preferred species mixes to reflect known species interactions).

Recommendation: Begin to explore policy and economic incentives that while maintaining traditional flows of regional revenue, will accommodate higher costs of management to allow for this dynamic approach.

Recommendation: Extension / Institutional expertise needs to be maintained, but ideally increased. Extension needs to be tangible and supported to meet our desired future forest outcomes.

3. How is the current management paradigm preventing us from achieving desired outcomes?

    - As many of the presenters pointed out, free growing requirements favour the selection of fast growing species and the elimination of deciduous species. This practice has been found to upset the host-pathogen balance in many ecosystems.
    - In part, the suppression of fire has created age class distributions in natural disturbance types that are beyond the normal variation and has exacerbated recent pest occurrence.
    - The continued homogenization of forest landscapes through the application of identical silviculture systems will likely not create the resilience and integrity required if forests are to be sustained in the face on ongoing global climate change.

Managing for biodiversity through specific application of silviculture systems, will increase the ability of the landbase to respond to change. Within this landbase we must encompass parks and not treat them as "walled cities". However, in parks we must maintain the highest possible level of ecosystem integrity with the lowest level of risk to that integrity through the careful application of science and informed management, (i.e. few access roads, buffer management).

FRPA in the current form recognizes and incorporates biogeoclimatic differences and issues around biodiversity through wildlife tree patches and reserves. This works at the small scale but will fail or be strained under the pressure of biotic events such as we are now seeing with MPB. One step is to plan for diversity. The 1995 biodiversity guidebook and subsequent landscape planning guides are useful tools in this pursuit, however may not have achieved a low enough level of risk given the increasing level of uncertainty of resource management decisions in the face of climate change.

The Province must legislate or direct licensees to consider the larger issues around forest health. There must be a much closer and visible link between the provincial Forest Health Plan and objectives and those at the TSA and captured within a FSP. At the same time, as mentioned previously, that plan needs to be constantly updated and communicated in an operation context.

Recommendation: Incorporate projections and modelling (using the newest and most reliable science) to anticipate future FH issues, impacts and management implications into timber supply and landscape level planning, the ladder of which should be made the duty of the regional offices and forest health staff within them.

Recommendation: Implement and make legally required the known insect and disease hazard and risk rating systems and use them to plan the harvest and regeneration of ecosystems dominated by mid- and large-scale catastrophic events (e.g. spruce dominated ecosystems, plan for spruce beetle infestation cycles and incorporate degree day models to plan for climate change).

4. What changes to the current paradigm would be advantageous, or what alternative would be preferred?

   Match disturbance regimes, scale, frequency, and impact to the ecosystem to where it occurs and then tailor the ecosystem management to attain the desired outcomes.

   Manage by a systems approach as well as take a prompt response approach to reduce catastrophic scale.

5. Identify key information needs?

B.C has one of the best overview survey systems in North America. This survey captures all catastrophic, landscape level occurrences on an annual basis and allows for evaluation of change monitoring. Where we are falling behind is in the intermediate or small scale disturbance monitoring and the predictive forecasting of insect and disease occurrence. Often the most efficient and effective management for a biotic agent is to apply treatment at the incipient stage. Our current annual monitoring system will only partially detect incipient populations (or seldom, depending on the insect or disease organism).

The next challenge to the government and FH community is to effectively communicate and interpret the information we collect. Prompt and targeted dissemination and communication of information is imperative to a successful FH program. A key to success in this critical area is continuity and longevity of well trained staff and a complementary, competent scientific and contracting community. Continuous improvement and an intimate mix of scientific and operational staff are imperative for a flow of information into on-the-ground operations. All levels of staff training are necessary to maintain corporate strength, expertise, interest and innovation. Training can be from the informal field trip to multi-day instructional courses and updating guidebooks. Access at all levels to science-based information will vastly improve the field component of management.

FRPA stresses the results-based concept of forest management so the challenge is to communicate the different views and definitions of “results” throughout licensees, BCTS, First Nations, the science community and public. How do we maximize the incorporation of “best science” into our results and management goals without adding

significant ecological or economic costs? This with the understanding that failure to do so is already creating significant costs in the form of disturbance (i.e. fire, MPB). Within government we could ensure the budget process is seamless and organized so as not to be an impediment in the implementation of biological/seasonally dependent activities. Budgets must adequately reflect priority activities such as long- and short term monitoring and research into change. Research on various aspects of insects and disease as biotic agents of change must be conducted, and supported, by Universities, Federal Research organizations (e.g. CFS), and by the Ministry of Forests and Range. There are no entomologists, pathologists or forest health specialists within the Research Branch (except the newly staffed position of Cone and Seed Insect specialist). Considering the enormous annual impact that biotic agents have on our forest resource it is unacceptable that there is no research staff in this subject area within the MOFR.

Recommendation: Increase the capacity of intermediate and small scale forest health monitoring through either reinstatement of the Federal Insect and Disease Survey program or increasing the capacity of provincial forest health staff to conduct ongoing monitoring activities.

Recommendation: There is an imperative need to capture forest health risks and changes in the context of climate change. We can start this immediately by using data models currently available and incorporating them into different levels of planning.

Recommendation: We must continue to monitor insects and disease at the current level while developing and implementing a more comprehensive and spatially and temporally efficient model of monitoring.

Recommendation: Long- and short-term monitoring can be achieved in part through the use of designated areas and permanent sample plots. Parks may be good candidates for the location of these plots. Parks need to account for all biotic and ecosystem circumstances as do permanent reserves across the entire landbase. A comprehensive evaluation of the contribution that parks and reserves make to biotic and ecosystem representation should be part of an on-gong monitoring process. The output of these analyses should factor into planning in the manner referred to above.